SITE MANAGEMENT PLAN

for

28-90 REVIEW AVENUE DEVELOPMENT
QUEENS COUNTY
LONG ISLAND CITY, NEW YORK
NYSDEC Site Number: C241236

Prepared for:

28-90 Review Ave Property Owner LLC
c/o Innovo Property Group
1350 Avenue of the Americas, 17th Floor
New York, New York 10019

Prepared by:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
300 Kimball Drive, Floor 4
Parsippany, New Jersey 07054
973-560-4900

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2025

LANGAN

CERTIFICATION STATEMENT

I, Satyajit Vaidya, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and Green Remediation (DER-31).



_____ SATYAJIT VAIDYA, P.E.

___12/11/2025_____ DATE

TABLE OF CONTENTS

28-90 REVIEW AVENUE DEVELOPMENT
QUEENS COUNTY
LONG ISLAND CITY, NEW YORK

SITE MANAGEMENT PLAN

Section	Description	Page
ES	EXECUTIVE SUMMARY	1
1.0	Introduction	4
1.1	General	4
1.2	Revisions and Alterations	5
1.3	Notifications	5
2.0	SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS	8
2.1	Site Location and Description	8
2.2	Physical Setting	8
2.2.1	Land Use	8
2.2.2	Geology	9
2.2.3	Hydrogeology	9
2.3	Investigation and Remedial History	10
2.4	Remedial Action Objectives	15
	Groundwater	15
	Soil	16
	Soil Vapor	16
2.5	Remaining Contamination	16
2.5.1	Soil	16
2.5.2	Groundwater	18
2.5.3	Soil Vapor	18
3.0	INSTITUTIONAL AND ENGINEERING CONTROL PLAN	20
3.1	General	20
3.2	Institutional Controls	20
3.3	Engineering Controls	22

3.3.1 In-Situ Stabilization Monolith....22
3.3.2 Composite Cover System....22
3.3.3 Sub-Slab Depressurization System (SSDS)....23
3.3.4 Monitoring Wells Associated with Monitored Natural Attenuation....24
3.4 Criteria for Completion of Remediation/Termination of Remedial Systems....24
3.4.1 In-Situ Stabilization Monolith....25
3.4.2 Composite Cover System....25
3.4.3 Sub-Slab Depressurization System (SSDS)....25
3.4.4 Monitoring Wells Associated with Monitored Natural Attenuation....25
4.0 MONITORING AND SAMPLING PLAN....27
4.1 General....27
4.2 Site-Wide Inspection....28
4.3 Post-Remediation Monitoring and Sampling....29
4.3.1 Groundwater Sampling....29
4.3.2 SSDS Monitoring and Inspections....32
4.3.3 Monitoring and Sampling Protocol....33
5.0 OPERATION AND MAINTENANCE PLAN....34
5.1 General....34
5.2 Remedial System (or other Engineering Control) Performance Criteria....34
5.3 Operation and Maintenance of the SSDS....34
5.3.1 System Start-Up and Testing....34
5.3.2 Routine System Operation and Maintenance....35
5.3.3 Non-Routine Operation and Maintenance....36
5.3.4 System Performance Monitoring....36
5.3.5 System Monitoring Devices and Alarms....36
5.3.6 Fire Safety....37
6.0 PERIODIC ASSESSMENTS/EVALUATIONS....38
6.1 Climate Change Vulnerability Assessment....38
6.2 Green Remediation Evaluation....39
6.2.1 Environmental Footprint Analysis....39
6.2.2 Green Remediation Principles and Best Management Practices....40
6.2.3 Timing of Green Remediation Evaluations....42
6.3 Remedial Systems....42

6.4 Frequency of System Checks, Sampling and Other Periodic Activities 42
6.5 Metrics and Reporting 43
6.6 Remedial System Optimization 43
7.0 REPORTING REQUIREMENTS 45
7.1 Site Management Reports 45
7.2 Periodic Review Report 47
7.3 Certification of Institutional and Engineering Controls 50
7.4 Corrective Measures Work Plan 51
7.5 Remedial System Optimization Report 52
8.0 REFERENCES 53

List of Tables

Table ES-1 Summary of Controls, Inspections, Monitoring, Maintenance, and Reporting
Table 1-1 Site Notification Contacts
Table 2-1 Range of Soil Contamination Remaining On-Site
Table 4-1 Groundwater Performance Monitoring Sampling Plan
Table 4-2 SSDS Performance Monitoring Plan
Table 7-1 Reporting Frequency

List of Appendices

Appendix A Tables
- Table 1 2020 RI Monitoring Well Gauging Summary
- Table 2 Soil Cleanup Objectives
- Table 3 Lead Delineation Endpoint Sample Analytical Results
- Table 4 UST Endpoint Sample Analytical Results
- Table 5 Site-Wide Documentation Sample Analytical Results
- Table 6 Groundwater Analytical Results
- Table 7 Soil Vapor Analytical Results
- Table 8 Proposed Monitoring Well Construction Details Summary

Appendix B Figures
- Figure 1 Site Location Map
- Figure 2 Site Plan
- Figure 3 Remedial Investigation Subsurface Profiles – A-A' through H-H'
- Figure 4 Potentiometric Surface Map
- Figure 5 Endpoint Sample Location Plan
- Figure 5A Lead Delineation Sample Analytical Results
- Figure 5B UST Endpoint Sample Analytical Results
- Figure 5C Site-Wide Documentation Sample Analytical Results
- Figure 6 2020 RI Groundwater Analytical Results
- Figure 7 2020 RI Soil Vapor Analytical Results
- Figure 8 Composite Cover System Layout
- Figure 9 Sub-Slab Depressurization System Layout
- Figure 10 Proposed Groundwater Monitoring Plan

Appendix C Environmental Easement
Appendix D List of Site Contacts
Appendix E Soil Boring and Monitoring Well Construction Logs
Appendix F Composite Cover System Survey
Appendix G Excavation Work Plan
Appendix H Health and Safety Plan
Appendix I Generic NYSDOH Community Air Monitoring Plan
Appendix J Sub-Slab Depressurization System As-Built Drawings
Appendix K Quality Assurance Project Plan
Appendix L Site Management Forms
Appendix M Green and Sustainable Remediation Footprint Analysis and Climate Vulnerability Checklist
Appendix N Remedial System Optimization Report

List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization

SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Table ES-1 Summary of Controls, Inspections, Monitoring, Maintenance, and Reporting

Site Identification: 28-90 Review Avenue Development (Site No. C241236)

Institutional Controls:	1. The property may be used for Commercial use as defined in 6 New York Codes, Rules and Regulations (NYCRR) Part 375-1.8(g)(2)(iii), and Industrial use as defined in 6 NYCRR Part 375-1.8(g)(2)(iv), although land use is subject to local zoning laws;
	2. All ECs must be operated and maintained as specified in this SMP;
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP;
	4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene (NYCDOHMH) to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
	5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
	6. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;

Site Identification: 28-90 Review Avenue Development (Site No. C241236)

	7. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
	8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
Institutional Controls:	9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
	10. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
	11. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 2 (Appendix B), and any potential impacts that are identified must be monitored or mitigated; and
	12. Vegetable gardens and farming on the Site are prohibited.
Engineering Controls:	1. In-Situ Stabilization Monolith
	2. Composite Cover System
	3. Sub-Slab Depressurization System
	4. Groundwater Monitoring Wells Associated with Monitored Natural Attenuation

Site Identification: 28-90 Review Avenue Development (Site No. C241236)

Inspections:	Frequency
1. Composite cover system inspection	Annually
2. SSDS inspection	Quarterly first year, semi-annually thereafter
Monitoring:	
1. Groundwater Monitoring	Semi-annually
2. SSDS Monitoring	Quarterly first year, semi-annually thereafter
Maintenance:	
1. SSDS	As needed
2. Monitoring Wells	As needed
3. Composite Cover System	As needed
Reporting:	
1. Groundwater Analytical Data	Annually
2. Site-Wide Inspections	Annually
3. SSDS Inspections	Annually
4. Periodic Review Report	16 months after COC, annually thereafter

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 28-90 Review Avenue Development Site located in Long Island City, New York (Site). The Site location is shown on Figure 1 (Appendix B). The Site is currently enrolled in the New York State (NYS) Brownfield Cleanup Program (BCP) Site No. C241236, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

28-90 Review Avenue Owner, LLC entered into a Brownfield Cleanup Agreement (BCA) on 2 October 2019 with the NYSDEC to remediate the Site. On 26 April 2022, the BCA was amended to add 28-90 Review Ave Property Owner LLC as an applicant. A figure showing the Site location and boundaries is provided in Figure 2 (Appendix B). The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement provided in Appendix C.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Queens County Clerk, requires compliance with this SMP and all ECs and ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This SMP has been approved by the NYSDEC, and compliance with this SMP is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA (Index No. C241236-09-19; Site No. C241236) for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix D of this SMP.

This SMP was prepared by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan), on behalf of 28-90 Review Ave Property Owner LLC (the Volunteer), in accordance with the requirements of the NYSDEC's DER-10 (Technical Guidance for Site Investigation and Remediation), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 Revisions and Alterations

Revisions and alterations to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. All approved alterations must conform with Article 145, Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Easement for the Site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.

2. 7-day advance notice of any field activity associated with the remedial program.

3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

5. Notice within 48 hours of any non-routine maintenance activities.

6. Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

8. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.

9. Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

The table below includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix D.

Table 1-1 Site Notification Contacts

Name	**Contact Information**	**Required Notification****
Brittany Taranto NYSDEC Project Manager	Phone: 518-402-9791 Email: brittany.taranto@dec.ny.gov	All Notifications
Douglas MacNeal NYSDEC Project Manager's Supervisor	Phone: 518-402-9684 Email: douglas.macneal@dec.ny.gov	All Notifications
Kelly Lewandowski NYSDEC Site Control	Phone: 518-402-0193 Email: kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
Daniel Tucholski NYSDOH Project Manager	Phone: 518-402-7860 Email: beei@health.ny.gov	Notifications 4, 6, and 7

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in Long Island City, Queens County, New York and is identified as Block 294 and Lot 106 on the Queens County Tax Map (see Figure 1 [Appendix B]). The Site is an approximately 192,792-square foot area and is bound to the north by an asphalt-paved parking lot, to the east by 29th Street followed by an asphalt-paved parking lot associated with a four-story storage facility, to the south by at-grade railroad tracks associated with the Metropolitan Transportation Authority Long Island Rail Road (MTA LIRR) lines, and to the west by the Dutch Kills Creek. The boundaries of the Site are more fully described in Appendix C – Environmental Easement. The owner of the Site parcel at the time of issuance of this SMP is:

28-90 Review Ave Property Owner LLC
c/o Innovo Property Group
1350 Avenue of the Americas, 17th Floor
New York, New York 10019

2.2 Physical Setting

2.2.1 Land Use

The Site consists of a five-story commercial and industrial warehouse building. The ground level will consist of approximately 152,110 square feet (SF) of at-grade open air parking and ground vehicle circulation space, 15,085 SF of truck ramps, 1,450 SF of building lobby spaces, 2,755 SF by egress spaces (i.e., stairs and elevators) and approximately 9,820 SF of mechanical spaces. Enclosed space and associated drive ramps and structured parking areas will be located on levels two through five and the rooftop of the building will be used for fleet parking and a large solar array. The Site is zoned within a Manufacturing District (M3-1) and is currently undergoing redevelopment. The proposed use is consistent with the existing zoning for the property.

The Site is bound to the north by an asphalt-paved parking lot followed by a series of one- and two-story industrial and manufacturing properties, to the east by 29th Street followed by an asphalt-paved parking lot associated with a four-story storage facility, to the south by at-grade railroad tracks associated with the Metropolitan Transportation Authority Long Island Rail Road (MTA LIRR) lines followed by the Sims Metal Recycling Center, and to the west by the Dutch Kills Creek. The Long Island Expressway/Queens Midtown

Expressway and the Newtown Creek are in proximity to the north and to the south of the Site, respectively.

2.2.2 Geology

Historic fill was encountered during the investigations in all borings to depths ranging from 8 to 25 feet bgs. The fill generally consists of light brown to dark brown, fine- to coarse-grained sand with varying amounts of gravel, silt, brick clay, glass, miscellaneous debris and concrete.

Historic fill is underlain by a clay layer that was encountered in all soil borings, with the exception of LSB-45 in the eastern portion of the Site where native gray fine- to medium-grained sand was observed between 20 and 30 feet bgs and LSB-4, LSB-5, LSB-21, LSB-42, LSB-59 through LSB-61, LSB-67, and LSB-71 in which fill was encountered to the termination depths of the borings. The bottom of the clay layer was not encountered in any soil borings advanced as part of the RI or SRI. However, according to the Geotechnical Investigations completed by Langan in 2017 and 2018, subsurface conditions consist of miscellaneous fill underlain by a 1.5- to 20-foot thick stratum of inferred former marsh deposit materials consisting of clay, silt, sand, and peat below the fill. An about 2- to 38-foot-thick stratum generally consisting of medium dense sand and silt, and medium to very stiff clay was encountered directly underlying the former marsh deposits in all geotechnical borings; the clay within this layer was typically observed to be between 1.5 and 10 feet thick. This layer was followed by an 8- to 30-foot thick layer of dense to very dense sand underlain by decomposed mica schist. The top of competent mica schist bedrock was encountered between 58- and 74-feet below grade; bedrock was not encountered during the environmental investigations

Geologic cross sections are shown in Figures 3A through 3H (Appendix B). Site specific boring logs are provided in Appendix E.

2.2.3 Hydrogeology

Monitoring wells installed during the 2018 RI and the 2020 SRI revealed groundwater depths corresponding to el +2.98 (LMW-12) to el -0.87 (LMW-25) NAVD88. Groundwater flow direction is towards the west.

Langan reviewed United States Fish and Wildlife National Wetland Inventory (NWI) and New York State Freshwater Wetlands maps. Based on these documents, no mapped wetlands are listed on the subject property, although the Dutch Kills Creek is located

adjacent to the west and Newtown Creek is approximately 375-feet south of the subject property.

A summary of the monitoring well gauging observations during the 2020 RI is provided in Table 1 (Appendix A). A groundwater contour map is shown in Figure 4 (Appendix B). Groundwater monitoring well construction logs are provided in Appendix E.

2.3 Investigation and Remedial History

The following environmental assessment and investigation reports have been prepared for the Site. Previous environmental correspondence, environmental site assessment reports, and environmental investigation reports were reviewed as part of the investigation scope development for the 2018 RI. These documents are listed below and are summarized in detail in Section 3.3 of the April 2019 RIR and were provided as Appendix A of the April 2019 RIR which was included as an attachment to the June 2019 BCP Application.

- Subsurface Investigation, prepared by Tyree Brothers Environmental Services, Inc. (Tyree), dated May 1990
- Monitoring Well Installation and Tank Tightness Testing Summary Letter, prepared by Tyree, dated 1 October 1990
- Various correspondence between Tyree and NYSDEC, dated May 1990 through November 1991
- Remote Sensing Survey Ground Penetrating Radar Investigation, prepared by Impact Environmental (Impact), dated 28 July 1999
- Tank Closure Affidavit, prepared by The Franklin Company, dated 11 May 1999
- Tank Closure Affidavit, prepared by Alvin Petroleum Systems, Inc., dated 5 August 1999
- Phase I ESA, prepared by Tyree, dated September 2001
- Subsurface Investigation, prepared by Impact, dated 2 October 2008
- Investigation Summary Report, prepared by Impact, dated 24 June 2009
- Quarterly Monitoring Report, prepared by Impact, dated 12 March 2010
- Quarterly Monitoring Report, prepared by Impact, dated 11 June 2010
- Quarterly Monitoring Report, prepared by Impact, dated 10 September 2010

- Groundwater Monitoring Well Decommissioning Letter, prepared by Impact, dated 9 August 2011
- Summary of Remediation Completed, prepared by Impact, dated 16 January 2012
- Remedial Investigation Report, Langan, dated 24 April 2019
- Supplemental Remedial Investigation Work Plan, Langan, dated 21 April 2020
- Vacuum Enhanced Extraction Pilot Test Work Plan, Langan, dated 12 October 2020
- ISS Pre-Implementation Investigation Work Plan, Langan, dated 6 May 2022
- ISS Pre-Implementation Investigation Report, Langan, dated 21 June 2022
- Supplemental Remedial Investigation Report, Langan, dated 24 June 2022
- Remedial Action Work Plan, Langan, dated 29 June 2022

Spill No. 9010146 – Tyree Brothers Environmental Services, Inc. (1990-1991)

Investigation was completed in the eastern portion of the Site to evaluate subsurface impacts associated with three active 4,000-gallon diesel (formerly gasoline) USTs, and on the southern portion of the Site to evaluate the area of the former 275,000-gallon Texaco Terminal ASTs. Monitoring well locations noted below are shown on Figure 2 (Appendix B).

Soil analytical results detected benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX) and recoverable petroleum hydrocarbons. The observation of light non-aqueous phase liquid (LNAPL) in one of the monitoring wells was reported to NYSDEC and Spill No.9010146 was assigned in December 1990. Monitoring well gauging records revealed that up to 0.875-inches and up to 12 inches of LNAPL were detected in W-3 and W-1, respectively. Approximately 8 gallons of free-phase product was removed from the wells via bailing, and NYSDEC administratively closed Spill No. 9010146 in November 1991 based on ongoing non-aqueous phase liquid (NAPL) recovery, review of monitoring well gauging results that showed a declining trend in LNAPL thickness, and results of quarterly groundwater monitoring (which were not provided to Langan for review). The final round of groundwater sampling prior to spill closure documented the presence of benzene concentrations between 3.3 and 135 micrograms per liter (µg/L) in monitoring wells W-2 through W-4. An affidavit prepared by The Franklin Company dated 11 May 1999 documented the closure-in-place of three 4,000-gallon diesel USTs by filling to capacity with an unspecified inert material.

Spill No. 0807459 – Impact Environmental (1999-2012)

Impact Environmental completed a geophysical investigation in 1999 to locate potential undocumented USTs. The investigation located subsurface metallic anomalies consistent with potential USTs in the northeast portion of the Site. An affidavit prepared by Alvin Petroleum Systems, Inc. dated 5 August 1999 documented the closure-in-place of two 550-gallon USTs via filling to capacity with concrete. It is unclear if these USTs are related to those identified by the geophysical survey completed by Impact.

Additional subsurface investigation, quarterly groundwater monitoring and LNAPL recovery was completed at the Site by Impact between 2008 and 2012. The 2008 Subsurface Investigation included installation of six soil borings and six one-inch diameter groundwater monitoring wells. Observations of LNAPL, ranging in thickness from 0.9 feet to 1.4 feet, in all groundwater monitoring wells installed and the detection of gasoline related volatile organic compounds (VOCs) in groundwater samples was reported to NYSDEC, and Spill No. 0807459 was assigned in October 2008. Soil sample analytical results were compared to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 Recommended Soil Cleanup Objectives (RSCOs). VOCs were not detected in any of the soil samples collected at concentrations exceeding the TAGM 4046 RSCOs, and low levels of semi-volatile organic compounds (SVOCs) were detected in all soil samples at concentrations above the TAGM 4046 RSCOs.

Installation of six additional soil borings and six four-inch diameter monitoring wells was completed at the Site in 2009 in accordance with the NYSDEC-approved Remedial Investigation Work Plan (RIWP) dated 14 November 2008 to determine the extent of petroleum impacts and groundwater flow direction. Elevated PID field screening results were identified in all soil borings completed, and strong petroleum odors and dark staining were also observed. Soil samples collected from between 5 and 12 feet below grade revealed limited detections of VOCs and SVOCs above TAGM 4046 RSCOs. In August 2009, all twelve monitoring wells were gauged, and LNAPL was not detected in any of the wells, with the exception of one monitoring well which contained 0.01 foot of NAPL. Groundwater sampling results showed gasoline-related VOCs at concentrations exceeding the NYSDEC Ambient Water Quality Standards and Guidance Values (SGVs). Petroleum fingerprint analysis revealed that groundwater impacts were consistent with a combination of heavy fuel oil and gasoline. Based on the findings of the supplemental investigation, including the lack of observed NAPL, notable VOC and

SVOC impacts were not identified, and subsurface conditions at the Site reflect the presence of aged and degraded petroleum, Monitored Natural Attenuation (MNA) was proposed.

Quarterly groundwater monitoring was performed between 2010 and 2011, including LNAPL removal via a sump skimmer and/or bailer in one monitoring well. Based on the quarterly monitoring reports submitted, NYSDEC administratively closed Spill No. 0807459 on 27 September 2010 and the onsite wells were decommissioned.

2019 Remedial Investigation Report (Langan)

Langan completed a remedial investigation (RI) in November 2018 in accordance with the Remedial Investigation Work Plan (RIWP) dated September 2018 which was submitted to the New York City Office of Environmental Remediation (NYCOER) for acceptance into the NYC Voluntary Cleanup Program (VCP). Based on field observations and analytical results of soil, groundwater, and soil vapor samples collected, Spill No. 1809113 was reported to NYSDEC on 29 November 2018. The scope of work and a detailed discussion of subsurface impacts identified in soil, groundwater, and soil vapor are presented in the April 2019 RIR, which was submitted with the BCP application in May 2019 and are included in the discussion of the RI activities and results, below.

2022 Remedial Investigation Report (Langan)

The June 2022 Remedial Investigation Report documented the Remedial Investigation completed in accordance with the RIWP. The results of the RI are included below:

1. Historic Fill Quality: Up to 25 feet of fill material was identified below the existing surface cover. Contaminants related to historic fill material include SVOCs, metals, polychlorinated biphenyls (PCBs), and pesticides, which were detected at concentrations above Unrestricted Use SCOs, Commercial RUSCOs, Industrial RUSCOs, and/or Protection of Groundwater SCOs within this layer. VOCs exceeding the Unrestricted Use SCOs and/or Protection of Groundwater SCOs are attributed to historical Site operations. Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were also detected in fill above the NYSDEC Unrestricted Use SCOs.

2. NAPL Impacts: LNAPL and DNAPL impacts associated with former aboveground storage tanks were observed in 22 soil borings and 6 monitoring wells. The NAPL impacts extend laterally across an approximately 38,000 square foot area and vertically between approximately 6 feet below existing ground surface and 15 to 20 feet below existing ground surface. NAPL impacts have not been observed to extend below the clay confining layer existing on-Site. The lateral extents of the delineated NAPL impacts are inclusive of three of the westernmost existing subsurface foundations associated with former ASTs. Monitoring wells within the area of observed LNAPL and DNAPL impacts were constructed to facilitate the collection of NAPL and were monitored on a monthly basis between September 2020 and May 2021. Absorbent socks were placed in monitoring wells LMW-21, LMW-24, LMW-25, LMW-29, LMW-26, LMW-30, and VEE-01 on 7 August 2020 and approximately 2.04-gallons of product were recovered via absorbent socks during this timeframe.
3. Groundwater Quality: Groundwater analytical results exceeding the SGVs for SVOCs and metals were detected throughout the Site, and petroleum-related VOC exceedances of the SGVs were detected in the eastern portion of the Site. Groundwater analytical results exceeding the SGVs for metals are attributed to fill material of unknown origin, naturally occurring background concentrations and elevated turbidity during sample collection. Groundwater analytical results exceeding the SGVs for SVOCs are attributed to fill material of unknown origin or historical Site operations. Groundwater analytical results exceeding the SGVs for petroleum-related VOCs are attributed to residual impacts from historical Site operations. Spill No. 9010146 was reported due to the presence of gasoline impacts in groundwater and administratively closed by NYSDEC following remediation on 8 November 1991 with remaining benzene concentrations up to 135 µg/L. PFOS, PFOA, and perfluorohexanesulfonic acid (PFHxS) were also detected in groundwater above the SGVs. Analytical results for groundwater samples collected from within the NAPL-impacted area of the Site reveal that the presence of NAPL has not resulted in greater impacts than those identified throughout the remainder of the Site where only historic fill or historical gasoline impacts were encountered.

4. Soil Vapor Quality: Results of the soil vapor evaluation completed as part of the RI identified concentrations of vinyl chloride, carbon tetrachloride, and PCE that would require monitoring and/or mitigation per the NYSDOH guidance values. These compounds were not detected at concentrations exceeding NYSDEC threshold values in soil or groundwater samples collected from the corresponding soil borings and monitoring wells. As such, CVOCs in soil vapor are likely attributable to an unknown offsite source. Petroleum-related VOCs were also detected which are attributed to the presence of gasoline-related impacts in soil and groundwater.

Remedial Action Work Plan (Langan)

A Remedial Action Work Plan dated 29 June 2022 was prepared by Langan for the Volunteer to propose a scope of work for the Site remedy. Components of the remedy included: excavation of metals hot spots, remediation of Spill No. 1809113, in-situ stabilization of NAPL impacted soils, SSDS installation, and construction of a composite Site cover.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated June 2022 are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a Site.

2.5 Remaining Contamination

2.5.1 Soil

Remedial excavations were completed to address soil exhibiting petroleum impacts associated with Spill No. 1809113 as well as two areas exhibiting elevated concentrations of metals. Excavation was also completed for the construction of foundation elements (pile caps, grade beams, elevator pits) throughout the Site footprint, including an elevator pit where analytical results revealed hazardous levels of lead. Material generated from between 0 and 4 feet below ground surface within the ISS treatment area was re-used throughout the Site above the water table in accordance with the Soil Reuse Request dated 12 April 2023 which was approved by NYSDEC on 27 April 2023. In addition to the remedial excavation activities identified above, four USTs were also encountered during Site redevelopment excavation activities in the northeastern and southwestern portions of the Site; no evidence of a release was identified surrounding the tanks and a total of twelve documentation end point samples were collected in the footprint of the former tanks following removal activities.

Prior to excavation activities, twelve delineation soil samples, including one duplicate sample, were collected from the two metals hotspots in the northern and southern portions of the Site. The delineation soil samples also serve as end-point soil samples in accordance with the RAWP. Thirty-seven documentation samples, including two duplicate samples, were taken throughout the Site extents upon reaching the final development or remedial excavation depths. Laboratory analytical results identified that the remaining contamination consists of PAHs and metals at concentrations exceeding the Track 4 Commercial Use SCOs. The Track 4 Commercial Use SCOs are presented in Table 2 (Appendix A).

Tables 3 through 5 (Appendix A) and Figures 5A through 5C (Appendix B) summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs and the Commercial Use SCOs at the Site after completion of remedial action.

Table 2-1 Range of Soil Contamination Remaining On-Site

Analyte	Minimum Detected Concentration above SCOs (mg/kg)		Maximum Detected Concentration above SCOs (mg/kg)	
VOCs				
1,2,4-Trimethylbenzene	**5.6**	UST03_9.5-10	**13**	UST02_9.5-10
Acetone	**0.052**	EPB12_0.5-1	**0.27**	EPB08_5-5.5
Benzene	**0.7**	UST02_9.5-10	**0.7**	UST02_9.5-10
Ethylbenzene	**1.2**	UST-1_B_5.5-6	**3.6**	UST02_9.5-10
Naphthalene	**58**	UST-1_B_5.5-6	**58**	UST-1_B_5.5-6
Total Xylenes	**0.38**	EPB05_0.5-1	**4.8**	UST02_9.5-10
SVOCs				
Benzo(a)anthracene	**1.05**	EPB10_5-5.5	**5.23**	EPB01_0.5-1
Benzo(a)pyrene	**1.1**	EPB15_0.5-1	**4.94**	EPB01_0.5-1
Benzo(b)fluoranthene	**1.11**	EPB13_0.5-1	**3.7**	EPB01_0.5-1
Benzo(k)fluoranthene	**0.884**	UST-1_W_3.5-4	**3.48**	EPB01_0.5-1
Chrysene	**1.51**	UST-1_B_5.5-6	**4.55**	EPB01_0.5-1
Dibenz(a,h)anthracene	**0.338**	UST-1_W_3.5-4	**1.02**	EPB01_0.5-1
Indeno(1,2,3-cd)pyrene	**0.562**	UST03_9.5-10	**2.26**	EPB01_0.5-1
Pesticides				
4,4'-DDE	**0.00402**	EPB25_0.5-1	**0.00402**	EPB25_0.5-1
4,4'-DDT	**0.00378**	EPB34_3.5-4	**0.00751**	EPB15_0.5-1
PCBs				
Total PCBs	**0.258**	EPB15_0.5-1	**0.258**	EPB15_0.5-1
Metals				
Arsenic	**13.5**	EPB09_1.5-2	**70.4**	EPB15_0.5-1
Cadmium	**2.83**	EPB07_5-5.5	**6.79**	EPB01_0.5-1
Chromium, Trivalent	**30.5**	EPB10_5-5.5	**1,010**	EPB18_1.5-2
Copper	**53**	EPB35_3-3.5	**331**	EPB18_1.5-2
Lead	**85.5**	EPB26_0.5-1	**625**	EPB05_0.5-1

Analyte	Minimum Detected Concentration above SCOs (mg/kg)		Maximum Detected Concentration above SCOs (mg/kg)	
Mercury	**0.218**	EPB35_3-3.5	**10.1**	EPB22_11.5-12
Nickel	**30.2**	EPB23_0.5-1	**59.1**	EPB09_1.5-2
Selenium	**4.12**	EPB09_1.5-2	**6.18**	EPB31_1.5-2
Silver	**3.44**	EPB18_1.5-2	**3.44**	EPB18_1.5-2
Zinc	**111**	EPB19_0.5-1	**2480**	EPB31_1.5-2
PFAS				
Perfluorooctanesulfonic Acid (PFOS)	**0.00189**	EPB08_5-5.5	**0.00284**	EPB15_0.5-1

Note: **Result exceeds Unrestricted Use SCOs**
Result exceeds Protection of Groundwater SCOs
Result exceeds Restricted Use Commercial SCOs

2.5.2 Groundwater

Groundwater samples collected during the Phase II ESI and RI identified concentrations of SVOCs and metals exceeding the SGVs throughout the Site and concentrations of petroleum-related VOC exceeding the SGVs in the eastern portion of the Site. Groundwater analytical results exceeding the SGVs for metals are attributed to fill material of unknown origin and naturally occurring background concentrations and elevated turbidity during sample collection. Groundwater analytical results exceeding the SGVs for SVOCs are attributed to fill material of unknown origin or historical Site operations. Groundwater analytical results exceeding the SGVs for petroleum-related VOCs are attributed to residual impacts from historical Site operations. Spill No. 9010146 was reported due to the presence of gasoline impacts in groundwater and administratively closed by NYSDEC following remediation on 8 November 1991 with remaining benzene concentrations up to 135 µg/L. PFOS, PFOA, and perfluorohexanesulfonic acid (PFHxS) were also detected in groundwater above the SGVs. Analytical results for groundwater samples collected from the NAPL-impacted area of the Site reveal that the presence of NAPL had not resulted in greater impacts than those identified throughout the remainder of the Site where only historic fill or historical gasoline impacts were encountered. As discussed below, the NAPL-impacted area of the Site has been addressed by in-situ stabilization. Table 6 (Appendix A) and Figure 6 (Appendix B) summarize the results of all groundwater samples collected.

2.5.3 Soil Vapor

Soil vapor samples collected during the Phase II ESI and RI contained chlorinated VOCs, including carbon tetrachloride (0.373 micrograms per cubic meter (µg/m^3) – 6.9 µg/m^3), methylene chloride (0.6 µg/m^3 – 2.6 µg/m^3), and PCE (4.64 µg/m^3 – 790 µg/m^3). Soil vapor

sample analytical results also identified petroleum-related VOCs, including 1,2,4-trimethylbenzene (1.8 µg/m^3 – 1,350 µg/m^3), 1,3,5-trimethylbenzene (1.96 µg/m^3 – 5.32 µg/m^3), benzene (2.7 µg/m^3 – 50 µg/m^3), ethylbenzene (2.6 µg/m^3 – 2,280 µg/m^3), toluene (6.6 µg/m^3 – 1,630 µg/m^3), m- and p-xylene (8.2 µg/m^3 – 5,660 µg/m^3), o-xylene (1.6 µg/m^3 – 2,400 µg/m^3), heptane (1.8 µg/m^3 – 19.9 µg/m^3), and hexane (2.3 µg/m^3 – 10,600 µg/m^3). Table 7 (Appendix A) and Figure 7 (Appendix B) summarize the results of all soil vapor samples collected.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix G) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to Commercial or Industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the

Environmental Easement. The IC boundaries are shown on Figure 2 (Appendix B). These ICs are:

- The property may be used for: Commercial use as defined in 6 New York Codes, Rules and Regulations (NYCRR) Part 375-1.8(g)(2)(iii), and Industrial use as defined in 6 NYCRR Part 375-1.8(g)(2)(iv), although land use is subject to local zoning laws;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene (NYCDOHMH) to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;

- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 2 (Appendix B), and any potential impacts that are identified must be monitored or mitigated; and

- Vegetable gardens and farming on the Site are prohibited.

3.3 Engineering Controls

3.3.1 In-Situ Stabilization Monolith

Cement based in-situ soil stabilization and solidification (ISS) was implemented at the Site to mitigate potential exposure to low-mobility NAPL-contaminated soil at the Site. The ISS consists of an approximately 38,000-square foot monolith that starts at approximately four feet bgs and extends to between approximately 12 and 17 feet bgs. The ISS monolith does not fully penetrate the clay layer which underlays the Site, as NAPL impacts have not been identified beneath the confining layer. The ISS monolith has an unconfined compressive strength (UCS) ranging between 71 and 492 pounds per square inch (psi), with an average of 236 psi, and the hydraulic conductivity is less than 1×10^{-6} centimeter per second (cm/s) after 7 days of curing. Figure 8 (Appendix B) presents the location of the ISS.

3.3.2 Composite Cover System

Exposure to remaining contamination at the Site is prevented by a cover system placed over the Site. The existing cover system is comprised of impervious areas including concrete slabs (minimum 12- to 14-inch thick), heavy duty asphalt (7-inch thick), and concrete sidewalks (minimum 4-inch thick). Pervious areas of the cover system include a minimum of 1 foot of clean fill over a demarcation layer within landscaped areas, an approximately 6-inch thick layer of river stone over a minimum 8-inch thick layer of Item 4 Type 2 Subbase stone, and an approximately 12-inch thick layer of Item 4 Type 2 Subbase stone within a portion of the parking lot area. Future construction activities will include the replacement of the approximately 12-inch thick layer of Item 4 Type 2 Subbase stone in the western portion of the Site with heavy duty asphalt (7-inch thick). Figure 8 (Appendix B) presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in Appendix G outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and

Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the Site and provided in Appendices F and G, respectively.

Any breach of the Site's cover system must be overseen by a Professional Engineer (PE) who is licensed and registered in New York State or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.3 Sub-Slab Depressurization System (SSDS)

An active SSDS was installed beneath the concrete slab throughout the enclosed occupiable portions of the building (i.e., lobby, stairwells and mechanical spaces) that exist at the ground floor level to mitigate potential soil vapor intrusion from any remaining sources on-site or migrating onto the Site from off-site sources. The remainder of the ground floor level consists of open air at-grade parking below the second story. The SSDS was designed in accordance with New York City Mechanical Code MC 512 Sub-Slab Exhaust Systems, New York City Local Law 2009/071, USEPA document EPA/625/R-92/016 for the Sub-Slab Depressurization of Large Buildings and Schools, and the NYSDOH October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York. The SSDS creates depressurized (low vacuum) fields beneath the floor slabs by extracting sub-slab air with an in-line fan mounted at the roof level which creates the vacuum within the system. The low vacuum fields create a negative pressure gradient and divert potentially-impacted vapors beneath the building to the atmosphere above the rooftop of the building, thereby reducing the potential for vapor intrusion.

The SSDS includes a network of horizontal perforated piping set in the middle of a gas permeable gravel layer beneath the building slab and waterproofing/vapor barrier system. The horizontal piping consists of 12-inch wide SITEDRAIN™ Strip 9400, which consists of a dimpled polymeric perforated core fully wrapped in a nonwoven geotextile, vapor collection screen. The gas permeable layer consists of a minimum 6-inch-thick layer of 3/4-inch clean stone installed beneath the slab. A continuous waterproofing/vapor barrier system was installed above the gas permeable layer. The GCP Applied Technologies vapor barrier system consists of a PrePrufe 300R Plus 46-mil grade membrane installed below the concrete foundation slab and along the exterior of the subsurface foundation walls to the first-floor grade.

Above-grade components of the SSDS (including the riser pipes, in-line fans, and related accessories/monitoring devices) will be installed during the building superstructure construction. After the building is complete and before building occupancy, initial system start-up testing (SMP Section 5.3.1) will be performed to verify that all components are

installed and that the system is operating within the design parameters provided in the RAWP.

Once formally commissioned, the operation of the active SSDS will not be discontinued without written approval by the NYSDEC and NYSDOH project managers. A proposal to discontinue the active SSDS may be submitted by the Volunteer based on confirmatory data that justifies such request. The SSDS will remain in-place and operational until permission to discontinue its use is granted in writing by the NYSDEC project manager.

Procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan (SMP Section 5.0). As-built drawings of the sub-slab components of the SSDS and supporting documents are included in Appendix J. The SSDS layout is shown on Figure 9 (Appendix B).

3.3.4 Monitoring Wells Associated with Monitored Natural Attenuation

Groundwater monitoring along the downgradient edge of the Site to allow for the monitoring of the natural attenuation of the dissolved phase groundwater contamination includes proposed monitoring wells LMW-32 through LMW-36, which will be installed along the northwestern Site boundary immediately following the construction of the composite cover system. A description of the proposed monitoring wells is provided in Section 4.3.1.

A drawing of the proposed monitoring wells included in the groundwater monitoring well network is included as Figure 10 (Appendix B).

3.4 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the Site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all Site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed Site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the Site.

3.4.1 In-Situ Stabilization Monolith

The ISS monolith is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.4.2 Composite Cover System

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.4.3 Sub-Slab Depressurization System (SSDS)

The active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. If monitoring data indicates that the SSDS may no longer be required, a work plan to decommission the active components of the SSDS will be submitted by the remedial party to the NYSDEC and NYSDOH project managers. The work plan must include soil vapor intrusion sampling to verify that the SSDS is no longer needed and must comply with the NYSDOH Final Guidance on Soil Vapor Intrusion (NYSDOH Soil Vapor Guidance) dated October 2006 and all updates.

If the NYSDEC project manager approves termination of operation and maintenance of an SSDS, the remedial party will notify the property owner and ask whether the property owner wants to keep the SSDS. If the property owner elects to keep the system, the property owner will be responsible for the operation and maintenance of the system going forward. If the property owner wants the system removed, the remedial party will remove and dispose of the system and repair any parts of the structure that were altered or modified by the SSDS, such as holes in the basement floor or walls.

3.4.4 Monitoring Wells Associated with Monitored Natural Attenuation

Groundwater monitoring along the downgradient edge of the Site to allow for the monitoring of the natural attenuation of the dissolved phase groundwater contamination will continue, as determined by the NYSDEC project manager in consultation with

NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the Site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the Site are included in the Quality Assurance Project Plan provided in Appendix K.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site-Wide Inspection

Site-wide inspections will be performed annually. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix L – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirmation that Site records are up to date.

Inspections of all remedial components installed at the Site will be conducted. A comprehensive Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If Site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as defined in 6 NYCRR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public. The remedial party will submit follow-up status reports to the NYSDEC within 45 days of the event regarding actions taken to respond to any emergency event requiring ongoing responsive action, as well as describing and documenting any actions taken to restore the effectiveness of the ECs.

The remedial party will conduct exterior inspections of all SSDS components annually and perform comprehensive inspections quarterly for the first year and semi-annually thereafter. Exterior inspections will include confirming that the fan is running correctly, determining whether there is damage to the stack or other exterior system components, and determining whether there have been structural changes, such as an addition to the structure, since the previous inspection. Comprehensive inspections include all of the activities required in the exterior inspection and an interior inspection, which includes confirming a pressure differential on the manometer, inspecting the interior components for damage, recording vacuum readings from sub-slab vacuum monitoring points, and inspecting the ground floor areas for cracks in the concrete floors that may have developed since the SSDS was installed. The SSDS Performance Monitoring Plan is outlined in Section 4.3.2. The remedial party will notify the NYSDEC project manager about any problems within three days of inspections. Inspection reports will be emailed to the NYSDEC Project Manager and included in the next PRR. Any needed repairs will be made promptly according to the procedures in the Operation and Maintenance Plan (Section 5.3).

4.3 Post-Remediation Monitoring and Sampling

4.3.1 Groundwater Sampling

Groundwater monitoring to allow for the monitoring of the natural attenuation of the dissolved phase groundwater contamination will be performed semi-annually (twice a year) at five newly installed monitoring wells along the downgradient edge of the Site.

Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4-1 Groundwater Performance Monitoring Sampling Plan

Monitoring Well	Monitoring Parameter	Monitoring Schedule
LMW-32	Full TCL/TAL PFAS	Semi-annually starting in 2026
LMW-33		
LMW-34		
LMW-35		
LMW-36		

Monitoring Well Installation

Each proposed monitoring well (LMW-32 through LMW-36) will be constructed using a 2-inch-diameter PVC riser pipe attached to a 10-foot long, schedule-40, 0.020-inch slotted, 2-inch-diameter PVC screen. Each well will be installed so that the well screen is installed 2- to 3-feet above the observed water table to account for seasonal fluctuations of the water table elevation. A 6-inch bedding layer of filter pack will be placed at the bottom of each borehole before installing the well screen and the 2-inch well annulus around the screen will be backfilled with clean sand to about 2 feet above the top of the screen. A minimum 2-foot bentonite seal will be installed above the sand, and the borehole annulus will be backfilled with non-impacted soil cuttings and/or clean sand. Each well will be finished with a flush-mounted metal manhole cover set in concrete. Following installation, each newly installed monitoring well will be developed by surging the newly installed sand pack with a surge block, a weighted bailer, or surge pumping techniques across the well screen to agitate and remove fine particles. The surge block, bailer, or submersible pump will be surged across the submerged well screen in 2- to 3-foot increments for approximately 2 minutes per increment. After surging, the well will be purged via pumping until the water becomes clear. The well will then be allowed to sit for a minimum of one week before sampling. All drilling derived waste (i.e., soil cuttings and purged groundwater) collected during the well installation will be containerized in 55-gallon drums and properly disposed of off-Site.

Construction details for the proposed monitoring wells are presented in Table 8 (Appendix A) and a drawing of the proposed monitoring wells included in the groundwater monitoring well network is included as Figure 10 (Appendix B).

Monitoring Well Sampling

The remedial party will measure depth to the water table for each monitoring well before sampling. Groundwater samples will be collected by a QEP as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State via USEPA low-flow sampling methods. Samples will be analyzed for VOCs and SVOCs. Depth to water measurements and groundwater quality parameters (pH, temperature, ORP, DO, turbidity, and conductivity) will be collected during each groundwater monitoring event. Purged groundwater collected during the sampling event will be containerized in 55-gallon drums and properly disposed of off-Site. Groundwater samples will be collected in laboratory-supplied containers and will be sealed, labeled, and placed into a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to a NYSDOH ELAP-certified analytical laboratory. Detailed sample collection and analytical procedures, QA/QC procedures, and protocols are described in the QAPP provided as Appendix K.

If NAPL is observed in the well at the time of sampling, NAPL thickness will be documented in sampling logs and a sample of the NAPL will be collected and analyzed for TCL VOCs. NAPL will then be removed prior to groundwater sample collection. If biofouling or silt accumulation occurs in the on-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

The frequency of groundwater sampling will be re-evaluated following review of results obtained from the first year of sampling. The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.3.2 SSDS Monitoring and Inspections

Monitoring of the active SSDS will be performed quarterly for the first year and semi-annually thereafter to evaluate whether the system is operating within design parameters. The monitoring of remedial systems must be conducted by a QEP as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the monitoring and/or inspection frequency requirements will require approval from the NYSDEC project manager. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled monitoring and/or inspection may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. SSDS components to be monitored include, but are not limited to, the components included in the table below.

Table 4-2 SSDS Performance Monitoring Plan

SSDS Component	Monitoring Parameter	Monitoring Schedule
Vacuum Monitoring Points	Vacuum Pressure	Quarterly, Semi-Annually*
Vacuum Gauges	Vacuum Pressure	Quarterly, Semi-Annually*
Exhaust Points	Motor Operation and Air Flow Direction	Quarterly, Semi-Annually*
Vent Riser	Flow	Quarterly, Semi-Annually*
Vent Riser	Vacuum Pressure	Quarterly, Semi-Annually*
Remote Alarm System	Functionality & Integrity	Quarterly, Semi-Annually*
Exposed Riser Piping	Functionality, Integrity, and Labeling	Quarterly, Semi-Annually*

SSDS Component	Monitoring Parameter	Monitoring Schedule
In-Line Fan	Functionality & Integrity	Quarterly, Semi-Annually*

*Components will be monitored quarterly for the first year of operation and semi-annually thereafter.

A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix L - Site Management Forms. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications, then maintenance and repair, as per the Operation and Maintenance Plan, is required and shall be implemented immediately.

4.3.3 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix L – Site Management Forms. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Plan:

- Includes procedures for SSDS start-up and testing;
- Includes procedures for the monitoring of the performance of the SSDS;
- Includes the procedures necessary to allow individuals unfamiliar with the Site to operate and maintain the SSDS;
- Will be updated periodically to reflect changes in Site conditions or the manner in which the SSDS are operated and maintained.

Routine inspection and maintenance of the SSDS is the responsibility of the Volunteer, their successors and/or the property owner and/or building management.

5.2 Remedial System (or other Engineering Control) Performance Criteria

The SSDS will consist of one in-line fan connected to a sub-slab pipe network. The inline fan will be Obar model GBR76 UD or approved alternates. The inline fan will be operated in accordance with manufacturer's specifications and recommendations. The minimum required flow rate of the inline fan is as follows:

- 85 standard cubic feet per minute (scfm) at 10 inches of water vacuum.

5.3 Operation and Maintenance of the SSDS

The following sections provide a description of the operations and maintenance of the SSDS which is based on the NYSDOH Guidance and USEPA guidance document EPA/625/R-92/016 concerning active depressurization of large buildings and schools (June 1994). Manufacturing cut-sheets and as-built drawings for the sub-slab portions of the SSDS are provided in Appendix J.

5.3.1 System Start-Up and Testing

Prior to building occupancy, all accessible SSDS components will be inspected. The equipment will be started in accordance with the manufacturer's recommendations. System testing for the initial start-up will be performed as follows:

- The riser pipes will be pressure tested utilizing 5 psi of pressure in the riser pipes and holding the pressure for at least 10 minutes.
- While the system is operating, smoke tubes will be used to check for leaks through concrete cracks, floor joints, and at exposed above-grade piping connections associated with the lowest-level slab. Any leaks identified will be properly sealed.
- The blower-malfunction warning device will be tested.
- Airflow rates will be measured through the sample ports with a TSI VelociCalc meter to document that airflow within the system is consistent with design calculations.
- Vacuum pressure will be measured at the vacuum monitoring points and at the blower to document that vacuum conveyance is consistent with the design calculations.
- The building's heating, ventilation, and air conditioning (HVAC) system is operating under normal conditions.

The system testing described above will be conducted if, in the course of the SSDS lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

5.3.2 Routine System Operation and Maintenance

The SSDS and its in-line fans will operate continuously after the initial start-up in accordance with appropriate design specifications and parameters, the manufacturer's operation manual, and SMP requirements.

Routine equipment maintenance is the responsibility of the remedial party and/or building management. The blower assembly and its appurtenances shall be inspected at the interval specified in the manufacturer's operation manual. Routine equipment maintenance may include, but is not limited to, replacing the in-line fans or other parts, replacing vacuum pressure gauges, and testing the remote alarm system.

If any technical difficulties or non-optimal operating conditions are encountered with the SSDS, the property owner and/or building management responsible for the building shall complete any necessary modifications or repairs to the system to bring the system into compliance with appropriate design specifications and parameters. The remedial party, NYSDEC and NYSDOH shall be notified of any significant modifications or repairs that are planned.

5.3.3 Non-Routine Operation and Maintenance

Non-routine maintenance may also be required during operation of the SSDS, including potentially in the following situations:

- The building's owner or occupants report that the warning device indicates the SSDS is not operating properly;
- The SSDS becomes damaged; or
- The building has undergone renovations that may reduce the effectiveness of the SSDS.

The NYSDEC will be informed within 24 hours upon discovery of SSDS failure. Repairs or adjustments will be made to the system as appropriate and as per manufacturer guidelines, within 15 days of the equipment failure, or whenever possible (i.e., pending availability of parts). If necessary, the system will be redesigned and restarted. Activities conducted during non-routine maintenance visits will vary.

5.3.4 System Performance Monitoring

Performance monitoring will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State to document the effectiveness of the SSDS at the following milestones/intervals:

- At the commissioning event and start-up inspection;
- Quarterly for the first year and semi-annually thereafter, concurrent with the annual Site inspections;
- After any severe weather or other emergency conditions (natural disasters and/or fires) that has or may have damaged the system (if necessary); and
- After any significant repairs and/or modifications.

Performance monitoring will include the similar procedures listed for the commissioning and startup inspection as stated in Section 5.3.1.

5.3.5 System Monitoring Devices and Alarms

The SSDS has a warning device to indicate that the system is not operating properly. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS will be

restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

5.3.6 Fire Safety

The remedial party will conduct facility walks with the local fire chief and/or fire suppression team as required. The site walk will allow for the addition of the facility to any local preplanning efforts. The NYSDEC project manager will be provided with the local fire chief's/fire suppression team's recommendations as soon as they become available. Following review, the NYSDEC project manager may direct the remedial party to implement the recommendations and/or revise the SMP.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, all resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given Site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a current vulnerability assessment that evaluates the vulnerability of the Site and/or engineering controls to severe storms/weather events and associated flooding. This section also identifies vulnerability assessment updates that will be conducted for the Site in Periodic Review Reports.

According to the Effective National Flood Insurance Rate map for the City of New York published by FEMA (Community Panel No. 3604970202F, dated 5 September 2007), the Site is mapped within Zone AE. Zone AE is defined as a special flood hazard area and is subject to inundation by the 1 percent annual chance flood.

Site erosion is not expected during severe weather or precipitation events because soil will be covered with a concrete slab, asphalt pavement, and/or imported stone/planting medium. The building footprint protects the SSDS from extreme wind conditions and stormwater watershed. ECs will be inspected after severe weather or other emergency conditions (e.g., natural disasters or fires) that are known to have inflicted damage at the Site or adjoining properties and repaired, as necessary.

The SSDS receives electrical service from Consolidated Edison, Inc. (ConEd). A power loss and/or dips/surges in voltage during a severe weather event, including lightning strikes, may impact the SSDS equipment and operations. The SSDS control panel will shut down the system in the event of a dip or surge in voltage.

Overall, the Site ECs are not expected to be vulnerable to the effects of global climate change, including severe weather and flooding events.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this SMP. This section of the SMP also provides a summary of green remediation evaluations to be completed for the Site during site management and reported in Periodic Review Reports (PRRs).

6.2.1 Environmental Footprint Analysis

An environmental footprint analysis was completed using SiteWise™ (available in the SURF library) which is a NYSDEC accepted environmental footprint analysis calculator. The following components of this SMP were entered in the SiteWise™ model:

- Installation of groundwater monitoring wells associated with monitored natural attenuation;
- Semi-annual groundwater sampling for up to 10 years;
- Annual Site-wide inspections for 10 years; and,
- Quarterly SSDS inspections for the first year, followed by semi-annual SSDS inspections for the following 9 years.

Using the above identified information, the SiteWise™ model estimated the following emissions and total energy usage for up to 10 years of Site Management activities:

Remedial Alternatives	10 Years of Site Management Activities
Greenhouse Gas (GHG) Emissions (metric ton)	37.46
Total energy Used (MMBTU)	783.54
Total NOx Emissions (metric ton)	0.167
Total SOx Emissions (metric ton)	0.124
Total PM10 Emissions (metric ton)	0.014

Details regarding the inputs and outputs of the SiteWise™ model are provided in Appendix M.

6.2.2 Green Remediation Principles and Best Management Practices

The SMP will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and/or monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the Site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term
- Reducing direct and indirect greenhouse gases and other emissions
- Increasing energy efficiency and minimizing use of non-renewable energy
- Conserving and efficiently managing resources and materials
- Reducing waste, increasing recycling and increasing reuse of materials that would otherwise be considered a waste
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development
- Additionally, to incorporate the GSR principles and techniques to the extent feasible in the future development at this Site, any future on-Site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

The SMP will include the implementation of several Best Management Practices (BMPs) related to these green remediation components, including but not limited to the following:

- Waste Generation
- Electrical Use
- Emissions
- Water Usage
- Land and/or Ecosystem

Waste Generation

Waste generation considers the management of waste associated with SMP activities and any waste reduction projects including, but not limited to, material reuse and recycling. Waste generation is not anticipated for routine SMP activities. Waste generation may be required during non-routine SMP activities (implementation of the

Excavation Work Plan [EWP]). Several waste streams may be generated during implementation of non-routine SMP activities (e.g., soil, polyethylene sheets used for stockpile coverage and separating types of contamination, nitrile gloves for endpoint sampling, disposable sample ware, acetate liners from drilling operations, decontamination materials). When possible, an effort will made to minimize consumption/generation of such materials. If possible, decontamination and reuse of applicable materials will be considered. Electronic methods of data collection (e.g., tablets) will also be used to reduce paper consumption when possible. Additionally, designated collection points for waste streams will be encouraged to be separated into single use items such as metal, plastics, and glass containers; compostable materials; paper and cardboard; and other items that may be recycled locally.

Electrical Energy Use

Energy usage considers the electricity usage needed for SMP activities. Energy usage is not anticipated for routine SMP activities but may be required during non-routine SMP activities (implementation of the EWP). Energy will be required for charging equipment (e.g., PIDs, air monitoring equipment). Battery-powered equipment will be turned off when not in use to limit charging activities.

Emissions

Emissions tracking considers fuel usage for transportation of personnel to and from the Site for routine SMP activities. However, during non-routine SMP activities (implementation of the EWP), emissions tracking will consider fuel usage for transportation of personnel to and from the site, trucks used for export of contaminated material or import of backfill material, equipment and laboratory sample couriers, and drilling/construction equipment. To reduce fuel usage, trucks and heavy machinery operators will be encouraged to reduce idling time and shut down vehicles or equipment when not in use. The contractor will also be encouraged to perform routine, on-time maintenance such as oil changes to improve fuel efficiency. When possible and pending availability, personnel will be considered based on their proximity to the Site and will be encouraged to take public transport.

Water Usage

Water usage considers sources of water for tasks such as decontamination, irrigation, etc. Water usage is not anticipated for routine SMP activities. Water usage may be required during non-routine SMP activities (implementation of the EWP). The public water supply will be used when water is required for decontamination activities or dust suppression

during any soil disturbance as part of this SMP. Water will only be consumed when necessary, and consumption will be in accordance with local regulations.

Land and/or Ecosystems

Land and/or ecosystems consider any disturbances and restoration of land and/or ecosystems as part of the implementation/operation of the remedy. The final redevelopment of the Site will consist of a five-story commercial and industrial warehouse building. During implementation of the SMP, the Site cover will be restored following any excavation and will require minimal to no maintenance.

6.2.3 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate (e.g., during significant maintenance events or in conjunction with storm recovery activities).

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities after approval from the DER project manager. Reporting of these modifications will be presented in the PRR.

6.3 Remedial Systems

Remedial systems will be operated properly considering the current Site conditions and in order to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate.

6.4 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources. SSDS inspections will be conducted quarterly for the first year of operation. Following the initial operational period, the SSDS inspections will be reduced to semi-annually in order to reduce the direct and/or indirect energy costs

associated with the Site visits. The need for Site visits is also reduced due to the installation of a remote telemetry system on the SSDS that will provide alerts based on certain operating conditions. SSDS inspections will be completed concurrently with annual inspections, where possible, to avoid excess Site visits. When possible and pending availability, personnel will be considered based on their proximity to the Site and will be encouraged to take public transport.

6.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix L – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits. A set of metrics has been developed and will be evaluated over time to ensure that green remediation actions are achieving the desired results.

6.6 Remedial System Optimization

A Remedial System Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a Site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall Site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to Site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All Site management inspection, maintenance and monitoring events will be recorded on the appropriate Site management forms provided in Appendix L. These forms are subject to NYSDEC revision. All Site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of the table below and summarized in the Periodic Review Report.

Table 7-1 Reporting Frequency

Task/Report	Reporting Frequency*
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., groundwater, sub-slab vapor, indoor air, outdoor air);

- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc. (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/ repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the NYSDEC project manager beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix C – Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site.
- Results of the required annual Site inspections, fire inspections and severe condition inspections, if applicable.
- Description of any change of use, import of materials, or excavation that occurred during the certifying period.
- All applicable Site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation

of past data as part of an evaluation of contaminant concentration trends, including but not limited to:

  - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
  - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
  - O&M data summary tables;
  - A current plume map for Sites with remaining groundwater contamination; and
  - A groundwater elevation contour map for each gauging event.

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.
- A Site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the Site-specific Remedial Action Work Plan (RAWP), ROD or Decision Document;
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
  - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
  - An update to the climate change vulnerability assessment if Site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities.

  - A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a Site's environmental impacts and recommendations to improve the remedy's environmental footprint. The PRR will include the completed Summary of Green Remediation Metrics form provided in Appendix L.
  - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD or Decision Document; and
  - The overall performance and effectiveness of the remedy.

- A performance summary for all treatment systems at the Site during the calendar year, including information such as:
  - The number of days the system operated for the reporting period;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A description of the resolution of performance problems;
  - Alarm conditions;
  - Trends in equipment failure;
  - A summary of the performance, effluent and/or effectiveness monitoring; and
  - Comments, conclusions, and recommendations based on data evaluation. Recommendations must address how receptors would be impacted. Recommendations can include:
    - Proposals to address efficiency and costs such as: instituting remote operation, system changes to decrease maintenance costs and downtime, and system changes to decrease energy use; and
    - Proposals to modify or shut down a treatment system due to remediation completion, system performance or changed conditions. System shutdowns are addressed in Section 6.4 of DER-10.

7.3 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice and registered in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:*

- *The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;*
- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *No new information has come to my attention, including groundwater monitoring data from wells located at the Site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-Site contamination are no longer valid;*
- *Use of the Site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*

- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Satyajit Vaidya, of Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., am certifying as Remedial Party's Designated Site Representative for the Site."

"I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

Every five years the following certification will be added to the PRR:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.4 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct Site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

7.5 Remedial System Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in Appendix N. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, and present a revised conceptual Site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

8.0 REFERENCES

Tyree Brothers Environmental Services, Inc., Subsurface Investigation, dated May 1990.

Tyree Brothers Environmental Services, Inc., Monitoring Well Installation and Tank Tightness Testing Summary Letter, dated 1 October 1990.

Tyree Brothers Environmental Services, Inc., various correspondence between Tyree and NYSDEC, dated May 1990 through November 1991.

Impact Environmental, Remote Sensing Survey Ground Penetrating Radar Investigation, dated 28 July 1999.

The Franklin Company, Tank Closure Affidavit, dated 11 May 1999.

Alvin Petroleum Systems, Inc., Tank Closure Affidavit, dated 5 August 1999.

Tyree Brothers Environmental Services, Inc., Phase I Environmental Site Assessment, dated September 2001.

Impact Environmental, Subsurface Investigation, dated 2 October 2008.

Impact Environmental, Investigation Summary Report, dated 24 June 2009.

Impact Environmental, Quarterly Monitoring Report, dated 12 March 2010.

Impact Environmental, Quarterly Monitoring Report, dated 11 June 2010.

Impact Environmental, Quarterly Monitoring Report, dated 10 September 2010.

Impact Environmental, Groundwater Monitoring Well Decommissioning Letter, dated 9 August 2011.

Impact Environmental, Summary of Remediation Completed, dated 16 January 2012.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Remedial Investigation Report, dated 24 April 2019.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Supplemental Remedial Investigation Work Plan, dated 21 April 2020.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Vacuum Enhanced Extraction Pilot Test Work Plan, dated 12 October 2020.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., ISS Pre-Implementation Investigation Work Plandated 6 May 2022.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., ISS Pre-Implementation Investigation Report, dated 21 June 2022.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Supplemental Remedial Investigation Report, dated 24 June 2022.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Remedial Action Work Plan, dated 29 June 2022.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Phase I ESA, dated 26 October 2022.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Soil Reuse Request Letter, dated 12 April 2023.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., Environmental Soil Pre-Characterization Results Letter Report, dated 26 May 2023.

6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

NYSDOH, 2006. Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October 2006. (and all subsequent updates).

APPENDIX A

TABLES

Table 1
Site Management Plan
Monitoring Well Gauging Summary

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Monitoring Well Location	Top of Casing Elevation	Depth to LNAPL (ft bgs)	Depth to Water (ft bgs)	Groundwater Elevation	Depth to DNAPL (ft bgs)	PID Headspace Reading (ppm)
LMW-1	7.925	NA	6.81	1.115	NA	0.0
LMW-2	6.195	NA	6.34	-0.145	NA	0.0
LMW-3	7.555	NA	6.58	0.975	NA	0.0
LMW-4	9.045	NA	8.85	0.195	NA	0.0
LMW-5	9.215	NA	7.81	1.405	NA	0.6
LMW-6	Mointoring well could not be located during the 2020 SRI					
LMW-7	Mointoring well could not be located during the 2020 SRI					
LMW-8	9.29	NA	7.87	1.42	NA	0.0
LMW-9	Mointoring well could not be located during the 2020 SRI					
LMW-10	Mointoring well could not be located during the 2020 SRI					
LMW-11	Mointoring well could not be located during the 2020 SRI					
LMW-12	7.0	NA	4.02	2.98	NA	28.2
LMW-13	Mointoring well could not be located during the 2020 SRI					
LMW-14	7.58	NA	5.15	2.43	NA	58.7
LMW-15	7.14	NA	4.85	2.29	NA	19.5
LMW-16	7.26	NA	4.89	2.37	NA	142.8
LMW-17	7.07	NA	4.74	2.33	NA	7.7
LMW-18	7.42	NA	5.48	1.94	NA	0.0
LMW-19	7.325	NA	5.42	1.905	NA	63.1
LMW-20	9.195	NA	7.49	1.705	NA	5.5
LMW-21	9.915	Product on Probe	8.49	1.425	NA	41.9
LMW-22	7.815	NA	6.5	1.315	NA	0.8
LMW-23	6.795	NA	6.43	0.365	NA	2.8
LMW-24	6.265	Product on Probe	5.82	0.445	Product on probe	61.8
LMW-25	6.46	NA	7.33	-0.87	Product on probe	25.2
LMW-26	7.06	NA	6.54	0.52	NA	1.6
LMW-27	7.33	NA	6.13	1.2	NA	2.6
LMW-28	7.2	NA	7.54	-0.34	NA	3.1
LMW-29	7.775	NA	7.65	0.125	NA	1.4
LMW-30	9.8	Product on Probe	8.38	1.42	NA	0.8

Notes:
All monitoring wells gauged on 30 July 2020.
LNAPL = light non-aqueous phase liquid
DNAPL = dense non-aqueous phase liquid
ft bgs = feet below ground surface
PID = photoionization detector
ppm = parts per million
NA = Product not observed during monitoring well gauging

Table 2
Site Management Plan
Soil Cleanup Objectives

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	Track 1 SCOs (Unrestricted Use SCOs)	Track 4 SCOs (Commercial Restricted Use SCOs)
Volatile Organic Compounds (mg/kg)			
1,1,1-Trichloroethane	71-55-6	0.68	500
1,1-Dichloroethane	75-34-3	0.27	240
1,1-Dichloroethene	75-35-4	0.33	500
1,2,4-Trimethylbenzene	95-63-6	3.6	190
1,2-Dichlorobenzene	95-50-1	1.1	500
1,2-Dichloroethane	107-06-2	0.02	30
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	190
1,3-Dichlorobenzene	541-73-1	2.4	280
1,4-Dichlorobenzene	106-46-7	1.8	130
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	130
Acetone	67-64-1	0.05	500
Benzene	71-43-2	0.06	44
Carbon Tetrachloride	56-23-5	0.76	22
Chlorobenzene	108-90-7	1.1	500
Chloroform	67-66-3	0.37	350
Cis-1,2-Dichloroethene	156-59-2	0.25	500
Ethylbenzene	100-41-4	1	390
Hexachlorobenzene	118-74-1	0.33	6
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	500
Methylene Chloride	75-09-2	0.05	500
Naphthalene	91-20-3	12	500
n-Butylbenzene	104-51-8	12	500
n-Propylbenzene	103-65-1	3.9	500
Sec-Butylbenzene	135-98-8	11	500
T-Butylbenzene	98-06-6	5.9	500
Tert-Butyl Methyl Ether	1634-04-4	0.93	500
Tetrachloroethene (PCE)	127-18-4	1.3	150
Toluene	108-88-3	0.7	500
Total Xylenes	1330-20-7	0.26	500
Trans-1,2-Dichloroethene	156-60-5	0.19	500
Trichloroethene (TCE)	79-01-6	0.47	200
Vinyl Chloride	75-01-4	0.02	13
Semivolatile Organic Compounds (mg/kg)			
1,2-Dichlorobenzene	95-50-1	1.1	500
1,3-Dichlorobenzene	541-73-1	2.4	280
1,4-Dichlorobenzene	106-46-7	1.8	130
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	130
2-Methylphenol (o-Cresol)	95-48-7	0.33	500
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	500
Acenaphthene	83-32-9	20	500
Acenaphthylene	208-96-8	100	500
Anthracene	120-12-7	100	500
Benzo(a)anthracene	56-55-3	1	5.6
Benzo(a)pyrene	50-32-8	1	1
Benzo(b)fluoranthene	205-99-2	1	5.6
Benzo(g,h,i)Perylene	191-24-2	100	500
Benzo(k)fluoranthene	207-08-9	0.8	56
Chrysene	218-01-9	1	56
Dibenz(a,h)anthracene	53-70-3	0.33	0.56
Dibenzofuran	132-64-9	7	350
Fluoranthene	206-44-0	100	500
Fluorene	86-73-7	30	500
Hexachlorobenzene	118-74-1	0.33	6
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	5.6
Naphthalene	91-20-3	12	500
Pentachlorophenol	87-86-5	0.8	6.7
Phenanthrene	85-01-8	100	500
Phenol	108-95-2	0.33	500
Pyrene	129-00-0	100	500

Notes provided on Page 2.

Table 2
Site Management Plan
Soil Cleanup Objectives

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	Track 1 SCOs (Unrestricted Use SCOs)	Track 4 SCOs (Commercial Restricted Use SCOs)
Pesticides (mg/kg)			
4,4'-DDD	72-54-8	0.0033	92
4,4'-DDE	72-55-9	0.0033	62
4,4'-DDT	50-29-3	0.0033	47
Aldrin	309-00-2	0.005	0.68
Alpha BHC (Alpha Hexachlorocyclohexane	319-84-6	0.02	3.4
Alpha Chlordane	5103-71-9	0.094	24
Alpha Endosulfan	959-98-8	2.4	200
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	3
Beta Endosulfan	33213-65-9	2.4	200
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	500
Dibenzofuran	132-64-9	7	350
Dieldrin	60-57-1	0.005	1.4
Endosulfan Sulfate	1031-07-8	2.4	200
Endrin	72-20-8	0.014	89
Gamma Bhc (Lindane)	58-89-9	0.1	9.2
Heptachlor	76-44-8	0.042	15
Herbicides (mg/kg)			
Silvex (2,4,5-Tp)	93-72-1	3.8	500
Polychlorinated Biphenyls (mg/kg)			
Total PCBs	1336-36-3	0.1	1
Inorganics (mg/kg)			
Arsenic	7440-38-2	13	16
Barium	7440-39-3	350	400
Beryllium	7440-41-7	7.2	590
Cadmium	7440-43-9	2.5	9.3
Chromium, Hexavalent	18540-29-9	1	400
Chromium, Trivalent	16065-83-1	30	1,500
Copper	7440-50-8	50	270
Total Cyanide	~	27	27
Lead	7439-92-1	63	1,000
Manganese	7439-96-5	1,600	10,000
Mercury	7439-97-6	0.18	2.8
Nickel	7440-02-0	30	310
Selenium	7782-49-2	3.9	1,500
Silver	7440-22-4	2	1,500
Zinc	7440-66-6	109	10,000
Per- and Polyfluoroalkyl Substances (mg/kg)			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.00088	0.44
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.5

Notes:
1. Soil cleanup objectives taken from New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use and Commercial Restricted Use Soil Cleanup Objectives (SCOs).
2. Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and
3. ~ = Regulatory limit for this analyte does not exist
4. mg/kg = milligrams per kilogram

Table 3
Site Management Plan
Lead Delineation Endpoint Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	RCRA Characteristics of Hazardous Waste	Location	LSB-119	LSB-120	LSB-121	LSB-122	LSB-123
						Sample Name	LSB-119_14-16	LSB-120_11-13	LSB-121_11-13	LSB-122_11-13	LSB-123_11-13
						Sample Date	02/06/2023	02/06/2023	02/09/2023	02/07/2023	02/07/2023
						Sample Depth	14-16	11-13	11-13	11-13	11-13
						Unit	Result	Result	Result	Result	Result
Metals - Total											
Lead	7439-92-1	**63**	450	1000	NS	mg/kg	18.1	**783**	54.9	29.6	**289**
Metals - TCLP											
Lead	7439-92-1	NS	NS	NS	5	mg/l	<0.125 U	<0.125 U	<0.125 U	<0.125 U	0.322 J
General Chemistry											
Solids, Percent	SOLID	NS	NS	NS	NS	Percent	57.3	63.8	57.2	67.7	65.3

Table 3
Site Management Plan
Lead Delineation Endpoint Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	RCRA Characteristics of Hazardous Waste	Location	LSB-128	LSB-128	LSB-129	LSB-130	LSB-131	LSB-132	LSB-135
						Sample Name	LSB-128_14-16	DUP-4_020623	LSB-129_11.5-13.5	LSB-130_11.5-13.5	LSB-131_11.5-13.5	LSB-132_11.5-13.5	LSB-135_11.5-13.5
						Sample Date	02/06/2023	02/06/2023	02/06/2023	02/06/2023	02/06/2023	02/06/2023	02/06/2023
						Sample Depth	14-16	14-16	11.5-13.5	11.5-13.5	11.5-13.5	11.5-13.5	11.5-13.5
						Unit	Result	Result	Result	Result	Result	Result	Result
Metals - Total													
Lead	7439-92-1	**63**	450	1000	NS	mg/kg	53.4 J	26.7 J	20.2	**74.7**	**1,230**	28.8	**75.4**
Metals - TCLP													
Lead	7439-92-1	NS	NS	NS	5	mg/l	<0.125 U	<0.125 U	<0.125 U	0.262	<0.125 U	<0.125 U	0.278
General Chemistry													
Solids, Percent	SOLID	NS	NS	NS	NS	Percent	71.6	67.8	68.2	83.7	67.7	59.2	65.7

Table 3
Site Management Plan
Lead Delineation Endpoint Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Notes:

TCLP - Toxicity Characteristic Leaching Procedure
CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
RL - Reporting limit
<RL - Not detected
Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Commercial Soil Cleanup Objectives (SCO) and to the 6 New York Codes, Rules and Regulations (NYCRR) Part 371.3 and 40 CFR 261 Subpart C and Table 1 of 40 CFR 261.24 - Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Characteristics of Hazardous Waste.

Qualifiers:

J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Commercial SCOs
10 - Result exceeds the RCRA Maximum Concentration of Contaminants for the Toxicity Characteristic

Table 4
Site Management Plan
UST Endpoint Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	UST02	UST03	UST04	UST_E	UST_N	UST_S	UST_W
					Sample Name	UST02_010424	UST03_010424	UST04_010424	UST_E_010424	UST_N_010424	UST_S_010424	UST_W_010424
					Sample Date	01/04/2024	01/04/2024	01/04/2024	01/04/2024	01/04/2024	01/04/2024	01/04/2024
					Sample Depth	9.5-10	9.5-10	9.5-10	7.5-8	7.5-8	7.5-8	7.5-8
					Unit	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds												
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	190	mg/kg	**13 D**	**5.6 D**	2.7 D	0.0077	0.08 J	0.16 J	<1 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	8.4	190	mg/kg	3.5 D	1.4 D	0.9 D	<0.0066 U	0.029 J	0.055 J	<1 U
Benzene	71-43-2	**0.06**	0.06	44	mg/kg	**0.7 D**	<0.76 U	0.017 J	<0.0066 U	<0.0057 U	0.025 J	<1 U
Ethylbenzene	100-41-4	**1**	1	390	mg/kg	**3.6 D**	**2.7 D**	0.069 J	<0.0066 U	0.0085 J	0.016 J	<1 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	2 D	1.4 D	0.099 J	0.027	0.016 J	0.18 J	<1 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	3.5 D	1.9 D	0.3 J	<0.013 U	0.035 J	0.055 J	<2.1 U
Naphthalene	91-20-3	**12**	12	500	mg/kg	7.2 D	1.4 JD	0.12 J	0.0048 J	0.02 J	0.04 J	<2.1 U
n-Butylbenzene	104-51-8	12	12	500	mg/kg	2.9 D	1.4 D	0.12 J	0.0048 J	0.03 J	0.081 J	<1 U
n-Propylbenzene	103-65-1	3.9	3.9	500	mg/kg	2.5 D	1.5 D	0.18 J	0.0077	0.027 J	0.13 J	<1 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	1.3 D	0.81 D	0.15 J	<0.0066 U	0.019 J	0.028 J	<1 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	NS	mg/kg	2 D	0.54 JD	0.048 J	<0.0066 U	0.0095 J	<0.0067 U	<1 U
Sec-Butylbenzene	135-98-8	11	11	500	mg/kg	1.8 D	0.82 D	0.099 J	0.015	0.021 J	0.13 J	<1 U
T-Butylbenzene	98-06-6	5.9	5.9	500	mg/kg	<0.56 U	<0.76 U	0.0084 J	0.0038 J	<0.0057 U	<0.0067 U	<1 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	500	mg/kg	<0.56 U	<0.76 U	0.0057 J	0.017	<0.0057 U	0.018 J	<1 U
Toluene	108-88-3	0.7	0.7	500	mg/kg	0.41 JD	0.47 JD	0.1 J	<0.0066 U	0.0084 J	0.016 J	<1 U
Total Xylenes	1330-20-7	**0.26**	1.6	500	mg/kg	**4.8 D**	**2.7 D**	**0.45 J**	<0.02 U	0.054 J	0.084 J	<3.1 U
Semi-Volatile Organic Compounds												
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	20.8 D	0.336 D	3.99 D	<0.105 U	<0.0984 U	1.53 D	<0.104 U
Acenaphthene	83-32-9	20	98	500	mg/kg	0.687 D	0.0857 JD	0.701 D	<0.105 U	0.096 JD	0.199 D	0.319 D
Acenaphthylene	208-96-8	100	107	500	mg/kg	0.172 D	<0.114 U	0.226 D	<0.105 U	0.427 D	<0.118 U	0.104 D
Anthracene	120-12-7	100	1,000	500	mg/kg	0.188 D	0.108 JD	0.265 D	<0.105 U	0.124 D	<0.118 U	<0.104 U
Benzo(a)anthracene	56-55-3	**1**	1	5.6	mg/kg	0.14 D	0.656 D	0.102 JD	0.0629 JD	0.242 D	0.0661 JD	0.0563 JD
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	0.132 D	0.699 D	0.0958 JD	0.0754 JD	0.286 D	0.0661 JD	<0.104 U
Benzo(b)fluoranthene	205-99-2	**1**	1.7	5.6	mg/kg	0.193 D	0.9 D	0.124 JD	0.093 JD	0.408 D	0.0916 JD	<0.104 U
Benzo(g,h,i)Perylene	191-24-2	100	1,000	500	mg/kg	0.12 D	0.487 D	0.0887 JD	0.0603 JD	0.304 D	0.0623 JD	<0.104 U
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	56	mg/kg	0.175 D	0.361 D	<0.127 U	<0.105 U	0.115 D	<0.118 U	<0.104 U
Chrysene	218-01-9	**1**	1	56	mg/kg	0.178 D	0.65 D	0.128 D	0.062 JD	0.269 D	0.068 JD	0.0771 JD
Dibenz(a,h)anthracene	53-70-3	**0.33**	1,000	0.56	mg/kg	<0.115 U	0.12 D	<0.127 U	<0.105 U	0.0866 JD	<0.118 U	<0.104 U
Fluoranthene	206-44-0	100	1,000	500	mg/kg	0.273 D	1.27 D	0.222 D	0.0939 JD	0.574 D	0.126 D	0.156 D
Fluorene	86-73-7	30	386	500	mg/kg	1.24 D	0.104 JD	1.22 D	<0.105 U	0.145 D	0.368 D	0.239 D
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	5.6	mg/kg	0.12 D	**0.562 D**	0.0958 JD	0.0562 JD	0.316 D	<0.118 U	<0.104 U
Naphthalene	91-20-3	12	12	500	mg/kg	3.28 D	0.172 D	1.02 D	<0.105 U	<0.0984 U	<0.118 U	0.162 D
Phenanthrene	85-01-8	100	1,000	500	mg/kg	2.65 D	0.734 D	2.39 D	<0.105 U	0.502 D	0.665 D	<0.104 U
Pyrene	129-00-0	100	1,000	500	mg/kg	0.507 D	1.03 D	0.224 D	0.083 JD	0.479 D	0.163 D	<0.104 U
General Chemistry												
Solids, Percent	SOLID	NS	NS	NS	Percent	72.4	71.7	65.2	78	83.9	69.7	79.4

Table 4
Site Management Plan
UST Endpoint Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	UST-1_BOTTOM	UST-1_E	UST-1_N	UST-1_S	UST-1_W
					Sample Name	UST-1_5.5-6_BOTTOM	UST-1_3.5-4_E	UST-1_3.5-4_N	UST-1_3.5-4_S	UST-1_3.5-4_W
					Sample Date	08/17/2023	08/17/2023	08/17/2023	08/17/2023	08/17/2023
					Sample Depth	5.5-6	3.5-4	3.5-4	3.5-4	3.5-4
					Unit	Result	Result	Result	Result	Result
Volatile Organic Compounds										
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	190	mg/kg	**8.7 D**	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	8.4	190	mg/kg	2.3 D	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
Benzene	71-43-2	**0.06**	0.06	44	mg/kg	<1.2 U	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
Ethylbenzene	100-41-4	**1**	1	390	mg/kg	**1.2 J**	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	0.72 JD	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	2.6 J	<0.016 U	<0.014 U	<0.012 U	<0.015 U
Naphthalene	91-20-3	**12**	12	500	mg/kg	**58 D**	0.0048 J	<0.014 U	0.004 J	<0.015 U
n-Butylbenzene	104-51-8	12	12	500	mg/kg	1.9 D	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
n-Propylbenzene	103-65-1	3.9	3.9	500	mg/kg	1.3 D	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	1.2 J	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	NS	mg/kg	2.2 D	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
Sec-Butylbenzene	135-98-8	11	11	500	mg/kg	0.84 JD	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
T-Butylbenzene	98-06-6	5.9	5.9	500	mg/kg	<1.2 U	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	500	mg/kg	<1.2 U	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
Toluene	108-88-3	0.7	0.7	500	mg/kg	<1.2 U	<0.0081 U	<0.007 U	<0.0058 U	<0.0077 U
Total Xylenes	1330-20-7	**0.26**	1.6	500	mg/kg	**3.7 D**	<0.024 U	<0.021 U	<0.017 U	<0.023 U
Semi-Volatile Organic Compounds										
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	16 J	<0.122 U	<0.0998 U	0.29 J	<0.104 U
Acenaphthene	83-32-9	20	98	500	mg/kg	0.695 J	<0.122 U	<0.0998 U	<0.478 UJ	<0.104 U
Acenaphthylene	208-96-8	100	107	500	mg/kg	<0.731 UJ	<0.122 U	<0.0998 U	<0.478 UJ	0.215 D
Anthracene	120-12-7	100	1,000	500	mg/kg	1.69 J	<0.122 U	<0.0998 U	<0.478 UJ	0.165 D
Benzo(a)anthracene	56-55-3	**1**	1	5.6	mg/kg	**1.18 J**	0.108 JD	0.532 D	<0.478 UJ	**1.77 D**
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	<0.731 UJ	0.0997 JD	0.694 D	<0.478 UJ	**1.84 D**
Benzo(b)fluoranthene	205-99-2	**1**	1.7	5.6	mg/kg	<0.731 UJ	0.118 JD	0.624 D	<0.478 UJ	**2.34 D**
Benzo(g,h,i)Perylene	191-24-2	100	1,000	500	mg/kg	<0.731 UJ	<0.122 U	0.578 D	<0.478 UJ	1.29 D
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	56	mg/kg	<0.731 UJ	<0.122 U	0.543 D	<0.478 UJ	**0.884 D**
Chrysene	218-01-9	**1**	1	56	mg/kg	**1.51 J**	0.089 JD	0.573 D	<0.478 UJ	**1.66 D**
Dibenz(a,h)anthracene	53-70-3	**0.33**	1,000	0.56	mg/kg	<0.731 UJ	<0.122 U	0.126 D	<0.478 UJ	**0.338 D**
Fluoranthene	206-44-0	100	1,000	500	mg/kg	1.04 J	0.215 D	0.511 D	<0.478 UJ	2.57 D
Fluorene	86-73-7	30	386	500	mg/kg	2.19 J	<0.122 U	<0.0998 U	<0.478 UJ	<0.104 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	5.6	mg/kg	<0.731 UJ	0.0636 JD	**0.583 D**	<0.478 UJ	**1.34 D**
Naphthalene	91-20-3	12	12	500	mg/kg	5.14 J	<0.122 U	<0.0998 U	<0.478 UJ	<0.104 U
Phenanthrene	85-01-8	100	1,000	500	mg/kg	7.62 J	0.13 D	0.071 JD	<0.478 UJ	0.432 D
Pyrene	129-00-0	100	1,000	500	mg/kg	7.41 J	0.175 D	0.777 D	<0.478 UJ	2.46 D
General Chemistry										
Solids, Percent	SOLID	NS	NS	NS	Percent	55.6	66.6	81.4	86.2	78

Table 4
Site Management Plan
UST Endpoint Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Notes:

CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
NA - Not analyzed
RL - Reporting limit
<RL - Not detected

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Commercial Soil Cleanup Objectives (SCO).

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use, Restricted Use Commercial, and Protection of Groundwater Guidance Values (April 2023).

Qualifiers:

D - The concentration reported is a result of a diluted sample.

B - The analyte was found in the associated analysis batch blank.
J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Commercial SCOs

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB01	EPB02	EPB03	EPB04	EPB05	EPB06	EPB07	EPB08	EPB09	EPB10	EPB11	EPB12
					Sample Name	EPB01_020624	EPB02_020624	EPB03_02142024	EPB04_02142024	EPB05_03112024	EPB06_03112024	EPB07_03112024	EPB08_03112024	EPB09_03112024	EPB10_03132024	EPB11_03132024	EPB12_03132024
					Sample Date	02/06/2024	02/06/2024	02/14/2024	02/14/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/13/2024	03/13/2024	03/13/2024
					Sample Depth	0.5-1	3.5-4	0.5-1	1.5-2	0.5-1	0.5-1	5-5.5	5-5.5	1.5-2	5-5.5	0.5-1	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,1-Dichloroethane	75-34-3	0.27	0.27	240	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,1-Dichloroethene	75-35-4	0.33	0.33	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	NA	NA	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	190	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	3.2 D	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2-Dichloroethane	107-06-2	0.02	0.02	30	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	8.4	190	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.12	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	280	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	NA	NA	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	130	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	130	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	NA	NA	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	NA	NA	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	NA	NA	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Acetone	67-64-1	**0.05**	0.05	500	mg/kg	**0.1**	**0.12**	**0.15**	0.031	**0.083**	0.046	**0.081**	**0.27**	**0.12**	**0.11**	**0.14**	**0.052**
Acrolein	107-02-8	NS	NS	NS	mg/kg	<0.011 U	<0.012 U	<0.017 U	<0.01 U	<0.0097 U	<0.012 U	<0.011 U	<0.019 U	<0.012 U	<0.012 U	<0.016 U	<0.011 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Benzene	71-43-2	**0.06**	0.06	44	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	NA	NA	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	0.0033 J	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Carbon Tetrachloride	56-23-5	0.76	0.76	22	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Chlorobenzene	108-90-7	1.1	1.1	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Chloroform	67-66-3	0.37	0.37	350	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Cyclohexane	110-82-7	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.0086	0.003 J	0.003 J	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Ethylbenzene	100-41-4	**1**	1	390	mg/kg	0.014	<0.006 U	<0.0083 U	<0.005 U	0.054	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.016	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	0.061	<0.012 U	<0.017 U	<0.01 U	0.23	<0.012 U	<0.011 U	<0.019 U	<0.012 U	<0.012 U	<0.016 U	<0.011 U
Methyl Acetate	79-20-9	NS	NS	NS	mg/kg	0.0071	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	0.0045 J	<0.006 U	<0.0079 U	<0.0056 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	500	mg/kg	<0.0056 U	<0.006 U	0.005 J	0.0039 J	<0.0049 U	0.0088	<0.0057 U	<0.0097 U	<0.0058 U	0.0043 J	0.0064 J	0.0048 J
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.0056 UJ	<0.006 UJ	<0.0083 UJ	<0.005 UJ	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Methylcyclohexane	108-87-2	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.011	0.0057 J	0.0051 J	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Methylene Chloride	75-09-2	0.05	0.05	500	mg/kg	<0.011 U	<0.012 U	<0.017 U	<0.01 U	<0.0097 U	<0.012 U	<0.011 U	<0.019 U	<0.012 U	<0.012 U	<0.016 U	<0.011 U
n-Butylbenzene	104-51-8	12	12	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.034	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
n-Propylbenzene	103-65-1	3.9	3.9	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.047	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	0.022	<0.006 U	<0.0083 U	<0.005 U	0.15	0.0038 J	<0.0057 U	<0.0097 U	<0.0058 U	0.0035 J	<0.0079 U	<0.0056 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.0088	0.0085	0.0075	<0.0097 U	<0.0058 U	0.0069	0.021	<0.0056 U
Sec-Butylbenzene	135-98-8	11	11	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
T-Butylbenzene	98-06-6	5.9	5.9	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Tert-Butyl Alcohol	75-65-0	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	150	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Toluene	108-88-3	0.7	0.7	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	0.07	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Total Xylenes	1330-20-7	**0.26**	1.6	500	mg/kg	0.083	<0.018 U	<0.025 U	<0.015 U	**0.38**	<0.018 U	<0.017 U	<0.029 U	<0.017 U	<0.018 U	<0.024 U	<0.017 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	500	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene (TCE)	79-01-6	0.47	0.47	200	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	NA	NA	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U
Vinyl Chloride	75-01-4	0.02	0.02	13	mg/kg	<0.0056 U	<0.006 U	<0.0083 U	<0.005 U	<0.0049 U	<0.0059 U	<0.0057 U	<0.0097 U	<0.0058 U	<0.006 U	<0.0079 U	<0.0056 U

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB01	EPB02	EPB03	EPB04	EPB05	EPB06	EPB07	EPB08	EPB09	EPB10	EPB11	EPB12
					Sample Name	EPB01_020624	EPB02_020624	EPB03_02142024	EPB04_02142024	EPB05_03112024	EPB06_03112024	EPB07_03112024	EPB08_03112024	EPB09_03112024	EPB10_03132024	EPB11_03132024	EPB12_03132024
					Sample Date	02/06/2024	02/06/2024	02/14/2024	02/14/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/13/2024	03/13/2024	03/13/2024
					Sample Depth	0.5-1	3.5-4	0.5-1	1.5-2	0.5-1	0.5-1	5-5.5	5-5.5	1.5-2	5-5.5	0.5-1	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																	
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	500	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
1,2-Diphenylhydrazine	122-66-7	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	280	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	130	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	130	mg/kg	<0.0187 U	<0.0194 U	<0.0187 U	<0.019 U	<0.0187 U	<0.0192 U	<0.0187 U	<0.0192 U	<0.0187 U	<0.0198 U	<0.0198 U	<0.0198 U
1-Methylnaphthalene	90-12-0	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	0.0757 JD	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	0.675 D	0.202 D	0.0797 JD	0.0688 JD	0.0798 JD	<0.099 U	0.0645 JD	0.415 D	0.0906 JD	0.117 D	0.121 D	0.0824 JD
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	500	mg/kg	0.0641 JD	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	500	mg/kg	0.138 D	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
Acenaphthene	83-32-9	20	98	500	mg/kg	1.94 D	0.187 D	0.0845 JD	0.098 JD	0.0768 JD	0.129 D	0.116 D	0.397 D	0.0966 D	0.18 D	0.119 D	0.129 D
Acenaphthylene	208-96-8	100	107	500	mg/kg	0.131 D	0.121 D	0.0671 JD	0.0713 JD	0.0499 JD	0.0673 JD	0.0511 JD	0.135 JD	0.0591 JD	0.0946 JD	0.132 D	0.0824 JD
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	NS	NS	mg/kg	<0.365 U	<0.38 U	<0.395 U	<0.406 U	<0.385 U	<0.396 U	<0.394 U	<0.996 U	<0.375 U	<0.398 U	<0.388 U	<0.386 U
Anthracene	120-12-7	100	1,000	500	mg/kg	3 D	0.459 D	0.254 D	0.294 D	0.16 D	0.255 D	<0.0984 U	1.18 D	0.206 D	0.472 D	0.364 D	0.472 D
Atrazine	1912-24-9	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Benzaldehyde	100-52-7	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Benzidine	92-87-5	NS	NS	NS	mg/kg	<0.365 U	<0.38 U	<0.395 U	<0.406 U	<0.385 U	<0.396 U	<0.394 U	<0.996 U	<0.375 U	<0.398 U	<0.388 U	<0.386 U
Benzo(a)anthracene	56-55-3	**1**	1	5.6	mg/kg	**5.23 D**	0.931 D	0.506 D	0.474 D	0.552 D	0.62 D	0.581 D	**2.23 D**	0.51 D	**1.05 D**	1 D	**1.09 D**
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	**4.94 D**	0.788 D	0.504 D	0.477 D	0.532 D	0.502 D	0.444 D	**2.04 D**	0.457 D	0.941 D	0.994 D	0.983 D
Benzo(b)fluoranthene	205-99-2	**1**	1.7	5.6	mg/kg	**3.7 D**	0.627 D	0.394 D	0.367 D	0.465 D	0.444 D	<0.0984 U	**1.89 D**	0.393 D	0.796 D	0.811 D	0.821 D
Benzo(g,h,i)Perylene	191-24-2	100	1,000	500	mg/kg	2.48 D	0.507 D	0.344 D	0.316 D	0.334 D	0.326 D	0.059 JD	1.26 D	0.332 D	0.575 D	0.635 D	0.6 D
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	56	mg/kg	**3.48 D**	0.569 D	0.424 D	0.398 D	0.371 D	0.388 D	0.353 D	**1.5 D**	0.311 D	0.673 D	0.742 D	0.744 D
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	0.143 D	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	0.23 D	0.183 D	0.0553 JD	0.0988 JD	0.149 D	0.272 D	0.137 D	0.125 JD	0.0793 JD	0.116 D	0.132 D	0.239 D
Caprolactam	105-60-2	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	<0.197 U	<0.202 U	<0.192 U	<0.198 U	<0.197 U	<0.497 U	<0.187 U	<0.199 U	<0.194 U	<0.192 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	1.49 D	0.134 D	<0.0988 U	0.0688 JD	<0.096 U	0.0696 JD	<0.0984 U	0.578 D	0.0501 JD	0.154 D	0.0961 JD	0.102 D
Chrysene	218-01-9	**1**	1	56	mg/kg	**4.55 D**	0.963 D	0.524 D	0.479 D	0.54 D	0.561 D	<0.0984 U	**1.96 D**	0.481 D	0.968 D	0.908 D	1 D
Cresols, Total	1319-77-3	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	53-70-3	**0.33**	1,000	0.56	mg/kg	**1.02 D**	0.148 D	0.113 D	0.105 D	0.112 D	0.091 JD	<0.0984 U	**0.374 D**	0.0666 JD	0.174 D	0.203 D	0.219 D
Dibenzofuran	132-64-9	7	210	350	mg/kg	0.956 D	0.116 D	<0.0988 U	0.064 JD	<0.096 U	0.0641 JD	0.081 JD	0.312 D	0.0524 JD	0.115 D	0.0705 JD	0.0824 JD
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.0911 U	0.0576 JD	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	0.0508 JD
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Diphenylamine	122-39-4	NS	NS	NS	mg/kg	<0.182 U	<0.189 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	100	1,000	500	mg/kg	9.79 D	1.71 D	0.924 D	0.964 D	0.959 D	1.2 D	<0.0984 U	4.45 D	0.904 D	1.96 D	1.72 D	2.07 D
Fluorene	86-73-7	30	386	500	mg/kg	1.56 D	0.222 D	0.0868 JD	0.131 D	0.101 D	0.13 D	0.153 D	0.622 D	0.1 D	0.214 D	0.16 D	0.175 D
Hexachlorobenzene	118-74-1	0.33	3.2	6	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	5.6	mg/kg	**2.26 D**	0.407 D	0.344 D	0.3 D	0.391 D	0.394 D	<0.0984 U	**1.37 D**	0.367 D	**0.669 D**	**0.729 D**	**0.731 D**
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Naphthalene	91-20-3	12	12	500	mg/kg	1.53 D	0.236 D	0.104 D	0.0988 JD	0.089 JD	0.072 JD	0.105 D	0.519 D	0.103 D	0.157 D	0.143 D	0.114 D
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
n-Nitrosodimethylamine	62-75-9	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Parathion, Ethyl	56-38-2	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachloronitrobenzene	82-68-8	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Phenanthrene	85-01-8	100	1,000	500	mg/kg	9.59 D	1.59 D	0.682 D	0.922 D	0.61 D	0.963 D	<0.0984 U	4.27 D	0.778 D	1.97 D	1.27 D	1.69 D
Phenol	108-95-2	0.33	0.33	500	mg/kg	<0.0911 U	<0.0948 U	<0.0988 U	<0.101 U	<0.096 U	<0.099 U	<0.0984 U	<0.249 U	<0.0936 U	<0.0994 U	<0.097 U	<0.0963 U
Propargite	2312-35-8	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	129-00-0	100	1,000	500	mg/kg	8.02 D	2.25 D	0.989 D	0.932 D	1.09 D	1.32 D	1.13 D	3.34 D	1.12 D	2.11 D	1.84 D	2.04 D
Pyridine	110-86-1	NS	NS	NS	mg/kg	<0.365 U	<0.38 U	<0.395 U	<0.406 U	<0.385 U	<0.396 U	<0.394 U	<0.996 U	<0.375 U	<0.398 U	<0.388 U	<0.386 U
Resorcinol	108-46-3	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB01	EPB02	EPB03	EPB04	EPB05	EPB06	EPB07	EPB08	EPB09	EPB10	EPB11	EPB12
					Sample Name	EPB01_020624	EPB02_020624	EPB03_02142024	EPB04_02142024	EPB05_03112024	EPB06_03112024	EPB07_03112024	EPB08_03112024	EPB09_03112024	EPB10_03132024	EPB11_03132024	EPB12_03132024
					Sample Date	02/06/2024	02/06/2024	02/14/2024	02/14/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/13/2024	03/13/2024	03/13/2024
					Sample Depth	0.5-1	3.5-4	0.5-1	1.5-2	0.5-1	0.5-1	5-5.5	5-5.5	1.5-2	5-5.5	0.5-1	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																	
4,4'-DDD	72-54-8	0.0033	14	92	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
4,4'-DDE	72-55-9	**0.0033**	17	62	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
4,4'-DDT	50-29-3	**0.0033**	136	47	mg/kg	0.00183 D	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Aldrin	309-00-2	0.005	0.19	0.68	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	3.4	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Alpha Chlordane	5103-71-9	0.094	2.9	24	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Alpha Endosulfan	959-98-8	2.4	102	200	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	3	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Beta Endosulfan	33213-65-9	2.4	102	200	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	<0.036 U	<0.038 U	<0.0397 U	<0.0401 U	<0.038 U	<0.0392 U	<0.0389 U	<0.0394 U	<0.037 U	<0.0399 U	<0.0389 U	<0.0389 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	500	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Dieldrin	60-57-1	0.005	0.1	1.4	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Endosulfan Sulfate	1031-07-8	2.4	1,000	200	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Endrin	72-20-8	0.014	0.06	89	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	9.2	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Gamma-Chlordane	5566-34-7	NS	NS	NS	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Heptachlor	76-44-8	0.042	0.38	15	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.0018 U	<0.0019 U	<0.00199 U	<0.002 U	<0.0019 U	<0.00196 U	<0.00195 U	<0.00197 U	<0.00185 U	<0.00199 U	<0.00194 U	<0.00194 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.18 U	<0.19 U	<0.199 U	<0.2 U	<0.19 U	<0.196 U	<0.195 U	<0.197 U	<0.185 U	<0.199 U	<0.194 U	<0.194 U
Herbicides																	
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.0219 U	<0.023 U	<0.0239 U	<0.024 U	<0.0229 U	<0.0237 U	<0.0236 U	<0.0233 U	<0.0219 U	<0.0242 U	<0.0233 U	<0.0235 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.0219 U	<0.023 U	<0.0239 U	<0.024 U	<0.0229 U	<0.0237 U	<0.0236 U	<0.0233 U	<0.0219 U	<0.0242 U	<0.0233 U	<0.0235 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	500	mg/kg	<0.0219 U	<0.023 U	<0.0239 U	<0.024 U	<0.0229 U	<0.0237 U	<0.0236 U	<0.0233 U	<0.0219 U	<0.0242 U	<0.0233 U	<0.0235 U
Polychlorinated Biphenyl																	
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
Total PCBs	1336-36-3	**0.1**	3.2	1	mg/kg	<0.0182 U	<0.0192 U	<0.0201 U	<0.0202 U	<0.0192 U	<0.0198 U	<0.0197 U	<0.0199 U	<0.0187 U	<0.0201 U	<0.0196 U	<0.0196 U
Metals																	
Aluminum	7429-90-5	NS	NS	NS	mg/kg	5,680	8,760	7,130	7,500	7,540	7,990	7,500	7,290	8,690	8,750	6,440	8,950
Antimony	7440-36-0	NS	NS	NS	mg/kg	<2.29 U	<2.42 U	<2.52 U	<2.54 U	<2.41 U	<2.48 U	<2.47 U	<2.49 U	<2.35 U	<2.52 U	5.3	<2.46 U
Arsenic	7440-38-2	**13**	16	16	mg/kg	6.77	10.6	10	8.37	11.3	12.3	12.5	**17.1**	**13.5**	11.4	<1.48 U	10.6
Barium	7440-39-3	350	820	400	mg/kg	282	110	97.2	88.9	84.3	151	136	119	97	120	51.6	138
Beryllium	7440-41-7	7.2	47	590	mg/kg	<0.046 U	<0.049 U	<0.051 U	<0.051 U	<0.049 U	<0.05 U	<0.05 U	<0.05 U	<0.047 U	<0.051 U	<0.05 U	<0.05 U
Cadmium	7440-43-9	**2.5**	7.5	9.3	mg/kg	**6.79**	<0.29 U	0.453 J	**4.42 J**	0.454 J	**3.77 J**	**2.83 J**	1.26 J	0.521 J	1.09	0.631	**4.72**
Calcium	7440-70-2	NS	NS	NS	mg/kg	14,500	38,100	24,000	40,900	30,600	25,900	22,000	31,700	32,500	34,700	13,100	38,600
Chromium, Hexavalent	18540-29-9	1	19	400	mg/kg	<0.55 U	<0.58 U	<0.604 U	<0.609 U	<0.578 U	<0.595 U	<0.592 U	<0.598 U	<0.563 U	<0.606 U	<0.591 U	<0.591 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	15.6	75.4	27.7	44.9	25.5	30	30.7	34.5	109	30.5	413	29.9
Chromium, Trivalent	16065-83-1	**30**	NS	1,500	mg/kg	14.2	**65**	27.7	**44.9**	25.5	30	**30.7**	**34.5**	**109**	**30.5**	**413**	29.9
Cobalt	7440-48-4	NS	NS	NS	mg/kg	25	9.11	7.49	6.61	7.41	9.7	8.88	8.34	10.7	7.03	4.57	9.56
Copper	7440-50-8	**50**	1,720	270	mg/kg	**87.1**	**120**	**132**	**97**	**106**	**107**	**109**	**85.4**	**256**	**90.9 J**	**75.8 J**	**87.4 J**
Cyanide	57-12-5	27	40	27	mg/kg	<0.55 U	<0.58 U	<0.604 U	<0.609 U	<0.578 U	0.893	1.07 J	<0.598 U	1.07	1.03	0.709	1.06 J
Iron	7439-89-6	NS	NS	NS	mg/kg	13,400	23,100	13,600	15,500	14,600	18,000	15,600	16,500	29,400	15,700	6,120	18,000
Lead	7439-92-1	**63**	450	1,000	mg/kg	**197**	**172**	**157 B**	**118 B**	**625**	**175**	**167**	**135**	**155**	**170**	**102**	**186**
Magnesium	7439-95-4	NS	NS	NS	mg/kg	6,240	7,820	5,290	13,100	8,190	6,320	6,030	11,900	7,060	7,130	2,630	12,600
Manganese	7439-96-5	1,600	2,000	10,000	mg/kg	242	423	203	248	225	284	283	268	297	264	107	284
Mercury	7439-97-6	**0.18**	0.73	2.8	mg/kg	**0.493**	**1.16**	**0.858**	<0.0366 U	**0.542**	**0.471**	**0.469**	**0.412**	**0.727**	**0.859**	**1.21**	**0.581**
Nickel	7440-02-0	**30**	130	310	mg/kg	**49.9**	**40**	27.7	**35.4**	22.8	26.9	27.9	**30.7**	**59.1**	27.5	**38**	27
Potassium	7440-09-7	NS	NS	NS	mg/kg	1,380	1,580	1,290 B	1,450 B	1,290	1,220	1,200	1,220	1,090	1,820	515	1,610
Selenium	7782-49-2	**3.9**	4	1,500	mg/kg	<2.29 U	<2.42 U	<2.52 U	<2.54 U	2.57	**4.83**	3.06	2.92	**4.12**	<2.52 U	<2.46 U	<2.46 U
Silver	7440-22-4	**2**	8.3	1,500	mg/kg	<0.462 U	<0.487 U	<0.507 U	<0.512 U	<0.485 U	<0.5 U	<0.497 U	<0.503 U	<0.473 U	<0.509 UJ	0.584 J	<0.496 UJ
Sodium	7440-23-5	NS	NS	NS	mg/kg	545	568	449	837	409	684	557	618	480	832 J	682 J	1,130 J
Thallium	7440-28-0	NS	NS	NS	mg/kg	<2.29 U	<2.42 U	<2.52 U	<2.54 U	<2.41 U	<2.48 U	<2.47 U	<2.49 U	<2.35 U	<2.52 U	<2.46 U	<2.46 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	35.4	33.9	22.9	23.4	26.9	26.4	27.4	25.3	24.2	25.9	9.14	25.9
Zinc	7440-66-6	**109**	2,480	10,000	mg/kg	**376**	**180**	**163**	**174**	**143**	**286**	**235**	**181**	**217**	**198**	**247**	**242**

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB01	EPB02	EPB03	EPB04	EPB05	EPB06	EPB07	EPB08	EPB09	EPB10	EPB11	EPB12
					Sample Name	EPB01_020624	EPB02_020624	EPB03_02142024	EPB04_02142024	EPB05_03112024	EPB06_03112024	EPB07_03112024	EPB08_03112024	EPB09_03112024	EPB10_03132024	EPB11_03132024	EPB12_03132024
					Sample Date	02/06/2024	02/06/2024	02/14/2024	02/14/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/11/2024	03/13/2024	03/13/2024	03/13/2024
					Sample Depth	0.5-1	3.5-4	0.5-1	1.5-2	0.5-1	0.5-1	5-5.5	5-5.5	1.5-2	5-5.5	0.5-1	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																	
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	NS	NS	mg/kg	<0.000819 U	<0.000864 U	<0.000908 UJ	<0.000916 UJ	<0.000873 UJ	<0.000884 UJ	<0.000879 UJ	<0.000905 UJ	<0.00085 UJ	<0.000916 UJ	<0.000878 UJ	<0.00089 UJ
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000832 U	<0.000878 U	<0.000922 U	<0.000931 U	<0.000887 U	<0.000898 U	<0.000893 U	<0.000919 U	<0.000863 U	<0.000931 U	<0.000892 U	<0.000904 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	NS	NS	mg/kg	<0.000813 U	<0.000858 U	<0.0009 U	<0.000909 U	<0.000866 U	<0.000877 U	<0.000872 U	<0.000897 U	<0.000843 U	<0.000909 U	<0.000871 U	<0.000883 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000824 U	<0.000869 U	<0.000912 U	<0.000921 U	<0.000878 U	<0.000889 U	<0.000884 U	<0.000909 U	<0.000854 U	<0.000921 U	<0.000882 U	<0.000895 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00542 U	<0.00572 U	<0.006 U	<0.00606 U	<0.00578 U	<0.00585 U	<0.00582 U	<0.00598 U	<0.00562 U	<0.00606 U	<0.00581 U	<0.00588 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00542 U	<0.00572 U	<0.006 UJ	<0.00606 UJ	<0.00578 U	<0.00585 U	<0.00582 U	<0.00598 U	<0.00562 U	<0.00606 U	<0.00581 U	<0.00588 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.00108 UJ	<0.00114 UJ	<0.0012 UJ	<0.00121 UJ	<0.00116 UJ	<0.00117 UJ	<0.00116 UJ	<0.0012 UJ	<0.00112 UJ	<0.00121 UJ	<0.00116 UJ	<0.00118 UJ
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.000819 U	<0.000864 U	<0.000908 U	<0.000916 U	<0.000873 U	<0.000884 U	<0.000879 U	<0.000905 U	<0.00085 U	<0.000916 UJ	<0.000878 U	<0.00089 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	NS	NS	mg/kg	<0.000811 U	<0.000855 U	<0.000898 UJ	<0.000906 UJ	<0.000864 UJ	<0.000875 UJ	<0.00087 UJ	<0.000895 UJ	<0.000841 UJ	<0.000907 UJ	<0.000868 UJ	<0.00088 UJ
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.000867 U	<0.000915 U	<0.00096 U	<0.000969 U	<0.000924 UJ	<0.000936 UJ	<0.000931 UJ	<0.000957 UJ	<0.000899 UJ	<0.00097 UJ	<0.000929 UJ	<0.000942 UJ
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 UJ	<0.000242 UJ	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 UJ	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 UJ
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.00217 U	<0.00229 U	<0.0024 U	<0.00242 U	<0.00231 U	<0.00234 U	<0.00233 U	<0.00239 U	<0.00225 U	<0.00242 U	<0.00232 U	<0.00235 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.00217 U	<0.00229 U	<0.0024 U	<0.00242 U	<0.00231 U	<0.00234 U	<0.00233 U	<0.00239 U	<0.00225 U	<0.00242 U	<0.00232 U	<0.00235 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	NS	NS	mg/kg	<0.000434 U	<0.000457 U	<0.00048 U	<0.000485 U	<0.000462 UJ	<0.000468 UJ	<0.000465 UJ	<0.000479 UJ	<0.00045 UJ	<0.000485 UJ	<0.000464 UJ	<0.000471 UJ
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	NS	NS	mg/kg	<0.000386 U	<0.000407 U	<0.000427 U	<0.000431 U	<0.000411 U	<0.000416 U	<0.000414 U	<0.000426 U	<0.0004 U	<0.000432 UJ	<0.000413 U	<0.000419 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	NS	NS	mg/kg	<0.000434 UJ	<0.000457 UJ	<0.00048 UJ	<0.000485 UJ	<0.000462 UJ	<0.000468 UJ	<0.000465 UJ	<0.000479 UJ	<0.00045 UJ	<0.000485 UJ	<0.000464 UJ	<0.000471 UJ
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	NS	NS	mg/kg	<0.000434 U	<0.000457 U	<0.00048 U	<0.000485 U	<0.000462 U	<0.000468 U	<0.000465 U	<0.000479 U	<0.00045 U	<0.000485 U	<0.000464 U	<0.000471 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.000192 U	<0.000202 U	<0.000212 U	<0.000214 U	<0.000204 U	<0.000207 U	<0.000206 U	<0.000212 U	<0.000199 U	<0.000215 U	<0.000205 U	<0.000208 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000867 U	<0.000915 U	<0.00096 U	<0.000969 U	<0.000924 U	<0.000936 U	<0.000931 U	<0.000957 U	<0.000899 U	<0.00097 U	<0.000929 U	<0.000942 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000209 U	<0.000221 U	<0.000232 U	<0.000234 U	<0.000223 UJ	<0.000226 UJ	<0.000225 UJ	<0.000231 UJ	<0.000217 UJ	<0.000234 UJ	<0.000224 UJ	<0.000227 UJ
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 UJ	<0.000232 U	<0.000235 UJ
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.00021 U	<0.000222 U	<0.000233 U	<0.000235 U	<0.000224 UJ	<0.000227 UJ	<0.000226 UJ	<0.000232 UJ	<0.000218 UJ	<0.000235 UJ	<0.000225 UJ	<0.000228 UJ
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 UJ	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000198 U	<0.000209 U	<0.00022 U	<0.000222 U	<0.000211 U	<0.000214 UJ	<0.000213 U	<0.000219 U	<0.000206 U	<0.000222 UJ	<0.000212 U	<0.000215 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	0.000088 J	<0.000229 U	<0.00024 U	<0.000242 U	0.0000787 J	0.000101 J	0.0000996 J	0.000215 J	0.0000846 J	0.0000999 J	0.0000901 J	0.000137 J
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.000208 U	<0.00022 U	<0.000231 U	<0.000233 U	<0.000222 UJ	<0.000225 UJ	<0.000223 UJ	<0.00023 UJ	<0.000216 UJ	<0.000233 UJ	<0.000223 UJ	<0.000226 UJ
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 UJ	<0.000234 UJ	<0.000233 UJ	<0.000239 UJ	<0.000225 UJ	<0.000242 UJ	<0.000232 UJ	<0.000235 UJ
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 UJ	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 UJ	<0.000232 U	<0.000235 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.44	mg/kg	0.00048	<0.000213 U	<0.000223 U	0.000218 J	<0.000215 U	0.000479 J	0.000572	**0.00189**	<0.000209 U	0.000374	0.000369	0.000383 J
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.5	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 UJ	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 UJ	<0.000232 U	<0.000235 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000434 U	<0.000457 U	<0.00048 U	<0.000485 U	<0.000462 U	<0.000468 U	<0.000465 U	<0.000479 U	<0.00045 U	<0.000485 U	<0.000464 U	0.00128 J
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.000204 U	<0.000215 U	<0.000226 U	<0.000228 U	<0.000217 U	<0.00022 UJ	<0.000219 U	<0.000225 U	<0.000211 U	<0.000228 UJ	<0.000218 U	<0.000221 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
Perfluoroundecanoic Acid (PFUnDA)	2058-94-8	NS	NS	NS	mg/kg	<0.000217 U	<0.000229 U	<0.00024 U	<0.000242 U	<0.000231 U	<0.000234 U	<0.000233 U	<0.000239 U	<0.000225 U	<0.000242 U	<0.000232 U	<0.000235 U
General Chemistry																	
Solids, Percent	SOLID	NS	NS	NS	Percent	91	86.2	82.8	82	86.6	84	84.4	83.6	88.8	82.5	84.6	84.6

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB13	EPB13	EPB14	EPB15	EPB16	EPB17	EPB18	EPB19	EPB20	EPB21	EPB21	EPB22	EPB23
					Sample Name	EPB13_03152024	DUP_03152024	EPB14_03152024	EPB15_03152024	EPB16_03152024	EPB17_04102024	EPB18_04102024	EPB19_04182024	EPB20_04182024	EPB21_04182024	DUP_04182024	EPB22_05062024	EPB23_05072024
					Sample Date	03/15/2024	03/15/2024	03/15/2024	03/15/2024	03/15/2024	04/10/2024	04/10/2024	04/18/2024	04/18/2024	04/18/2024	04/18/2024	05/06/2024	05/07/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	1.5-2	0.5-1	3.5-4	3.5-4	3.5-4	12-12.5	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,1-Dichloroethane	75-34-3	0.27	0.27	240	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,1-Dichloroethene	75-35-4	0.33	0.33	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	NA	<0.01 UJ	<0.0052 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	190	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.011 J	<0.0052 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,2-Dichloroethane	107-06-2	0.02	0.02	30	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	8.4	190	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.061 J	<0.0052 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	280	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	130	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	130	mg/kg	<0.13 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.11 U	NA	NA
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Acetone	67-64-1	**0.05**	0.05	500	mg/kg	**0.18 J**	0.044 J	**0.11**	<0.011 U	**0.089**	**0.085**	0.023	<0.011 U	<0.012 U	0.047 J	<0.011 UJ	**0.091 J**	0.025
Acrolein	107-02-8	NS	NS	NS	mg/kg	<0.013 U	<0.013 U	<0.022 U	<0.011 U	<0.012 U	<0.012 U	<0.016 U	<0.011 U	<0.012 U	<0.012 U	<0.011 U	<0.02 UJ	<0.01 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Benzene	71-43-2	**0.06**	0.06	44	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.0086 J	<0.0052 U
Carbon Tetrachloride	56-23-5	0.76	0.76	22	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Chlorobenzene	108-90-7	1.1	1.1	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Chloroform	67-66-3	0.37	0.37	350	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 UJ	<0.0053 UJ	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 UJ
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Cyclohexane	110-82-7	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.064 J	<0.0052 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 UJ	<0.0053 UJ	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Ethylbenzene	100-41-4	**1**	1	390	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.021 J	<0.0052 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 UJ	<0.0053 UJ	<0.0062 U	<0.006 UJ	<0.0081 UJ	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.035 J	<0.0052 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.013 U	<0.013 U	<0.022 U	<0.011 U	<0.012 U	<0.012 U	<0.016 U	<0.011 U	<0.012 U	<0.012 U	<0.011 U	0.027 J	<0.01 U
Methyl Acetate	79-20-9	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	0.0061 J	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.021 J	<0.0052 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.0066 UJ	<0.0065 UJ	<0.011 UJ	<0.0053 UJ	<0.0062 UJ	<0.006 UJ	<0.0081 UJ	<0.0056 UJ	<0.0058 UJ	<0.0058 UJ	<0.0055 UJ	<0.01 UJ	<0.0052 UJ
Methylcyclohexane	108-87-2	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	2.3 J	0.0028 J
Methylene Chloride	75-09-2	0.05	0.05	500	mg/kg	<0.013 U	<0.013 U	<0.022 U	<0.011 U	<0.012 U	<0.012 U	<0.016 U	<0.011 U	<0.012 U	<0.012 U	<0.011 U	<0.02 UJ	<0.01 U
n-Butylbenzene	104-51-8	12	12	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 UJ	<0.0058 UJ	<0.0058 UJ	<0.0055 UJ	0.042 J	<0.0052 U
n-Propylbenzene	103-65-1	3.9	3.9	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.055 J	<0.0052 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.059 J	<0.0052 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	0.0086 J	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.0072 J	<0.0052 U
Sec-Butylbenzene	135-98-8	11	11	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.032 J	<0.0052 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
T-Butylbenzene	98-06-6	5.9	5.9	500	mg/kg	<0.0066 UJ	<0.0065 UJ	<0.011 UJ	<0.0053 UJ	<0.0062 UJ	<0.006 UJ	<0.0081 UJ	<0.0056 UJ	<0.0058 UJ	<0.0058 UJ	<0.0055 UJ	0.0065 J	<0.0052 UJ
Tert-Butyl Alcohol	75-65-0	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.063 J	<0.0052 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	150	mg/kg	<0.0066 U	<0.0065 U	<0.011 UJ	<0.0053 UJ	<0.0062 U	<0.006 UJ	<0.0081 UJ	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Toluene	108-88-3	0.7	0.7	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	0.033 J	0.0026 J
Total Xylenes	1330-20-7	**0.26**	1.6	500	mg/kg	<0.02 U	<0.019 U	<0.033 U	<0.016 U	<0.019 U	<0.018 U	<0.024 U	<0.017 U	<0.018 U	<0.017 U	<0.017 U	0.086 J	<0.016 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	500	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene (TCE)	79-01-6	0.47	0.47	200	mg/kg	<0.0066 U	<0.0065 U	<0.011 UJ	<0.0053 UJ	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U
Vinyl Chloride	75-01-4	0.02	0.02	13	mg/kg	<0.0066 U	<0.0065 U	<0.011 U	<0.0053 U	<0.0062 U	<0.006 U	<0.0081 U	<0.0056 U	<0.0058 U	<0.0058 U	<0.0055 U	<0.01 UJ	<0.0052 U

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB13	EPB13	EPB14	EPB15	EPB16	EPB17	EPB18	EPB19	EPB20	EPB21	EPB21	EPB22	EPB23
					Sample Name	EPB13_03152024	DUP_03152024	EPB14_03152024	EPB15_03152024	EPB16_03152024	EPB17_04102024	EPB18_04102024	EPB19_04182024	EPB20_04182024	EPB21_04182024	DUP_04182024	EPB22_05062024	EPB23_05072024
					Sample Date	03/15/2024	03/15/2024	03/15/2024	03/15/2024	03/15/2024	04/10/2024	04/10/2024	04/18/2024	04/18/2024	04/18/2024	04/18/2024	05/06/2024	05/07/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	1.5-2	0.5-1	3.5-4	3.5-4	3.5-4	12-12.5	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																		
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	NA	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	500	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
1,2-Diphenylhydrazine	122-66-7	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	280	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	130	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	130	mg/kg	<0.0198 U	<0.0198 U	<0.0198 U	<0.0192 U	<0.0198 U	<0.0198 U	<0.0198 U	<0.0196 U	<0.0196 U	<0.0196 U	<0.0189 U	<0.0194 U	<0.0196 U
1-Methylnaphthalene	90-12-0	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	0.38 J	0.0849 J	0.1 D	0.143 D	0.21 D	0.198 D	0.387 D	<0.0939 U	<0.0941 U	0.427 J	<0.0935 UJ	0.294 D	0.082 JD
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	500	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	500	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
Acenaphthene	83-32-9	20	98	500	mg/kg	0.697 J	0.0618 J	0.129 D	0.0651 JD	0.143 D	0.275 D	0.355 D	<0.0939 U	<0.0941 U	0.206 D	<0.0935 U	0.332 D	<0.0892 U
Acenaphthylene	208-96-8	100	107	500	mg/kg	0.121 D	0.0649 JD	0.12 D	0.211 D	0.128 D	0.0913 D	0.133 D	<0.0939 U	0.0617 JD	0.107 D	<0.0935 U	<0.124 U	<0.0892 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	0.114 D	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	NS	NS	mg/kg	<0.376 U	<0.387 U	<0.396 U	<0.371 U	<0.361 U	<0.36 U	<0.377 U	<0.376 U	<0.377 U	<0.374 U	<0.374 U	<0.498 U	<0.357 U
Anthracene	120-12-7	100	1,000	500	mg/kg	1.78 J	0.231 J	0.447 D	0.4 D	0.453 D	0.795 D	1.02 D	0.135 D	0.125 D	0.378 J	0.113 J	0.179 D	0.0948 D
Atrazine	1912-24-9	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Benzaldehyde	100-52-7	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	0.397 D	<0.0892 U
Benzidine	92-87-5	NS	NS	NS	mg/kg	<0.376 U	<0.387 U	<0.396 U	<0.371 U	<0.361 U	<0.36 U	<0.377 U	<0.376 U	<0.377 U	<0.374 U	<0.374 U	<0.498 U	<0.357 U
Benzo(a)anthracene	56-55-3	**1**	1	5.6	mg/kg	**1.83 J**	0.528 J	0.803 D	0.911 D	0.782 D	**1.63 D**	**1.77 D**	0.363 D	0.35 D	0.631 J	0.3 J	0.227 D	0.244 D
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	**1.77 J**	0.474 J	0.803 D	**1.1 D**	0.8 D	**1.41 D**	**1.57 D**	0.367 D	0.379 D	0.709 J	0.312 J	0.21 D	0.246 D
Benzo(b)fluoranthene	205-99-2	**1**	1.7	5.6	mg/kg	**1.11 J**	0.391 J	0.658 D	0.974 D	0.681 D	**1.23 D**	**1.19 D**	0.433 D	0.465 D	0.809 J	0.37 J	0.257 D	0.312 D
Benzo(g,h,i)Perylene	191-24-2	100	1,000	500	mg/kg	0.871 J	0.277 J	0.438 D	0.948 D	0.445 D	0.892 D	0.916 D	0.206 D	0.23 D	0.413 J	0.163 J	0.152 D	0.167 D
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	56	mg/kg	**1.07 J**	0.286 J	0.572 D	0.785 D	0.614 D	**1.07 D**	**1.11 D**	0.143 D	0.147 D	0.256 D	0.12 D	0.0874 JD	0.109 D
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 UJ	<0.0941 UJ	<0.0934 UJ	<0.0935 UJ	<0.124 U	<0.0892 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	0.057 JD	0.0494 JD	<0.0988 U	0.381 D	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	0.0453 JD	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	0.0697 JD	<0.0966 U	0.201 D	0.63 D	0.3 D	0.434 D	0.133 D	0.234 D	0.135 D	0.24 D	0.1 D	<0.124 U	<0.0892 U
Caprolactam	105-60-2	NS	NS	NS	mg/kg	<0.187 U	<0.193 U	<0.197 U	<0.185 U	<0.18 U	<0.18 U	<0.188 U	<0.188 U	<0.188 U	<0.186 U	<0.187 U	<0.248 U	<0.178 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.154 D	<0.0966 U	0.0948 JD	0.11 D	0.108 D	0.314 D	0.131 D	0.0495 JD	<0.0941 U	0.116 D	<0.0935 U	<0.124 U	<0.0892 U
Chrysene	218-01-9	**1**	1	56	mg/kg	**1.55 J**	0.493 J	0.709 D	0.851 D	0.74 D	**1.53 D**	**1.66 D**	0.323 D	0.349 D	0.616 J	0.27 J	0.239 D	0.238 D
Cresols, Total	1319-77-3	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	53-70-3	**0.33**	1,000	0.56	mg/kg	0.297 D	0.119 D	0.173 D	0.234 D	0.166 D	0.272 D	0.315 D	0.0571 JD	0.0692 JD	0.107 D	<0.0935 U	<0.124 U	<0.0892 U
Dibenzofuran	132-64-9	7	210	350	mg/kg	0.275 D	<0.0966 U	<0.0988 U	0.0666 JD	0.112 D	0.19 D	0.185 D	<0.0939 U	<0.0941 U	0.151 D	<0.0935 U	0.201 D	<0.0892 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	0.0545 JD	0.166 D	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.0938 U	0.0656 JD	<0.0988 U	0.0681 JD	0.067 JD	0.0741 JD	<0.0943 U	<0.0939 U	<0.0941 U	8.59 J	<0.0935 UJ	<0.124 U	<0.0892 U
Diphenylamine	122-39-4	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	100	1,000	500	mg/kg	3.25 J	0.763 J	1.58 D	1.53 D	1.52 D	3.01 D	3.12 D	0.838 D	0.813 D	1.83 J	0.696 J	0.644 D	0.536 D
Fluorene	86-73-7	30	386	500	mg/kg	0.944 J	0.078 J	0.167 D	0.101 D	0.216 D	0.362 D	0.537 D	<0.0939 U	0.0482 JD	0.234 D	<0.0935 U	0.289 D	<0.0892 U
Hexachlorobenzene	118-74-1	0.33	3.2	6	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 UJ	<0.0943 UJ	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	5.6	mg/kg	**0.827 J**	0.263 J	0.432 D	**0.686 D**	0.445 D	**1.09 D**	**1.04 D**	0.238 D	0.246 D	0.438 J	0.197 J	0.152 D	0.18 D
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Naphthalene	91-20-3	12	12	500	mg/kg	0.246 D	0.117 D	0.16 D	0.134 D	0.24 D	0.237 D	0.346 D	<0.0939 U	0.0497 JD	0.333 J	0.0486 J	0.242 D	0.0863 JD
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
n-Nitrosodimethylamine	62-75-9	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Parathion, Ethyl	56-38-2	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachloronitrobenzene	82-68-8	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Phenanthrene	85-01-8	100	1,000	500	mg/kg	5.26 J	0.609 J	1.19 D	0.925 D	1.3 D	2.52 D	3.17 D	0.468 D	0.385 D	1.49 J	0.398 J	0.937 D	0.357 D
Phenol	108-95-2	0.33	0.33	500	mg/kg	<0.0938 U	<0.0966 U	<0.0988 U	<0.0925 U	<0.0901 U	<0.09 U	<0.0943 U	<0.0939 U	<0.0941 U	<0.0934 U	<0.0935 U	<0.124 U	<0.0892 U
Propargite	2312-35-8	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	129-00-0	100	1,000	500	mg/kg	3.38 J	0.691 J	1.38 D	1.66 D	1.31 D	2.82 D	3.67 D	0.64 D	0.598 D	1.33 J	0.536 J	0.589 D	0.437 D
Pyridine	110-86-1	NS	NS	NS	mg/kg	<0.376 U	<0.387 U	<0.396 U	<0.371 U	<0.361 U	<0.36 U	<0.377 U	<0.376 U	<0.377 U	<0.374 U	<0.374 U	<0.498 U	<0.357 U
Resorcinol	108-46-3	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB13	EPB13	EPB14	EPB15	EPB16	EPB17	EPB18	EPB19	EPB20	EPB21	EPB21	EPB22	EPB23
					Sample Name	EPB13_03152024	DUP_03152024	EPB14_03152024	EPB15_03152024	EPB16_03152024	EPB17_04102024	EPB18_04102024	EPB19_04182024	EPB20_04182024	EPB21_04182024	DUP_04182024	EPB22_05062024	EPB23_05072024
					Sample Date	03/15/2024	03/15/2024	03/15/2024	03/15/2024	03/15/2024	04/10/2024	04/10/2024	04/18/2024	04/18/2024	04/18/2024	04/18/2024	05/06/2024	05/07/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	1.5-2	0.5-1	3.5-4	3.5-4	3.5-4	12-12.5	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																		
4,4'-DDD	72-54-8	0.0033	14	92	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
4,4'-DDE	72-55-9	**0.0033**	17	62	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	0.00211 D
4,4'-DDT	50-29-3	**0.0033**	136	47	mg/kg	<0.00185 U	<0.00189 U	0.00197 J	**0.00751 J**	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	0.0018 J
Aldrin	309-00-2	0.005	0.19	0.68	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	3.4	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Alpha Chlordane	5103-71-9	0.094	2.9	24	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	0.00268 D	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Alpha Endosulfan	959-98-8	2.4	102	200	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	3	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Beta Endosulfan	33213-65-9	2.4	102	200	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	<0.0369 U	<0.0377 U	<0.0394 U	<0.0369 U	<0.0352 U	<0.0355 U	<0.0367 U	<0.0369 U	<0.0369 U	<0.0363 U	<0.0367 U	<0.0488 U	<0.0353 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	500	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Dieldrin	60-57-1	0.005	0.1	1.4	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Endosulfan Sulfate	1031-07-8	2.4	1,000	200	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Endrin	72-20-8	0.014	0.06	89	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	9.2	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Gamma-Chlordane	5566-34-7	NS	NS	NS	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	0.00318 D	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Heptachlor	76-44-8	0.042	0.38	15	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.00185 U	<0.00189 U	<0.00197 U	<0.00184 U	<0.00176 U	<0.00177 U	<0.00183 U	<0.00185 U	<0.00184 U	<0.00182 U	<0.00184 U	<0.00244 U	<0.00176 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.185 U	<0.189 U	<0.197 U	<0.184 U	<0.176 U	<0.177 U	<0.183 U	<0.185 U	<0.184 U	<0.182 U	<0.184 U	<0.244 U	<0.176 U
Herbicides																		
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.0224 U	<0.0232 U	<0.0239 U	<0.0223 U	<0.0212 U	<0.0215 U	<0.0225 U	<0.0225 U	<0.0226 U	<0.0224 U	<0.0224 U	<0.0298 U	<0.0216 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.0224 U	<0.0232 U	<0.0239 U	<0.0223 U	<0.0212 U	<0.0215 U	<0.0225 U	<0.0225 U	<0.0226 U	<0.0224 U	<0.0224 U	<0.0298 U	<0.0216 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	500	mg/kg	<0.0224 U	<0.0232 U	<0.0239 U	<0.0223 U	<0.0212 U	<0.0215 U	<0.0225 U	<0.0225 U	<0.0226 U	<0.0224 U	<0.0224 U	<0.0298 U	<0.0216 U
Polychlorinated Biphenyl																		
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	<0.0186 U	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	<0.0186 U	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	<0.0186 U	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	<0.0186 U	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	0.187	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	<0.0186 U	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	0.0712	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
Total PCBs	1336-36-3	**0.1**	3.2	1	mg/kg	<0.0186 U	<0.019 U	<0.0199 U	**0.258**	<0.0178 U	<0.0179 U	<0.0185 U	<0.0186 U	<0.0186 U	<0.0183 U	<0.0185 U	<0.0247 U	<0.0178 U
Metals																		
Aluminum	7429-90-5	NS	NS	NS	mg/kg	5,550	7,280	9,890	5,420	8,710	7,490	10,300	7,310	8,960	9,380	5,810	7,180	6,960
Antimony	7440-36-0	NS	NS	NS	mg/kg	<2.37 U	<2.43 U	<2.5 U	6.25 J	<2.27 U	<2.25 U	13	<2.35 U	<2.36 U	<2.34 U	<2.34 U	<3.11 U	<2.26 U
Arsenic	7440-38-2	**13**	16	16	mg/kg	10.9	12.6	12.2	**70.4**	11.5	8.86	**14.4**	8.21	6.85	8.85 J	5.47 J	**21.4**	**14.2**
Barium	7440-39-3	350	820	400	mg/kg	176	145	143	321	116	101	140	72.1	78.5	82.3	54	174	97.3
Beryllium	7440-41-7	7.2	47	590	mg/kg	<0.048 U	<0.049 U	<0.05 U	0.286 J	<0.046 U	<0.045 U	0.072	<0.047 U	<0.048 U	<0.047 U	<0.047 U	<0.063 U	<0.046 U
Cadmium	7440-43-9	**2.5**	7.5	9.3	mg/kg	0.294 J	0.353 J	1.9 J	**6.34 J**	1.31 J	0.516 J	0.929 J	0.328 J	1.53 J	0.775 J	<0.281 UJ	0.672 J	0.915 J
Calcium	7440-70-2	NS	NS	NS	mg/kg	31,600	32,900	37,500	14,100 J	35,500	37,500	36,200	5,930	14,800	47,200 J	3,790 J	14,000	18,500
Chromium, Hexavalent	18540-29-9	1	19	400	mg/kg	<0.569 U	<0.583 U	<0.6 U	<0.56 U	<0.546 U	<0.541 U	<0.567 U	<0.565 U	<0.566 U	<0.562 U	<0.562 U	<0.747 U	<0.542 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	16.4 J	60.6 J	40.2	29.9	24.9	20.9	1,010	14.9	18	18.5	13.2	20.8	17.3
Chromium, Trivalent	16065-83-1	**30**	NS	1,500	mg/kg	16.4 J	**60.6 J**	**40.2**	29.9	24.9	20.9	**1,010**	14.9	18	18.5	13.2	20.8	17.3
Cobalt	7440-48-4	NS	NS	NS	mg/kg	4.49 J	39.3 J	8.59	10.4	6.61	5.32	27.5	5.62	8.37	5.28	5.06	4.67	6.65
Copper	7440-50-8	**50**	1,720	270	mg/kg	**84.2 J**	**188 J**	**101**	**283**	**100**	**108**	**331**	**63.8**	**83.8**	**73.6**	**75.7**	**130**	**326**
Cyanide	57-12-5	27	40	27	mg/kg	0.569	<0.583 U	0.721	0.953 J	0.764	1.19	1.64	<0.565 U	<0.566 U	<0.562 U	0.562	2.84	0.813
Iron	7439-89-6	NS	NS	NS	mg/kg	9,840 J	17,200 J	16,100	23,700	16,100	14,100	26,000	21,700	14,700	15,100	10,500	21,100	13,800
Lead	7439-92-1	**63**	450	1,000	mg/kg	**104 J**	**184 J**	**187**	**607**	**191**	**145**	**242**	**123**	**107**	**97**	60.1	**595 B**	**151**
Magnesium	7439-95-4	NS	NS	NS	mg/kg	7,670	8,450	6,520	3,070	7,440	5,850	5,810	3,470	4,690	9,070 J	2,100 J	3,720	4,670
Manganese	7439-96-5	1,600	2,000	10,000	mg/kg	158 J	548 J	286	212	248	238	363	233	238	250 J	147 J	200	223
Mercury	7439-97-6	**0.18**	0.73	2.8	mg/kg	**0.638**	**0.872**	**0.867**	**1.44 J**	**0.728**	**1.23**	**1.69**	**0.692**	**0.253**	**0.603 J**	**0.302 J**	**10.1**	**0.579**
Nickel	7440-02-0	**30**	130	310	mg/kg	16.3 J	**39.6 J**	**40.7**	**39.7**	24.3	20.1	**42**	21.1	27	17.8	18.1	21.6	**30.2**
Potassium	7440-09-7	NS	NS	NS	mg/kg	1,020	1,590	2,090	797	2,110	1,210	1,600	1,230	1,530	1,580	1,150	1,380	1,230
Selenium	7782-49-2	**3.9**	4	1,500	mg/kg	<2.37 U	3.57	2.68	**5.42**	2.58	<2.25 U	<2.36 U	<2.35 U	<2.36 U	<2.34 U	<2.34 U	<3.11 U	<2.26 U
Silver	7440-22-4	**2**	8.3	1,500	mg/kg	<0.478 U	<0.49 U	<0.504 U	<0.471 UJ	<0.458 U	<0.455 U	**3.44**	<0.475 U	<0.476 U	<0.472 U	<0.472 U	<0.628 U	<0.455 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	379 J	637 J	992	410 J	1,090	866	488	274	358	707 J	194 J	1,230	412
Thallium	7440-28-0	NS	NS	NS	mg/kg	<2.37 U	<2.43 U	<2.5 U	<2.33 U	<2.27 U	<2.25 U	<2.36 U	<2.35 U	<2.36 U	<2.34 U	<2.34 U	<3.11 U	<2.26 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	19.4	25.5	28.5	83.9	27.1	19.8	26	21.9	28.8	21.9	20.7	21.7	22.4
Zinc	7440-66-6	**109**	2,480	10,000	mg/kg	**128 J**	**468 J**	**203**	**954**	**181**	**147**	**586**	**111**	**163**	**113**	70.7	**299**	**229**

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB13	EPB13	EPB14	EPB15	EPB16	EPB17	EPB18	EPB19	EPB20	EPB21	EPB21	EPB22	EPB23
					Sample Name	EPB13_03152024	DUP_03152024	EPB14_03152024	EPB15_03152024	EPB16_03152024	EPB17_04102024	EPB18_04102024	EPB19_04182024	EPB20_04182024	EPB21_04182024	DUP_04182024	EPB22_05062024	EPB23_05072024
					Sample Date	03/15/2024	03/15/2024	03/15/2024	03/15/2024	03/15/2024	04/10/2024	04/10/2024	04/18/2024	04/18/2024	04/18/2024	04/18/2024	05/06/2024	05/07/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	1.5-2	0.5-1	3.5-4	3.5-4	3.5-4	12-12.5	0.5-1
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	NS	NS	mg/kg	<0.000856 UJ	<0.000876 UJ	<0.000895 UJ	<0.000842 UJ	<0.000822 UJ	<0.000818 UJ	<0.000857 UJ	<0.000854 UJ	<0.000856 UJ	<0.000849 UJ	<0.00085 UJ	<0.00112 U	<0.000818 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.00087 U	<0.00089 U	<0.00091 U	<0.000856 U	<0.000835 U	<0.000831 U	<0.000871 U	<0.000868 U	<0.00087 U	<0.000863 U	<0.000863 U	<0.00113 U	<0.000831 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	NS	NS	mg/kg	<0.00085 U	<0.000869 U	<0.000888 U	<0.000835 UJ	<0.000815 U	<0.000812 UJ	<0.00085 UJ	<0.000847 UJ	<0.000849 UJ	<0.000842 UJ	<0.000843 UJ	<0.00111 UJ	<0.000811 UJ
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000861 U	<0.000881 U	<0.0009 U	<0.000847 U	<0.000826 U	<0.000823 UJ	<0.000862 UJ	<0.000859 UJ	<0.000861 UJ	<0.000854 UJ	<0.000854 UJ	<0.00112 UJ	<0.000822 UJ
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00566 UJ	<0.00579 UJ	<0.00592 UJ	<0.00557 UJ	<0.00544 UJ	<0.00541 U	<0.00567 U	<0.00565 U	<0.00566 U	<0.00562 U	<0.00562 U	<0.00739 U	<0.00541 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00566 UJ	<0.00579 UJ	<0.00592 UJ	<0.00557 UJ	<0.00544 UJ	<0.00541 U	<0.00567 U	<0.00565 U	<0.00566 U	<0.00562 U	<0.00562 U	<0.00739 U	<0.00541 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.00113 UJ	<0.00116 UJ	<0.00118 UJ	<0.00111 UJ	<0.00109 UJ	<0.00108 UJ	<0.00113 UJ	<0.00113 U	<0.00113 U	<0.00112 U	<0.00112 U	<0.00148 U	<0.00108 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.000856 UJ	<0.000876 UJ	<0.000895 UJ	<0.000842 UJ	<0.000822 UJ	<0.000818 U	<0.000857 U	<0.000854 U	<0.000856 U	<0.000849 U	<0.00085 U	<0.00112 U	<0.000818 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	NS	NS	mg/kg	<0.000847 UJ	<0.000867 UJ	<0.000886 UJ	<0.000833 UJ	<0.000813 UJ	<0.00081 U	<0.000848 U	<0.000845 U	<0.000847 U	<0.00084 U	<0.000841 U	<0.0011 U	<0.000809 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.000906 UJ	<0.000927 UJ	<0.000947 UJ	<0.000891 UJ	<0.00087 UJ	<0.000866 U	<0.000907 U	<0.000904 U	<0.000906 U	<0.000898 U	<0.000899 U	<0.00118 U	<0.000865 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	<0.000223 U	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	<0.000223 U	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.00227 U	<0.00232 U	<0.00237 U	<0.00223 U	<0.00217 U	<0.00216 U	<0.00227 U	<0.00226 U	<0.00227 U	<0.00225 U	<0.00225 U	<0.00295 U	<0.00216 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	<0.000223 U	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	<0.000223 U	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.00227 U	<0.00232 U	<0.00237 U	<0.00223 U	<0.00217 U	<0.00216 U	<0.00227 U	<0.00226 U	<0.00227 U	<0.00225 U	<0.00225 U	<0.00295 U	<0.00216 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	NS	NS	mg/kg	<0.000453 U	<0.000464 U	<0.000474 U	<0.000446 U	<0.000435 U	<0.000433 U	<0.000454 U	<0.000452 U	<0.000453 U	<0.000449 U	<0.00045 U	<0.000591 U	<0.000433 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	NS	NS	mg/kg	<0.000403 U	<0.000413 U	<0.000422 U	<0.000397 U	<0.000387 U	<0.000385 U	<0.000404 U	<0.000402 U	<0.000403 U	<0.0004 U	<0.0004 U	<0.000526 U	<0.000385 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	NS	NS	mg/kg	<0.000453 U	<0.000464 U	<0.000474 U	<0.000446 U	<0.000435 U	<0.000433 UJ	<0.000454 UJ	<0.000452 U	<0.000453 U	<0.000449 U	<0.00045 U	<0.000591 U	<0.000433 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	NS	NS	mg/kg	<0.000453 U	<0.000464 U	<0.000474 U	<0.000446 U	<0.000435 U	<0.000433 U	<0.000454 U	<0.000452 U	<0.000453 U	<0.000449 U	<0.00045 U	<0.000591 U	<0.000433 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.0002 U	<0.000205 U	<0.00021 U	<0.000197 U	<0.000192 U	<0.000192 U	<0.000201 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000261 U	<0.000191 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000906 U	<0.000927 U	<0.000947 U	<0.000891 U	0.00661 J	<0.000866 U	<0.000907 U	<0.000904 U	<0.000906 U	<0.000898 U	<0.000899 U	<0.00118 U	<0.000865 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000219 UJ	<0.000224 UJ	<0.000229 UJ	<0.000215 UJ	<0.00021 UJ	<0.000209 U	<0.000219 U	<0.000218 U	<0.000219 U	<0.000217 U	<0.000217 U	<0.000285 U	<0.000209 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000568	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.00022 UJ	<0.000225 UJ	<0.00023 UJ	<0.000216 UJ	<0.000211 UJ	<0.00021 UJ	<0.00022 UJ	<0.000219 U	<0.00022 U	<0.000218 U	<0.000218 U	<0.000287 U	<0.00021 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000311	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	<0.000223 U	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000226	<0.000217 U	<0.000216 UJ	<0.000227 UJ	<0.000226 UJ	<0.000227 UJ	<0.000225 UJ	<0.000225 UJ	<0.000295 U	<0.000216 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000217 U	<0.000204 U	<0.000199 U	<0.000198 U	<0.000208 U	<0.000207 U	<0.000207 U	<0.000206 U	<0.000206 U	<0.00027 U	<0.000198 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000321 J	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.000217 U	<0.000223 U	<0.000227 U	<0.000214 U	<0.000209 U	<0.000208 U	<0.000218 U	<0.000217 U	<0.000217 U	<0.000216 U	<0.000216 U	<0.000284 U	<0.000208 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000358	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	<0.000223 U	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.44	mg/kg	0.000205 J	<0.000216 U	0.000427	**0.00284**	0.000354	<0.000201 U	<0.000211 U	<0.00021 U	0.000357	<0.000209 U	<0.000209 U	0.000457	<0.000201 U
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.5	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000635	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000453 U	<0.000464 U	<0.000474 U	<0.000446 U	<0.000435 U	<0.000433 U	<0.000454 U	<0.000452 U	<0.000453 U	<0.000449 U	<0.00045 U	<0.000591 U	<0.000433 U
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.000213 U	<0.000218 U	<0.000223 U	<0.000209 U	<0.000204 U	<0.000203 U	<0.000213 U	<0.000212 U	<0.000213 U	<0.000211 U	<0.000211 U	<0.000278 U	<0.000203 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000203 J	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000225	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 U	<0.000225 U	<0.000295 U	<0.000216 U
Perfluoroundecanoic Acid (PFUnDA)	2058-94-8	NS	NS	NS	mg/kg	<0.000227 U	<0.000232 U	<0.000237 U	0.000463	<0.000217 U	<0.000216 U	<0.000227 U	<0.000226 U	<0.000227 U	<0.000225 UJ	<0.000225 U	<0.000295 U	<0.000216 U
General Chemistry																		
Solids, Percent	SOLID	NS	NS	NS	Percent	87.9	85.8	83.3	89.2	91.6	92.4	88.2	88.5	88.3	89	88.9	66.9	92.3

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB24	EPB25	EPB26	EPB27	EPB28	EPB29	EPB30	EPB31	EPB32	EPB33	EPB34	EPB35
					Sample Name	EPB24_05072024	EPB25_05212024	EPB26_05212024	EPB27_05212024	EPB28_05222024	EPB29_05222024	EPB30_05222024	EPB31_06122024	EPB32_06122024	EPB33_06122024	EPB34_06122024	EPB35_06122024
					Sample Date	05/07/2024	05/21/2024	05/21/2024	05/21/2024	05/22/2024	05/22/2024	05/22/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	3.5-4	0.5-1	1.5-2	0.5-1	3.5-4	3.5-4	3-3.5
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,1-Dichloroethane	75-34-3	0.27	0.27	240	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,1-Dichloroethene	75-35-4	0.33	0.33	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	190	mg/kg	<0.006 U	0.011	<0.0021 U	0.021	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2-Dichloroethane	107-06-2	0.02	0.02	30	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	8.4	190	mg/kg	<0.006 U	0.0037 J	<0.0021 U	0.0097	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	280	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	130	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	130	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Acetone	67-64-1	**0.05**	0.05	500	mg/kg	0.011 J	0.043	0.0043	**0.053**	<0.006 U	0.0034 J	<0.0054 U	<0.015 U	<0.011 U	0.032	0.014 J	<0.01 U
Acrolein	107-02-8	NS	NS	NS	mg/kg	<0.012 U	<0.0093 U	<0.0042 U	<0.0089 U	<0.006 U	<0.0049 U	<0.0054 U	<0.015 U	<0.011 U	<0.014 U	<0.01 U	<0.01 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Benzene	71-43-2	**0.06**	0.06	44	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.006 U	0.0033 J	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Carbon Tetrachloride	56-23-5	0.76	0.76	22	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Chlorobenzene	108-90-7	1.1	1.1	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Chloroform	67-66-3	0.37	0.37	350	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.006 UJ	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Cyclohexane	110-82-7	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Ethylbenzene	100-41-4	**1**	1	390	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.012 U	<0.0093 U	<0.0042 U	0.0092	<0.006 U	<0.0049 U	<0.0054 U	<0.015 U	<0.011 U	<0.014 U	<0.01 U	<0.01 U
Methyl Acetate	79-20-9	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	0.0072
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	0.013	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.006 UJ	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Methylcyclohexane	108-87-2	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	0.0023 J	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Methylene Chloride	75-09-2	0.05	0.05	500	mg/kg	<0.012 U	<0.0093 U	<0.0042 U	<0.0089 U	<0.006 U	<0.0049 U	<0.0054 U	<0.015 U	<0.011 U	<0.014 U	<0.01 U	<0.01 U
n-Butylbenzene	104-51-8	12	12	500	mg/kg	<0.006 U	0.0055	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
n-Propylbenzene	103-65-1	3.9	3.9	500	mg/kg	<0.006 U	0.0035 J	<0.0021 U	0.0025 J	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	0.0076	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Sec-Butylbenzene	135-98-8	11	11	500	mg/kg	<0.006 U	0.0035 J	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
T-Butylbenzene	98-06-6	5.9	5.9	500	mg/kg	<0.006 UJ	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Tert-Butyl Alcohol	75-65-0	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	150	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Toluene	108-88-3	0.7	0.7	500	mg/kg	<0.006 U	0.0025 J	<0.0021 U	0.0033 J	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Total Xylenes	1330-20-7	**0.26**	1.6	500	mg/kg	<0.018 U	<0.014 U	<0.0063 U	0.017	<0.009 U	<0.0073 U	<0.0081 U	<0.022 U	<0.017 U	<0.021 U	<0.015 U	<0.016 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	500	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene (TCE)	79-01-6	0.47	0.47	200	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U
Vinyl Chloride	75-01-4	0.02	0.02	13	mg/kg	<0.006 U	<0.0046 U	<0.0021 U	<0.0045 U	<0.003 U	<0.0024 U	<0.0027 U	<0.0075 U	<0.0057 U	<0.007 U	<0.0051 U	<0.0052 U

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB24	EPB25	EPB26	EPB27	EPB28	EPB29	EPB30	EPB31	EPB32	EPB33	EPB34	EPB35
					Sample Name	EPB24_05072024	EPB25_05212024	EPB26_05212024	EPB27_05212024	EPB28_05222024	EPB29_05222024	EPB30_05222024	EPB31_06122024	EPB32_06122024	EPB33_06122024	EPB34_06122024	EPB35_06122024
					Sample Date	05/07/2024	05/21/2024	05/21/2024	05/21/2024	05/22/2024	05/22/2024	05/22/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	3.5-4	0.5-1	1.5-2	0.5-1	3.5-4	3.5-4	3-3.5
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																	
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 U	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	500	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
1,2-Diphenylhydrazine	122-66-7	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	280	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	130	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	130	mg/kg	<0.019 U	<0.019 U	<0.0196 U	<0.0196 U	<0.0196 U	<0.0196 U	<0.019 U	0.035	<0.0187 U	<0.0187 U	<0.019 U	<0.0194 U
1-Methylnaphthalene	90-12-0	NS	NS	NS	mg/kg	NA	1.37 J	0.243 J	0.215 D	<0.18 U	<0.177 U	<0.19 U	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 UJ	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.195 U	<0.212 UJ	<0.478 UJ	<0.185 UJ	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	<0.0978 U	0.901 J	0.193 J	0.289 D	0.0685 JD	0.0658 JD	0.0956 D	<0.0874 U	<0.0875 U	0.0487 JD	0.0591 JD	<0.089 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	500	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 U	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	500	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 U	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 UJ	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 U	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 UJ	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
Acenaphthene	83-32-9	20	98	500	mg/kg	<0.0978 U	0.318 J	0.337 J	0.199 D	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Acenaphthylene	208-96-8	100	107	500	mg/kg	0.0703 JD	0.107 J	0.165 J	<0.0926 U	<0.0902 U	<0.0885 U	0.066 JD	0.181 D	<0.0875 U	0.048 JD	<0.0891 U	<0.089 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	NS	NS	mg/kg	<0.392 U	<0.425 U	<0.959 U	<0.371 U	<0.361 U	<0.354 U	<0.38 U	<0.35 U	<0.35 U	<0.364 U	<0.357 U	<0.356 U
Anthracene	120-12-7	100	1,000	500	mg/kg	0.0766 JD	0.252 J	0.599 J	0.161 D	0.0591 JD	0.0934 D	0.123 D	0.171 D	<0.0875 U	0.0669 JD	0.0734 JD	0.0654 JD
Atrazine	1912-24-9	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Benzaldehyde	100-52-7	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Benzidine	92-87-5	NS	NS	NS	mg/kg	<0.392 U	<0.425 U	<0.959 U	<0.371 U	<0.361 U	<0.354 U	<0.38 U	<0.35 U	<0.35 U	<0.364 U	<0.357 U	<0.356 U
Benzo(a)anthracene	56-55-3	**1**	1	5.6	mg/kg	0.277 D	0.257 J	**1.92 J**	0.229 D	0.27 D	0.318 D	0.399 D	0.653 D	0.0665 JD	0.209 D	0.157 D	0.131 D
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	0.27 D	0.217 J	**1.76 J**	0.18 D	0.0613 JD	0.318 D	0.391 D	0.488 D	0.109 D	0.278 D	0.148 D	0.119 D
Benzo(b)fluoranthene	205-99-2	**1**	1.7	5.6	mg/kg	0.223 D	0.199 J	**1.36 J**	0.15 D	0.185 D	0.299 D	0.328 D	0.923 D	0.106 D	0.335 D	0.187 D	0.141 D
Benzo(g,h,i)Perylene	191-24-2	100	1,000	500	mg/kg	0.195 D	0.165 J	1.05 J	0.124 D	0.162 D	0.257 D	0.325 D	0.333 D	0.11 D	0.259 D	0.115 D	0.0932 D
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	56	mg/kg	0.238 D	0.208 J	**1.48 J**	0.144 D	0.149 D	0.211 D	0.297 D	0.324 D	0.0763 JD	0.115 D	0.0584 JD	0.0491 JD
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	0.0503 JD	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	<0.0978 U	0.243 J	<0.239 U	0.275 J	0.215 J	0.103 J	0.0978 J	<0.0874 U	0.0839 JD	0.0538 JD	0.0805 JD	0.105 D
Caprolactam	105-60-2	NS	NS	NS	mg/kg	<0.195 U	<0.212 U	<0.478 U	<0.185 U	<0.18 U	<0.177 U	<0.19 U	<0.175 U	<0.175 U	<0.182 U	<0.178 U	<0.178 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	<0.0978 U	0.0594 J	0.203 J	0.0555 JD	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Chrysene	218-01-9	**1**	1	56	mg/kg	0.313 D	0.288 J	**1.93 J**	0.229 D	0.272 D	0.421 D	0.479 D	0.716 D	0.109 D	0.234 D	0.17 D	0.139 D
Cresols, Total	1319-77-3	NS	NS	NS	mg/kg	NA	<0.212 U	<0.478 U	<0.185 UJ	<0.18 U	<0.177 U	<0.19 U	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	53-70-3	**0.33**	1,000	0.56	mg/kg	0.0649 JD	<0.106 U	0.26 J	<0.0926 U	0.0598 JD	0.102 D	0.115 D	0.103 D	<0.0875 U	0.0603 JD	<0.0891 U	<0.089 U
Dibenzofuran	132-64-9	7	210	350	mg/kg	<0.0978 U	0.21 J	<0.239 U	0.131 D	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	0.345 D	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Diphenylamine	122-39-4	NS	NS	NS	mg/kg	NA	<0.212 U	<0.478 U	<0.185 U	<0.18 U	<0.177 U	<0.19 U	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	100	1,000	500	mg/kg	0.394 D	0.575 J	3.56 J	0.565 D	0.312 D	0.41 D	0.563 D	0.931 D	0.0853 JD	0.302 D	0.278 D	0.293 D
Fluorene	86-73-7	30	386	500	mg/kg	<0.0978 U	0.563 J	<0.239 U	0.186 D	<0.0902 U	<0.0885 U	0.0599 JD	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Hexachlorobenzene	118-74-1	0.33	3.2	6	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.0978 U	<0.106 UJ	<0.239 UJ	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	5.6	mg/kg	0.213 D	0.161 J	**1.18 J**	0.126 J	0.159 J	0.226 J	0.315 J	0.432 D	0.0784 JD	0.256 D	0.13 D	0.0953 D
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Naphthalene	91-20-3	12	12	500	mg/kg	<0.0978 U	0.222 J	0.199 J	0.263 D	<0.0902 U	0.0735 JD	0.0971 D	<0.0874 U	<0.0875 U	0.0487 JD	<0.0891 U	<0.089 U
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
n-Nitrosodimethylamine	62-75-9	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Parathion, Ethyl	56-38-2	NS	NS	NS	mg/kg	NA	<0.106 U	<0.239 U	<0.0926 U	<0.0902 U	<0.0885 U	<0.0949 U	NA	NA	NA	NA	NA
Pentachloronitrobenzene	82-68-8	NS	NS	NS	mg/kg	NA	<0.212 U	<0.478 U	<0.185 U	<0.18 U	<0.177 U	<0.19 U	NA	NA	NA	NA	NA
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Phenanthrene	85-01-8	100	1,000	500	mg/kg	0.213 D	1.35 J	2.16 J	0.756 D	0.189 D	0.267 D	0.378 D	0.183 D	<0.0875 U	0.155 D	0.174 D	0.252 D
Phenol	108-95-2	0.33	0.33	500	mg/kg	<0.0978 U	<0.106 U	<0.239 U	<0.0926 UJ	<0.0902 U	<0.0885 U	<0.0949 U	<0.0874 U	<0.0875 U	<0.0909 U	<0.0891 U	<0.089 U
Propargite	2312-35-8	NS	NS	NS	mg/kg	NA	<0.425 U	<0.959 U	<0.371 U	<0.361 U	<0.354 U	<0.38 U	NA	NA	NA	NA	NA
Pyrene	129-00-0	100	1,000	500	mg/kg	0.435 D	0.666 J	3.49 J	0.533 D	0.387 D	0.564 D	0.744 D	0.88 D	0.171 D	0.375 D	0.37 D	0.331 D
Pyridine	110-86-1	NS	NS	NS	mg/kg	<0.392 U	<0.425 U	<0.959 U	<0.371 U	<0.361 U	<0.354 U	<0.38 U	<0.35 U	<0.35 U	<0.364 U	<0.357 U	<0.356 U
Resorcinol	108-46-3	NS	NS	NS	mg/kg	NA	<0.425 U	<0.959 U	<0.371 UJ	<0.361 U	<0.354 U	<0.38 U	NA	NA	NA	NA	NA

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB24	EPB25	EPB26	EPB27	EPB28	EPB29	EPB30	EPB31	EPB32	EPB33	EPB34	EPB35
					Sample Name	EPB24_05072024	EPB25_05212024	EPB26_05212024	EPB27_05212024	EPB28_05222024	EPB29_05222024	EPB30_05222024	EPB31_06122024	EPB32_06122024	EPB33_06122024	EPB34_06122024	EPB35_06122024
					Sample Date	05/07/2024	05/21/2024	05/21/2024	05/21/2024	05/22/2024	05/22/2024	05/22/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	3.5-4	0.5-1	1.5-2	0.5-1	3.5-4	3.5-4	3-3.5
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																	
4,4'-DDD	72-54-8	0.0033	14	92	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
4,4'-DDE	72-55-9	**0.0033**	17	62	mg/kg	<0.0019 U	**0.00402 D**	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
4,4'-DDT	50-29-3	**0.0033**	136	47	mg/kg	<0.0019 U	0.00212 J	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	0.00177 D	<0.0017 U	<0.00178 U	**0.00378 D**	<0.00177 U
Aldrin	309-00-2	0.005	0.19	0.68	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	3.4	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Alpha Chlordane	5103-71-9	0.094	2.9	24	mg/kg	<0.0019 U	0.00362 D	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	0.00224 J	<0.00172 U	<0.0017 U	<0.00178 U	0.00393 D	<0.00177 U
Alpha Endosulfan	959-98-8	2.4	102	200	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	3	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Beta Endosulfan	33213-65-9	2.4	102	200	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	<0.0379 U	<0.0419 U	<0.0378 U	<0.0371 U	<0.0359 U	<0.0354 U	<0.0373 U	<0.0344 U	<0.034 U	<0.0356 U	0.0498 D	<0.0353 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	500	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Dieldrin	60-57-1	0.005	0.1	1.4	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Endosulfan Sulfate	1031-07-8	2.4	1,000	200	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Endrin	72-20-8	0.014	0.06	89	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	9.2	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Gamma-Chlordane	5566-34-7	NS	NS	NS	mg/kg	0.00203 D	0.00292 D	<0.00189 U	<0.00186 U	0.00196 J	<0.00177 U	0.0025 D	<0.00172 U	<0.0017 U	<0.00178 U	0.00616 D	0.00279 D
Heptachlor	76-44-8	0.042	0.38	15	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.0019 U	<0.00209 U	<0.00189 U	<0.00186 U	<0.0018 U	<0.00177 U	<0.00186 U	<0.00172 U	<0.0017 U	<0.00178 U	<0.00173 U	<0.00177 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.19 U	<0.209 U	<0.189 U	<0.186 U	<0.18 U	<0.177 U	<0.186 U	<0.172 U	<0.17 U	<0.178 U	<0.173 U	<0.177 U
Herbicides																	
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.0234 U	<0.0251 U	<0.023 U	<0.0225 U	<0.0218 U	<0.0211 U	<0.0227 U	<0.0209 U	<0.0207 UJ	<0.022 U	<0.0214 U	<0.0216 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.0234 U	<0.0251 U	<0.023 U	<0.0225 U	<0.0218 U	<0.0211 U	<0.0227 U	<0.0209 U	<0.0207 UJ	<0.022 U	<0.0214 U	<0.0216 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	500	mg/kg	<0.0234 U	<0.0251 U	<0.023 U	<0.0225 U	<0.0218 U	<0.0211 U	<0.0227 U	<0.0209 U	<0.0207 UJ	<0.022 U	<0.0214 U	<0.0216 U
Polychlorinated Biphenyl																	
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
Total PCBs	1336-36-3	**0.1**	3.2	1	mg/kg	<0.0192 U	<0.0212 U	<0.0191 U	<0.0187 U	<0.0181 U	<0.0178 U	<0.0188 U	<0.0173 U	<0.0171 U	<0.018 U	<0.0175 U	<0.0178 U
Metals																	
Aluminum	7429-90-5	NS	NS	NS	mg/kg	6,340	8,530	4,100	9,680	5,310	7,710	6,910	8,670	7,060	6,660	12,700	8,790
Antimony	7440-36-0	NS	NS	NS	mg/kg	<2.45 U	<2.66 UJ	<2.41 U	<2.38 U	<2.28 U	2.38	<2.39 U	4.21	<2.19 U	<2.3 U	<2.23 U	<2.26 U
Arsenic	7440-38-2	**13**	16	16	mg/kg	11.2	**26.2 J**	7.94	8.73	6.03	12	**14.1**	**42.1**	4.52	**15.1**	8.78	6.21
Barium	7440-39-3	350	820	400	mg/kg	95.1	141 J	44.2	86.3	96.5	135	107	145	51	108	109	71.5
Beryllium	7440-41-7	7.2	47	590	mg/kg	<0.049 U	<0.054 U	0.083	<0.048 U	<0.046 U	<0.045 U	<0.048 U	<0.045 U	<0.044 U	<0.046 U	<0.045 U	<0.046 U
Cadmium	7440-43-9	**2.5**	7.5	9.3	mg/kg	0.575 J	1.02 J	0.351	0.543	0.92	0.687	0.633	**5.13**	0.713	0.945	0.865	0.436
Calcium	7440-70-2	NS	NS	NS	mg/kg	18,800	38,600	93,500	68,000	19,800	27,800	21,600	5,470	62,400	25,600	49,600	71,400
Chromium, Hexavalent	18540-29-9	1	19	400	mg/kg	<0.588 U	<0.639 UJ	<0.578 U	<0.572 U	<0.546 U	<0.537 U	<0.573 U	<0.531 U	<0.526 U	<0.552 U	<0.536 U	<0.542 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	16.6	17.4	10.7	22.8	11.7	37.6	23.2	99.4	13.9	15	20.1	16.2
Chromium, Trivalent	16065-83-1	**30**	NS	1,500	mg/kg	16.6	17.4	10.7	22.8	11.7	**37.6**	23.2	**99.4**	13.9	15	20.1	16.2
Cobalt	7440-48-4	NS	NS	NS	mg/kg	6.51	8.4	4.19	5.15	9.35	7.14	6.35	51.8	6.19	7.62	7.71	5.93
Copper	7440-50-8	**50**	1,720	270	mg/kg	**113**	**100 J**	**71.6**	**68.9**	**107**	**122**	**114**	**278**	**64.5**	**169**	**76.9**	**53**
Cyanide	57-12-5	27	40	27	mg/kg	3	3.64 J	<0.578 U	2.4	0.546	0.752	1.6	<0.531 U	<0.526 U	0.552	8.15	2.82
Iron	7439-89-6	NS	NS	NS	mg/kg	14,400	16,400	9,270	12,800	13,100	18,000	15,900	25,600	17,500	16,800	16,300	14,200
Lead	7439-92-1	**63**	450	1,000	mg/kg	**265**	**163 J**	**85.5 B**	**93.3 B**	**210 B**	**193 B**	**196 B**	**287**	52.8	**200**	**104**	57.5
Magnesium	7439-95-4	NS	NS	NS	mg/kg	3,330	8,120	54,200	9,860	5,590	5,300	4,370	3,710	33,900	10,600	8,520	30,500
Manganese	7439-96-5	1,600	2,000	10,000	mg/kg	399	695 J	172	215	128	208	217	277	208	221	266	236
Mercury	7439-97-6	**0.18**	0.73	2.8	mg/kg	**1.53**	**1.26 J**	**0.344**	**0.438**	**0.429**	**0.965**	**1.31**	**0.447**	0.0823	**0.436**	0.116	**0.218**
Nickel	7440-02-0	**30**	130	310	mg/kg	21	20.7	14	14.9	23.2	25.2	22.8	**56**	15	25.6	19.7	12.1
Potassium	7440-09-7	NS	NS	NS	mg/kg	1,130	1,470	915	1,310	967	1,540	1,490	1,150	972	1,230	1,760	1,830
Selenium	7782-49-2	**3.9**	4	1,500	mg/kg	<2.45 U	<2.66 U	<2.41 U	<2.38 U	<2.28 U	<2.24 U	<2.39 U	**6.18**	<2.19 U	<2.3 U	2.65	<2.26 U
Silver	7440-22-4	**2**	8.3	1,500	mg/kg	<0.494 U	<0.537 UJ	<0.486 U	<0.48 U	<0.459 U	<0.451 U	<0.481 U	<0.446 U	<0.442 U	<0.464 U	<0.45 U	<0.456 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	470	582 J	305 J	561 J	428 J	586 J	689 J	444	625	418	958	687
Thallium	7440-28-0	NS	NS	NS	mg/kg	<2.45 U	<2.66 U	<2.41 U	<2.38 U	<2.28 U	<2.24 U	<2.39 U	<2.21 U	<2.19 U	<2.3 U	<2.23 U	<2.26 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	22.7	27.8	15.3	27.7	26.6	24	26.4	44.6	48.8	28.1	33.2	31.6
Zinc	7440-66-6	**109**	2,480	10,000	mg/kg	**172**	**215 J**	74.1	**148**	**676**	**201**	**154**	**2,480**	**292**	**182**	**201**	75.1

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	Location	EPB24	EPB25	EPB26	EPB27	EPB28	EPB29	EPB30	EPB31	EPB32	EPB33	EPB34	EPB35
					Sample Name	EPB24_05072024	EPB25_05212024	EPB26_05212024	EPB27_05212024	EPB28_05222024	EPB29_05222024	EPB30_05222024	EPB31_06122024	EPB32_06122024	EPB33_06122024	EPB34_06122024	EPB35_06122024
					Sample Date	05/07/2024	05/21/2024	05/21/2024	05/21/2024	05/22/2024	05/22/2024	05/22/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
					Sample Depth	0.5-1	0.5-1	0.5-1	0.5-1	3.5-4	3.5-4	0.5-1	1.5-2	0.5-1	3.5-4	3.5-4	3-3.5
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																	
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	NS	NS	mg/kg	<0.00088 U	<0.000949 UJ	<0.000865 UJ	<0.000859 UJ	<0.000818 UJ	<0.0008 UJ	<0.000861 UJ	<0.0008 U	<0.000791 U	<0.000827 U	<0.000803 U	<0.000809 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000894 U	<0.000964 U	<0.000879 U	<0.000873 U	<0.000831 U	<0.000813 U	<0.000874 U	<0.000812 U	<0.000804 U	<0.00084 U	<0.000815 U	<0.000821 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	NS	NS	mg/kg	<0.000873 UJ	<0.000942 U	<0.000859 U	<0.000852 U	<0.000811 U	<0.000794 U	<0.000854 U	<0.000793 U	<0.000785 U	<0.00082 U	<0.000796 U	<0.000802 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000885 UJ	<0.000954 U	<0.00087 U	<0.000864 U	<0.000822 U	<0.000804 UJ	<0.000865 U	<0.000804 U	<0.000795 U	<0.000831 U	<0.000807 U	<0.000813 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00582 U	<0.00628 U	<0.00572 U	<0.00568 U	<0.00541 U	<0.00529 U	<0.00569 U	<0.00529 U	<0.00523 U	<0.00547 U	<0.00531 U	<0.00535 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00582 U	<0.00628 U	<0.00572 U	<0.00568 U	<0.00541 U	<0.00529 U	<0.00569 U	<0.00529 U	<0.00523 U	<0.00547 U	<0.00531 U	<0.00535 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.00116 U	<0.00126 U	<0.00114 U	<0.00114 U	<0.00108 U	<0.00106 U	<0.00114 U	<0.00106 U	<0.00105 U	<0.00109 U	<0.00106 U	<0.00107 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.00088 U	<0.000949 U	<0.000865 U	<0.000859 U	<0.000818 U	<0.0008 U	<0.000861 U	<0.0008 U	<0.000791 U	<0.000827 U	<0.000803 U	<0.000809 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	NS	NS	mg/kg	<0.000871 U	<0.000939 U	<0.000856 U	<0.00085 U	<0.000809 U	<0.000791 U	<0.000852 U	<0.000791 U	<0.000783 U	<0.000818 U	<0.000794 U	<0.0008 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.000932 U	<0.001 U	<0.000916 U	<0.000909 U	<0.000865 U	<0.000846 U	<0.000911 U	<0.000846 U	<0.000837 U	<0.000875 U	0.000657 J	<0.000856 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.00233 U	<0.00251 U	<0.00229 U	<0.00227 U	<0.00216 U	<0.00212 U	<0.00228 U	<0.00212 U	<0.00209 U	<0.00219 U	<0.00212 U	<0.00214 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.00233 U	<0.00251 U	<0.00229 U	<0.00227 U	<0.00216 U	<0.00212 U	<0.00228 U	<0.00212 U	<0.00209 U	<0.00219 U	<0.00212 U	<0.00214 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	NS	NS	mg/kg	<0.000466 U	<0.000502 U	<0.000458 U	<0.000455 U	<0.000433 U	<0.000423 U	<0.000455 U	<0.000423 U	<0.000419 U	<0.000438 U	<0.000425 U	<0.000428 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	NS	NS	mg/kg	<0.000415 U	<0.000447 U	<0.000408 U	<0.000405 U	<0.000385 U	<0.000377 U	<0.000405 U	<0.000377 U	<0.000373 U	<0.000389 U	<0.000378 U	<0.000381 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	NS	NS	mg/kg	<0.000466 U	<0.000502 U	<0.000458 U	<0.000455 U	<0.000433 U	<0.000423 U	<0.000455 U	<0.000423 UJ	<0.000419 UJ	<0.000438 UJ	<0.000425 UJ	<0.000428 UJ
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	NS	NS	mg/kg	<0.000466 U	<0.000502 U	<0.000458 U	<0.000455 U	<0.000433 U	<0.000423 U	<0.000455 U	<0.000423 U	<0.000419 U	<0.000438 U	<0.000425 U	<0.000428 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.000206 U	<0.000222 U	<0.000203 U	<0.000201 U	<0.000191 U	<0.000187 U	<0.000202 U	<0.000187 U	<0.000185 U	<0.000194 U	<0.000188 U	<0.000189 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000932 U	<0.001 U	<0.000916 U	<0.000909 U	<0.000865 U	<0.000846 U	<0.000911 U	<0.000846 U	<0.000837 U	<0.000875 U	<0.000849 U	<0.000856 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000225 U	<0.000242 U	<0.000221 U	<0.000219 U	<0.000209 U	<0.000204 U	<0.00022 U	<0.000204 U	<0.000202 U	<0.000211 U	<0.000205 U	<0.000206 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	0.000442	<0.000219 U	<0.000212 U	<0.000214 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.000226 U	<0.000244 UJ	<0.000222 UJ	<0.00022 UJ	<0.00021 UJ	<0.000205 UJ	<0.000221 UJ	<0.000205 U	<0.000203 U	<0.000212 U	<0.000206 U	<0.000208 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	0.000176 J	<0.000219 U	<0.000212 U	<0.000214 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000213 U	<0.00023 U	<0.00021 U	<0.000208 U	<0.000198 U	<0.000194 U	<0.000208 U	<0.000194 U	<0.000192 U	<0.0002 U	<0.000194 U	<0.000196 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	0.0000914 J	<0.000219 U	0.0000939 J	<0.000214 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.000224 U	<0.000241 U	<0.00022 U	<0.000218 U	<0.000208 U	<0.000203 U	<0.000219 U	<0.000203 U	<0.000201 U	<0.00021 U	<0.000204 U	<0.000205 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	0.000465	<0.000219 U	<0.000212 U	<0.000214 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.44	mg/kg	0.000293	0.000321	<0.000213 U	<0.000211 U	0.000348	0.000483	0.000358	0.00049	**0.00213**	0.000199 J	<0.000197 U	<0.000199 U
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.5	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	0.000535	<0.000219 U	<0.000212 U	<0.000214 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000466 U	<0.000502 U	<0.000458 U	<0.000455 U	<0.000433 U	<0.000423 U	<0.000455 U	<0.000423 U	0.000119 J	<0.000438 U	<0.000425 U	<0.000428 U
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.000219 U	<0.000236 U	<0.000215 U	<0.000214 U	<0.000203 U	<0.000199 U	<0.000214 U	<0.000199 U	<0.000197 U	<0.000206 U	<0.0002 U	<0.000201 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	<0.000209 U	<0.000219 U	<0.000212 U	<0.000214 U
Perfluoroundecanoic Acid (PFUnDA)	2058-94-8	NS	NS	NS	mg/kg	<0.000233 U	<0.000251 U	<0.000229 U	<0.000227 U	<0.000216 U	<0.000212 U	<0.000228 U	<0.000212 U	0.000288	<0.000219 U	<0.000212 U	<0.000214 U
General Chemistry																	
Solids, Percent	SOLID	NS	NS	NS	Percent	85	78.2	86.5	87.5	91.5	93	87.3	94.2	95	90.5	93.3	92.2

Table 5
Site Management Plan
Site-Wide Documentation Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Notes:
CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
NA - Not analyzed
RL - Reporting limit
<RL - Not detected

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Commercial Soil Cleanup Objectives (SCO).

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use, Restricted Use Commercial, and Protection of Groundwater Guidance Values (April 2023).

Qualifiers:

D - The concentration reported is a result of a diluted sample.

B - The analyte was found in the associated analysis batch blank.

J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.

U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:
10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Commercial SCOs

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-1	LMW-2	LMW-3	LMW-3	LMW-4	LMW-4	LMW-4	LMW-5	LMW-6	LMW-7	LMW-8	LMW-9	LMW-10
			Sample Name	LMW-1_112618	LMW-2_112618	LMW-3_112618	DUP-3_112618	LMW-4_112618	210 LMW-4	217_LMW-4-COD	LMW-5_112718	LMW-6_112618	LMW-7_112618	LMW-8_112618	LMW-9_112618	LMW-10_112718
			Sample Date	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	08/03/2020	08/06/2020	11/27/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/27/2018
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																
1,1,1,2-Tetrachloroethane	630-20-6	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,1,1-Trichloroethane	71-55-6	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,1,2,2-Tetrachloroethane	79-34-5	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,1,2-Trichloroethane	79-00-5	1	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,1-Dichloroethane	75-34-3	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,1-Dichloroethene	75-35-4	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,1-Dichloropropene	563-58-6	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2,3-Trichlorobenzene	87-61-6	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2,3-Trichloropropane	96-18-4	0.04	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2,4,5-Tetramethylbenzene	95-93-2	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	0.81	<0.2 U	0.99	**6.04 D**	<0.2 U	1.08
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2,4-Trimethylbenzene	95-63-6	**5**	ug/l	0.23 J	<0.2 U	<0.2 U	<0.2 U	0.26 J	NA	NA	**11.4**	<0.2 U	<0.2 U	1.48 D	0.61	4.68
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2-Dichloroethane	107-06-2	0.6	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,2-Dichloropropane	78-87-5	1	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	4.24	<0.2 U	<0.2 U	0.58 JD	<0.2 U	1.01
1,3-Dichlorobenzene	541-73-1	3	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,3-Dichloropropane	142-28-9	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	<40 U	<40 U	<40 U	<40 U	<40 U	NA	NA	<40 U	<40 U	<40 U	<80 U	<40 U	<40 U
2,2-Dichloropropane	594-20-7	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
2-Chlorotoluene	95-49-8	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
2-Hexanone (MBK)	591-78-6	50	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
4-Chlorotoluene	106-43-4	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Acetone	67-64-1	50	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U	NA	NA	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
Acrolein	107-02-8	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Acrylonitrile	107-13-1	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Benzene	71-43-2	**1**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	**1.95**	<0.2 U	<0.2 U	**1.64 D**	<0.2 U	0.97
Bromobenzene	108-86-1	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Bromochloromethane	74-97-5	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Bromodichloromethane	75-27-4	50	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Bromoform	75-25-2	50	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Bromomethane	74-83-9	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Carbon Disulfide	75-15-0	60	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Carbon Tetrachloride	56-23-5	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Chlorobenzene	108-90-7	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Chloroethane	75-00-3	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Chloroform	67-66-3	7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Chloromethane	74-87-3	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Cis-1,2-Dichloroethene	156-59-2	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Cis-1,3-Dichloropropene	10061-01-5	0.4	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Cyclohexane	110-82-7	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.3 J	NA	NA	17.6	<0.2 U	<0.2 U	4.28 D	<0.2 U	0.47 J
Dibromochloromethane	124-48-1	50	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Dibromomethane	74-95-3	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Dichlorodifluoromethane	75-71-8	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Ethylbenzene	100-41-4	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	**5.18**	<0.2 U	<0.2 U	0.88 JD	<0.2 U	1.21
Hexachlorobutadiene	87-68-3	0.5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene (Cumene)	98-82-8	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	1.46	<0.2 U	1.17	**6.24 D**	<0.2 U	<0.2 U
M,P-Xylene	179601-23-1	**5**	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	NA	**37.4**	<0.5 U	<0.5 U	2.4 D	0.66 J	4.79
Methyl Acetate	79-20-9	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Methylcyclohexane	108-87-2	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	19.2	<0.2 U	0.49 J	11.8 D	<0.2 U	0.46 J
Methylene Chloride	75-09-2	5	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U	NA	NA	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
n-Butylbenzene	104-51-8	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	0.24 J	<0.2 U	<0.2 U	1.04 D	<0.2 U	<0.2 U
n-Propylbenzene	103-65-1	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	1.74	<0.2 U	0.59	**6.66 D**	<0.2 U	0.51
o-Xylene (1,2-Dimethylbenzene)	95-47-6	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	**12.3**	<0.2 U	<0.2 U	0.76 JD	0.2 J	2.12
p-Cymene (p-Isopropyltoluene)	CYMP	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	0.73	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Sec-Butylbenzene	135-98-8	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	0.46 J	<0.2 U	0.31 J	2.24 D	<0.2 U	<0.2 U
Styrene	100-42-5	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
T-Butylbenzene	98-06-6	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.32 J	NA	NA	<0.2 U	<0.2 U	<0.2 U	0.58 JD	<0.2 U	<0.2 U
Tert-Butyl Alcohol	75-65-0	NS	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	4.85	NA	NA	<0.5 U	<0.5 U	4.08	<1 U	<0.5 U	<0.5 U
Tert-Butyl Methyl Ether	1634-04-4	10	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	0.66	<0.4 U	<0.2 U	<0.2 U
Tetrachloroethene (PCE)	127-18-4	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	0.48 J	0.22 J
Toluene	108-88-3	**5**	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	**13.6**	<0.2 U	<0.2 U	3.08 D	<0.2 U	4.1
Total Xylenes	1330-20-7	**5**	ug/l	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U	NA	NA	**49.8**	<0.6 U	<0.6 U	3.16 D	0.86 J	**6.91**
Trans-1,2-Dichloroethene	156-60-5	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Trans-1,3-Dichloropropene	10061-02-6	0.4	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Trans-1,4-Dichloro-2-Butene	110-57-6	5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene (TCE)	79-01-6	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Trichlorofluoromethane	75-69-4	5	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U
Vinyl Chloride	75-01-4	2	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.4 U	<0.2 U	<0.2 U

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-1	LMW-2	LMW-3	LMW-3	LMW-4	LMW-4	LMW-4	LMW-5	LMW-6	LMW-7	LMW-8	LMW-9	LMW-10
			Sample Name	LMW-1_112618	LMW-2_112618	LMW-3_112618	DUP-3_112618	LMW-4_112618	210 LMW-4	217_LMW-4-COD	LMW-5_112718	LMW-6_112618	LMW-7_112618	LMW-8_112618	LMW-9_112618	LMW-10_112718
			Sample Date	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	08/03/2020	08/06/2020	11/27/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/27/2018
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																
1,2,4,5-Tetrachlorobenzene	95-94-3	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
1,2-Diphenylhydrazine	122-66-7	0	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
1,4-Dioxane (P-Dioxane)	123-91-1	**0.35**	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2,4,5-Trichlorophenol	95-95-4	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2,4,6-Trichlorophenol	88-06-2	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2,4-Dichlorophenol	120-83-2	1	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2,4-Dimethylphenol	105-67-9	1	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2,4-Dinitrophenol	51-28-5	1	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2,4-Dinitrotoluene	121-14-2	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2,6-Dinitrotoluene	606-20-2	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2-Chloronaphthalene	91-58-7	10	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2-Chlorophenol	95-57-8	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2-Methylnaphthalene	91-57-6	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2-Methylphenol (o-Cresol)	95-48-7	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2-Nitroaniline	88-74-4	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
2-Nitrophenol	88-75-5	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
3,3'-Dichlorobenzidine	91-94-1	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
3-Nitroaniline	99-09-2	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
4-Chloro-3-Methylphenol	59-50-7	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
4-Chloroaniline	106-47-8	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
4-Nitroaniline	100-01-6	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
4-Nitrophenol	100-02-7	NS	ug/l	<5.88 U	<6.45 U	<5.88 U	<5.26 U	<5.56 U	NA	NA	<5.71 U	<5.71 U	<5.88 U	<5.56 U	<5.41 U	<5.71 U
Acenaphthene	83-32-9	20	ug/l	0.118	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	0.731	<0.0571 U	<0.0588 U	0.167	<0.0541 U	<0.0571 U
Acenaphthylene	208-96-8	NS	ug/l	<0.0588 U	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	<0.0571 U	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Acetophenone	98-86-2	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Anthracene	120-12-7	50	ug/l	0.0706	0.0903	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	0.16	<0.0571 U	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Atrazine	1912-24-9	7.5	ug/l	<0.588 U	<0.645 U	<0.588 U	<0.526 U	<0.556 U	NA	NA	<0.571 U	<0.571 U	<0.588 U	<0.556 U	<0.541 U	<0.571 U
Benzaldehyde	100-52-7	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Benzidine	92-87-5	5	ug/l	<5.88 U	<6.45 U	<5.88 U	<5.26 U	<5.56 U	NA	NA	<5.71 U	<5.71 U	<5.88 U	<5.56 U	<5.41 U	<5.71 U
Benzo(a)anthracene	56-55-3	**0.002**	ug/l	<0.0588 U	**0.0774**	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	<0.0571 U	**0.0588**	<0.0556 U	<0.0541 U	<0.0571 U
Benzo(a)pyrene	50-32-8	**0**	ug/l	<0.0588 U	**0.0645**	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	**0.0571**	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Benzo(b)fluoranthene	205-99-2	**0.002**	ug/l	<0.0588 U	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	<0.0571 U	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Benzo(g,h,i)Perylene	191-24-2	NS	ug/l	<0.0588 U	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	0.0571	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Benzo(k)fluoranthene	207-08-9	**0.002**	ug/l	<0.0588 U	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	<0.0571 U	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Benzoic Acid	65-85-0	NS	ug/l	<29.4 U	<32.3 U	<29.4 U	<26.3 U	<27.8 U	NA	NA	<28.6 U	<28.6 U	<29.4 U	<27.8 U	<27 U	<28.6 U
Benzyl Alcohol	100-51-6	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Benzyl Butyl Phthalate	85-68-7	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Biphenyl (Diphenyl)	92-52-4	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Bis(2-chloroethoxy) methane	111-91-1	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	ug/l	<1.18 U	<1.29 U	<1.18 U	<1.05 U	<1.11 U	NA	NA	<1.14 U	<1.14 U	<1.18 U	<1.11 U	<1.08 U	<1.14 U
Bis(2-chloroisopropyl) ether	108-60-1	5	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Bis(2-ethylhexyl) phthalate	117-81-7	5	ug/l	<0.588 U	<0.645 U	<0.588 U	<0.526 U	<0.556 U	NA	NA	<0.571 U	0.994	<0.588 U	0.789	<0.541 U	<0.571 U
Caprolactam	105-60-2	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Carbazole	86-74-8	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Chrysene	218-01-9	**0.002**	ug/l	<0.0588 U	**0.103**	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	**0.0571**	**0.0706**	<0.0556 U	<0.0541 U	<0.0571 U
Dibenz(a,h)anthracene	53-70-3	NS	ug/l	<0.0588 U	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	<0.0571 U	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Dibenzofuran	132-64-9	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Dibutyl phthalate	84-74-2	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Diethyl phthalate	84-66-2	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Dimethyl phthalate	131-11-3	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Dioctyl phthalate	117-84-0	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Fluoranthene	206-44-0	50	ug/l	<0.0588 U	0.142	<0.0588 U	<0.0526 U	0.144	NA	NA	0.32	0.08	0.0824	<0.0556 U	<0.0541 U	<0.0571 U
Fluorene	86-73-7	50	ug/l	0.0706	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	0.149	<0.0571 U	<0.0588 U	0.0778	<0.0541 U	<0.0571 U
Hexachlorobenzene	118-74-1	0.04	ug/l	<0.0235 U	<0.0258 U	<0.0235 U	<0.0211 U	<0.0222 U	NA	NA	<0.0229 U	<0.0229 U	<0.0235 U	<0.0222 U	<0.0216 U	<0.0229 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.588 U	<0.645 U	<0.588 U	<0.526 U	<0.556 U	NA	NA	<0.571 U	<0.571 U	<0.588 U	<0.556 U	<0.541 U	<0.571 U
Hexachlorocyclopentadiene	77-47-4	5	ug/l	<5.88 U	<6.45 U	<5.88 U	<5.26 U	<5.56 U	NA	NA	<5.71 U	<5.71 U	<5.88 U	<5.56 U	<5.41 U	<5.71 U
Hexachloroethane	67-72-1	5	ug/l	<0.588 U	<0.645 U	<0.588 U	<0.526 U	<0.556 U	NA	NA	<0.571 U	<0.571 U	<0.588 U	<0.556 U	<0.541 U	<0.571 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.002**	ug/l	<0.0588 U	<0.0645 U	<0.0588 U	<0.0526 U	<0.0556 U	NA	NA	<0.0571 U	<0.0571 U	<0.0588 U	<0.0556 U	<0.0541 U	<0.0571 U
Isophorone	78-59-1	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Naphthalene	91-20-3	10	ug/l	0.129	0.0903	0.0588	<0.0526 U	<0.0556 U	NA	NA	0.446	<0.0571 U	0.0941	0.256	<0.0541 U	<0.0571 U
Nitrobenzene	98-95-3	0.4	ug/l	<0.294 U	<0.323 U	<0.294 U	<0.263 U	<0.278 U	NA	NA	<0.286 U	<0.286 U	<0.294 U	<0.278 U	<0.27 U	<0.286 U
n-Nitrosodimethylamine	62-75-9	NS	ug/l	<0.588 U	<0.645 U	<0.588 U	<0.526 U	<0.556 U	NA	NA	<0.571 U	<0.571 U	<0.588 U	<0.556 U	<0.541 U	<0.571 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
n-Nitrosodiphenylamine	86-30-6	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Pentachlorophenol	87-86-5	1	ug/l	<0.294 U	<0.323 U	<0.294 U	<0.263 U	<0.278 U	NA	NA	<0.286 U	<0.286 U	<0.294 U	<0.278 U	<0.27 U	<0.286 U
Phenanthrene	85-01-8	50	ug/l	0.0588	0.168	<0.0588 U	<0.0526 U	0.0556	NA	NA	0.114	0.103	0.0941	<0.0556 U	<0.0541 U	<0.0571 U
Phenol	108-95-2	1	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U
Pyrene	129-00-0	50	ug/l	0.106	0.181	0.0588	<0.0526 U	0.3	NA	NA	0.4	0.0914	0.0824	0.0556	<0.0541 U	<0.0571 U
Pyridine	110-86-1	50	ug/l	<2.94 U	<3.23 U	<2.94 U	<2.63 U	<2.78 U	NA	NA	<2.86 U	<2.86 U	<2.94 U	<2.78 U	<2.7 U	<2.86 U

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-1	LMW-2	LMW-3	LMW-3	LMW-4	LMW-4	LMW-4	LMW-5	LMW-6	LMW-7	LMW-8	LMW-9	LMW-10
			Sample Name	LMW-1_112618	LMW-2_112618	LMW-3_112618	DUP-3_112618	LMW-4_112618	210 LMW-4	217_LMW-4-COD	LMW-5_112718	LMW-6_112618	LMW-7_112618	LMW-8_112618	LMW-9_112618	LMW-10_112718
			Sample Date	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	08/03/2020	08/06/2020	11/27/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/27/2018
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Petroleum Hydrocarbons																
Total Extractable Petroleum Hydrocarbons (C09-C40)	TEPH (C9-C40)	NS	ug/l	NA	NA	NA	NA	NA	1,000	NA	NA	NA	NA	NA	NA	NA
Pesticides																
4,4'-DDD	72-54-8	0.3	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
4,4'-DDE	72-55-9	0.2	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
4,4'-DDT	50-29-3	0.2	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Aldrin	309-00-2	0	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Alpha Chlordane	5103-71-9	NS	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Alpha Endosulfan	959-98-8	NS	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Beta Endosulfan	33213-65-9	NS	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Chlordane (alpha and gamma)	57-74-9	**0.05**	ug/l	<0.0216 U	<0.0205 U	<0.0222 U	<0.0216 U	<0.0216 U	NA	NA	<0.0229 U	<0.0216 U	<0.0211 U	<0.0205 U	<0.02 U	<0.0222 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Dieldrin	60-57-1	0.004	ug/l	<0.00216 U	<0.00205 U	<0.00222 U	<0.00216 U	<0.00216 U	NA	NA	<0.00229 U	<0.00216 U	<0.00211 U	<0.00205 U	<0.002 U	<0.00222 U
Endosulfan Sulfate	1031-07-8	NS	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Endrin	72-20-8	0	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Endrin Aldehyde	7421-93-4	5	ug/l	<0.0108 U	<0.0103 U	<0.0111 U	<0.0108 U	<0.0108 U	NA	NA	<0.0114 U	<0.0108 U	<0.0105 U	<0.0103 U	<0.01 U	<0.0111 U
Endrin Ketone	53494-70-5	5	ug/l	<0.0108 U	<0.0103 U	<0.0111 U	<0.0108 U	<0.0108 U	NA	NA	<0.0114 U	<0.0108 U	<0.0105 U	<0.0103 U	<0.01 U	<0.0111 U
Gamma Bhc (Lindane)	58-89-9	0.05	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Gamma-Chlordane	5566-34-7	NS	ug/l	<0.0108 U	<0.0103 U	<0.0111 U	<0.0108 U	<0.0108 U	NA	NA	<0.0114 U	<0.0108 U	<0.0105 U	<0.0103 U	<0.01 U	<0.0111 U
Heptachlor	76-44-8	0.04	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Heptachlor Epoxide	1024-57-3	0.03	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Methoxychlor	72-43-5	35	ug/l	<0.00432 U	<0.0041 U	<0.00444 U	<0.00432 U	<0.00432 U	NA	NA	<0.00457 U	<0.00432 U	<0.00421 U	<0.0041 U	<0.004 U	<0.00444 U
Toxaphene	8001-35-2	0.06	ug/l	<0.108 U	<0.103 U	<0.111 U	<0.108 U	<0.108 U	NA	NA	<0.114 U	<0.108 U	<0.105 U	<0.103 U	<0.1 U	<0.111 U
Herbicides																
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	35	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	50	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silvex (2,4,5-Tp)	93-72-1	0.26	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyl																
PCB-1016 (Aroclor 1016)	12674-11-2	NS	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
Total PCBs	1336-36-3	0.09	ug/l	<0.0541 U	<0.0513 U	<0.0556 U	<0.0541 U	<0.0541 U	NA	NA	<0.0571 U	<0.0541 U	<0.0526 U	<0.0513 U	<0.05 U	<0.0556 U
Metals - Dissolved																
Aluminum	7429-90-5	NS	ug/l	147	67.6	<55.6 U	70.6	<55.6 U	NA	NA	<55.6 U	95.2	62.8	<55.6 U	<55.6 U	<55.6 U
Antimony	7440-36-0	**3**	ug/l	1.84	2.93	1.57	1.37	<1.11 U	NA	NA	<1.11 U	2.23	<1.11 U	1.28	2.15	2.09
Arsenic	7440-38-2	25	ug/l	2.95	3.72	4.69	6.56	3.64	NA	NA	<1.11 U	4	<1.11 U	3.6	2	1.4
Barium	7440-39-3	1,000	ug/l	136	117	36.3	36.6	213	NA	NA	67.9	155	351	270	180	57.9
Beryllium	7440-41-7	3	ug/l	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	NA	NA	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U
Cadmium	7440-43-9	5	ug/l	0.745	2.09	<0.556 U	<0.556 U	<0.556 U	NA	NA	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U
Calcium	7440-70-2	NS	ug/l	207,000	238,000	180,000	180,000	162,000	NA	NA	84,500	293,000	168,000	146,000	170,000	104,000
Chromium, Total	7440-47-3	50	ug/l	14.8	<5.56 U	<5.56 U	<5.56 U	<5.56 U	NA	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Cobalt	7440-48-4	NS	ug/l	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	NA	NA	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U
Copper	7440-50-8	200	ug/l	24.5	<22.2 U	<22.2 U	<22.2 U	<22.2 U	NA	NA	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U
Iron	7439-89-6	**300**	ug/l	<278 U	**339**	<278 U	<278 U	<278 U	NA	NA	<278 U	<278 U	<278 U	<278 U	<278 U	<278 U
Lead	7439-92-1	25	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	NA	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Magnesium	7439-95-4	**35,000**	ug/l	**285,000**	**645,000**	**503,000**	**503,000**	**160,000**	NA	NA	15,800	**203,000**	**49,600**	**53,300**	**282,000**	18,000
Manganese	7439-96-5	**300**	ug/l	79.3	40.6	7.68	7.69	**417**	NA	NA	**488**	289	**616**	283	**678**	168
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	NA	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Potassium	7440-09-7	NS	ug/l	97,600	228,000	172,000	176,000	65,100	NA	NA	8,950	80,700	33,800	40,000	98,900	10,200
Selenium	7782-49-2	**10**	ug/l	**11.7 D**	<11.1 U	<11.1 U	**17.7 D**	<11.1 U	NA	NA	<11.1 U	**13.5 D**	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Silver	7440-22-4	50	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	NA	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Sodium	7440-23-5	**20,000**	ug/l	**2,860,000 D**	**7,390,000 D**	**5,680,000 D**	**5,500,000 D**	**1,990,000 D**	NA	NA	**71,100**	**2,170,000 D**	**625,000**	**560,000**	**3,240,000 D**	**76,600**
Thallium	7440-28-0	0.5	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	NA	NA	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	NA	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2,000	ug/l	140	57.9	50	47.2	<27.8 U	NA	NA	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	88.1

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-1	LMW-2	LMW-3	LMW-3	LMW-4	LMW-4	LMW-4	LMW-5	LMW-6	LMW-7	LMW-8	LMW-9	LMW-10
			Sample Name	LMW-1_112618	LMW-2_112618	LMW-3_112618	DUP-3_112618	LMW-4_112618	210 LMW-4	217_LMW-4-COD	LMW-5_112718	LMW-6_112618	LMW-7_112618	LMW-8_112618	LMW-9_112618	LMW-10_112718
			Sample Date	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	08/03/2020	08/06/2020	11/27/2018	11/26/2018	11/26/2018	11/26/2018	11/26/2018	11/27/2018
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals - Total																
Aluminum	7429-90-5	NS	ug/l	262	218	57.4	414	176	NA	NA	254	114	138	<55.6 U	503	721
Antimony	7440-36-0	**3**	ug/l	1.91	2.93	1.46	1.48	<1.11 U	NA	NA	<1.11 U	1.7	<1.11 U	1.18	1.85	1.66
Arsenic	7440-38-2	**25**	ug/l	3.13	5.56	5.52	4.93	5.38	NA	NA	1.83	4.45	1.68	8.88	3.84	2.34
Barium	7440-39-3	1,000	ug/l	137	113	35.8	36.9	232	NA	NA	287	159	507	301	183	926
Beryllium	7440-41-7	3	ug/l	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	NA	NA	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U
Cadmium	7440-43-9	5	ug/l	0.745	2.14	<0.556 U	0.608	<0.556 U	NA	NA	<0.556 U	<0.556 U	<0.556 U	<0.556 U	0.707	<0.556 U
Calcium	7440-70-2	NS	ug/l	207,000	236,000	182,000	185,000	162,000	NA	NA	671,000	300,000	177,000	144,000	170,000	375,000
Chromium, Hexavalent	18540-29-9	50	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	NA	NA	<10 U	11	<10 U	<10 U	15	<10 U
Chromium, Total	7440-47-3	NS	ug/l	14.4	6.23	<5.56 U	<5.56 U	<5.56 U	NA	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Chromium, Trivalent	16065-83-1	NS	ug/l	14	<10 U	<10 U	<10 U	<10 U	NA	NA	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Cobalt	7440-48-4	NS	ug/l	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	NA	NA	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U
Copper	7440-50-8	200	ug/l	25.8	23.7	<22.2 U	<22.2 U	<22.2 U	NA	NA	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U
Cyanide	57-12-5	200	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	7439-89-6	**300**	ug/l	<278 U	**625**	<278 U	<278 U	**1,560**	NA	NA	**6,880**	<278 U	**13,700**	**4,160**	**1,240**	**76,900**
Lead	7439-92-1	**25**	ug/l	6.42	<5.56 U	<5.56 U	<5.56 U	16.7	NA	NA	**106**	<5.56 U	19.8	<5.56 U	15.6	17.6
Magnesium	7439-95-4	**35,000**	ug/l	**280,000**	**629,000**	**501,000**	**510,000**	**158,000**	NA	NA	**158,000**	**210,000**	**50,700**	**53,300**	**279,000**	**111,000**
Manganese	7439-96-5	**300**	ug/l	84.5	40.8	7.49	7.71	**425**	NA	NA	**2,120**	295	**649**	291	**685**	**1,280**
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	NA	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Potassium	7440-09-7	NS	ug/l	94,700 B	218,000 B	166,000 B	171,000 B	63,200 B	NA	NA	52,800	82,800 B	33,500 B	39,500 B	97,000 B	76,800
Selenium	7782-49-2	**10**	ug/l	**12.8 D**	<11.1 U	<11.1 U	<11.1 U	<11.1 U	NA	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Silver	7440-22-4	50	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	NA	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Sodium	7440-23-5	**20,000**	ug/l	**4,110,000 D**	**8,530,000 D**	**6,780,000 D**	**5,720,000 D**	**2,640,000 D**	NA	NA	**1,030,000**	**2,900,000 D**	**729,000**	**640,000**	**3,780,000 D**	**1,100,000**
Thallium	7440-28-0	0.5	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	NA	NA	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	NA	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2,000	ug/l	136	55.1	40	64.7	40	NA	NA	74	<27.8 U	<27.8 U	<27.8 U	292	<27.8 U
Per- and Polyfluoroalkyl Substances																
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorobutanoic acid (PFBA)	375-22-4	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorononanoic Acid (PFNA)	375-95-1	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.0027**	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.0067**	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perfluoroundecanoic Acid (PFUnDA)	2058-94-8	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry																
Alkalinity, Total (as CaCO3)	471-34-1	NS	ug/l	NA	NA	NA	NA	NA	440,000	NA	NA	NA	NA	NA	NA	NA
Chloride (As Cl)	16887-00-6	**250,000**	ug/l	NA	NA	NA	NA	NA	**6,790,000 D**	NA	NA	NA	NA	NA	NA	NA
COD-Chemical Oxygen Demand	COD	NS	ug/l	NA	NA	NA	NA	NA	NA	1,400,000 D	NA	NA	NA	NA	NA	NA
Nitrogen, Nitrate (As N)	14797-55-8	10,000	ug/l	NA	NA	NA	NA	NA	<50 U	NA	NA	NA	NA	NA	NA	NA
Sulfate (As SO4)	14808-79-8	**250,000**	ug/l	NA	NA	NA	NA	NA	**326,000 D**	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	TDS	NS	ug/l	NA	NA	NA	NA	NA	8,940,000	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	TOC	NS	ug/l	NA	NA	NA	NA	NA	5,440	NA	NA	NA	NA	NA	NA	NA

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-11	LMW-12	LMW-13	LMW-14	LMW-15	LMW-15	LMW-16	LMW-17	LMW-18	LMW-19	LMW-20	LMW-21
			Sample Name	LMW-11_112618	LMW-12_112718	LMW-13_112718	LMW-14_112718	190 LMW-15	191 DUP-1	192 LMW-16	195 LMW-17	197 LMW-18	196 LMW-19	198 LMW-20	199 LMW-21
			Sample Date	11/26/2018	11/27/2018	11/27/2018	11/27/2018	07/27/2020	07/27/2020	07/27/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds															
1,1,1,2-Tetrachloroethane	630-20-6	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1,1-Trichloroethane	71-55-6	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1,2,2-Tetrachloroethane	79-34-5	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1,2-Trichloroethane	79-00-5	1	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1-Dichloroethane	75-34-3	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1-Dichloroethene	75-35-4	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,1-Dichloropropene	563-58-6	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	87-61-6	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
1,2,3-Trichloropropane	96-18-4	0.04	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2,4,5-Tetramethylbenzene	95-93-2	**5**	ug/l	**146 D**	**17.4**	0.33 J	**239 D**	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
1,2,4-Trimethylbenzene	95-63-6	**5**	ug/l	**14 D**	0.97	0.41 J	**13.2 D**	0.72	0.81	0.6	<0.2 U	<0.2 U	0.61	<0.2 U	0.43 J
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dichloroethane	107-06-2	0.6	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dichloropropane	78-87-5	1	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5	ug/l	4.6 JD	0.77	<0.2 U	3.3 JD	0.53	0.6	0.22 J	<0.2 U	<0.2 U	0.21 J	<0.2 U	<0.2 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,3-Dichloropropane	142-28-9	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	3	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	<400 U	<40 U	<40 U	<400 U	<40 UJ	<40 UJ	<40 UJ	<40 UJ	<40 UJ	<40 UJ	<40 UJ	<40 UJ
2,2-Dichloropropane	594-20-7	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	95-49-8	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone (MBK)	591-78-6	50	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
4-Chlorotoluene	106-43-4	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	67-64-1	50	ug/l	13.8 JD	6.98	<1 U	<10 U	<3.5 U	<5.5 U	<9.8 U	<2.4 U	<1 U	<3.6 U	<1 U	<4.8 U
Acrolein	107-02-8	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Acrylonitrile	107-13-1	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Benzene	71-43-2	**1**	ug/l	**119 D**	0.62	0.2 J	**50.1 D**	0.27 J	0.31 J	**3.3**	0.23 J	<0.2 U	**1.8**	<0.2 U	0.84
Bromobenzene	108-86-1	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	74-97-5	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Bromodichloromethane	75-27-4	50	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Bromoform	75-25-2	50	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
Bromomethane	74-83-9	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
Carbon Disulfide	75-15-0	60	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	0.38 J	0.21 J	0.23 J	<0.2 U	<0.2 U	<0.2 U	0.22 J	<0.2 U
Carbon Tetrachloride	56-23-5	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Chlorobenzene	108-90-7	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Chloroethane	75-00-3	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Chloroform	67-66-3	7	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Chloromethane	74-87-3	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Cis-1,2-Dichloroethene	156-59-2	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Cis-1,3-Dichloropropene	10061-01-5	0.4	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Cyclohexane	110-82-7	NS	ug/l	57.3 D	<0.2 U	<0.2 U	100 D	0.7	2.5	43	0.82	<0.2 U	11	<0.2 U	<0.2 U
Dibromochloromethane	124-48-1	50	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Dibromomethane	74-95-3	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Dichlorodifluoromethane	75-71-8	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Ethylbenzene	100-41-4	**5**	ug/l	**14.5 D**	0.34 J	<0.2 U	**7.2 D**	<0.2 U	<0.2 U	0.58	<0.2 U	<0.2 U	0.49 J	<0.2 U	0.48 J
Hexachlorobutadiene	87-68-3	0.5	ug/l	NA	NA	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Isopropylbenzene (Cumene)	98-82-8	**5**	ug/l	**125 D**	3.38	<0.2 U	**282 D**	1.2	1.4	**12**	<0.2 U	<0.2 U	**8.2**	<0.2 U	<0.2 U
M,P-Xylene	179601-23-1	**5**	ug/l	**49.1 D**	1.37	0.74 J	**34.8 D**	<0.5 U	<0.5 U	2.2	<0.5 U	<0.5 U	1.6	<0.5 U	1.4
Methyl Acetate	79-20-9	NS	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	2.2	<0.2 U	<0.2 U	<0.2 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	ug/l	<2 U	0.9	<0.2 U	<2 U	<0.5 U	<0.2 U	<0.2 U	<0.2 UJ	<0.2 UJ	1.1 J	<0.2 UJ	<0.2 UJ
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	ug/l	<2 U	3.22	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
Methylcyclohexane	108-87-2	NS	ug/l	163 D	6.67	<0.2 U	219 D	18	21	36	1.1	<0.2 U	47	<0.2 U	<0.2 U
Methylene Chloride	75-09-2	5	ug/l	<10 U	<1 U	<1 U	<10 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
n-Butylbenzene	104-51-8	**5**	ug/l	**46.6 D**	4.33	<0.2 U	**77.1 D**	1.1	1.2	3	<0.2 U	<0.2 U	3.4	<0.2 U	<0.2 U
n-Propylbenzene	103-65-1	**5**	ug/l	**320 D**	**5.89**	<0.2 U	**469 D**	0.87	0.95	**11**	<0.2 U	<0.2 U	**9.3**	<0.2 U	<0.2 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	**5**	ug/l	**20.1 D**	0.61	0.27 J	**8.8 D**	<0.2 U	<0.2 U	0.65	<0.2 U	<0.2 U	1.5	<0.2 U	0.45 J
p-Cymene (p-Isopropyltoluene)	CYMP	NS	ug/l	4.7 JD	0.27 J	<0.2 U	<2 U	120	140	0.97	2.3	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Sec-Butylbenzene	135-98-8	**5**	ug/l	**29.8 D**	1.86	<0.2 U	**52.8 D**	2.3	2.6	2.6	<0.2 U	<0.2 U	3.6	<0.2 U	1.3
Styrene	100-42-5	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
T-Butylbenzene	98-06-6	5	ug/l	2.7 JD	0.23 J	<0.2 U	4 JD	0.33 J	0.37 J	0.25 J	0.29 J	<0.2 U	0.86	<0.2 U	<0.2 U
Tert-Butyl Alcohol	75-65-0	NS	ug/l	<5 U	3.96	<0.5 U	<5 U	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ	4.4 J	<0.5 UJ	<0.5 UJ	<0.5 UJ
Tert-Butyl Methyl Ether	1634-04-4	10	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	1.4	0.32 J	<0.2 U	<0.2 U
Tetrachloroethene (PCE)	127-18-4	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.33 J	<0.2 U
Toluene	108-88-3	**5**	ug/l	**113 D**	1.35	0.76	**8.6 D**	<0.2 U	<0.2 U	1	<0.2 U	<0.2 U	1	<0.2 U	1.2
Total Xylenes	1330-20-7	**5**	ug/l	**69.2 D**	1.98	1.01 J	**43.6 D**	<0.6 U	<0.6 U	2.8	<0.6 U	<0.6 U	3.1	<0.6 U	1.8
Trans-1,2-Dichloroethene	156-60-5	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Trans-1,3-Dichloropropene	10061-02-6	0.4	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Trans-1,4-Dichloro-2-Butene	110-57-6	5	ug/l	NA	NA	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 UJ
Trichloroethene (TCE)	79-01-6	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Trichlorofluoromethane	75-69-4	5	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Vinyl Chloride	75-01-4	2	ug/l	<2 U	<0.2 U	<0.2 U	<2 U	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-11	LMW-12	LMW-13	LMW-14	LMW-15	LMW-15	LMW-16	LMW-17	LMW-18	LMW-19	LMW-20	LMW-21
			Sample Name	LMW-11_112618	LMW-12_112718	LMW-13_112718	LMW-14_112718	190 LMW-15	191 DUP-1	192 LMW-16	195 LMW-17	197 LMW-18	196 LMW-19	198 LMW-20	199 LMW-21
			Sample Date	11/26/2018	11/27/2018	11/27/2018	11/27/2018	07/27/2020	07/27/2020	07/27/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds															
1,2,4,5-Tetrachlorobenzene	95-94-3	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
1,2-Diphenylhydrazine	122-66-7	0	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
1,4-Dioxane (P-Dioxane)	123-91-1	**0.35**	ug/l	NA	NA	NA	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	**0.62**	<0.4 U	<0.4 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2,4,5-Trichlorophenol	95-95-4	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2,4,6-Trichlorophenol	88-06-2	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2,4-Dichlorophenol	120-83-2	1	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2,4-Dimethylphenol	105-67-9	1	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2,4-Dinitrophenol	51-28-5	1	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 UJ	<2.86 UJ	<2.7 UJ	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
2,4-Dinitrotoluene	121-14-2	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
2,6-Dinitrotoluene	606-20-2	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
2-Chloronaphthalene	91-58-7	10	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2-Chlorophenol	95-57-8	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2-Methylnaphthalene	91-57-6	NS	ug/l	5.12 J	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2-Methylphenol (o-Cresol)	95-48-7	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
2-Nitroaniline	88-74-4	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
2-Nitrophenol	88-75-5	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
3,3'-Dichlorobenzidine	91-94-1	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
3-Nitroaniline	99-09-2	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 UJ	<2.86 UJ	<2.7 UJ	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
4-Bromophenyl Phenyl Ether	101-55-3	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
4-Chloro-3-Methylphenol	59-50-7	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
4-Chloroaniline	106-47-8	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
4-Nitroaniline	100-01-6	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
4-Nitrophenol	100-02-7	NS	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.71 U	<5.41 U	<5.71 U	<5.56 U	<5.71 U	<6.06 U	<6.06 U
Acenaphthene	83-32-9	20	ug/l	1.94	<0.0556 U	<0.0556 U	<0.0556 U	0.533	0.434	1.01	0.629	<0.0556 U	0.126	0.109	0.412
Acenaphthylene	208-96-8	NS	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	<0.0556 U	<0.0556 U	<0.0571 U	0.13	<0.0571 U	<0.0556 U	<0.0571 U	<0.0606 U	0.0727
Acetophenone	98-86-2	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Anthracene	120-12-7	50	ug/l	0.244	<0.0556 U	<0.0556 U	0.1	0.178	0.171	0.0649	0.503	0.0556	<0.0571 U	0.097	0.145
Atrazine	1912-24-9	7.5	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.571 U	<0.541 U	<0.571 U	<0.556 U	<0.571 U	<0.606 U	<0.606 U
Benzaldehyde	100-52-7	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 UJ	<2.86 UJ	<2.7 UJ	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
Benzidine	92-87-5	5	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.71 U	<5.41 U	<5.71 U	<5.56 U	<5.71 U	<6.06 U	<6.06 U
Benzo(a)anthracene	56-55-3	**0.002**	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	**0.1**	**0.111**	**0.103**	**0.0541**	**0.103**	**0.0667**	<0.0571 U	**0.182**	**0.0606**
Benzo(a)pyrene	50-32-8	**0**	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	**0.1**	**0.111**	**0.0914**	**0.0541**	<0.0571 U	**0.0889**	<0.0571 U	**0.315**	<0.0606 U
Benzo(b)fluoranthene	205-99-2	**0.002**	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	**0.1**	**0.0778**	**0.08**	**0.0541**	<0.0571 U	**0.0667**	<0.0571 U	**0.218**	<0.0606 U
Benzo(g,h,i)Perylene	191-24-2	NS	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	0.0778	0.111	0.08	<0.0541 U	<0.0571 U	0.111	<0.0571 U	0.255	<0.0606 U
Benzo(k)fluoranthene	207-08-9	**0.002**	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	**0.0889**	**0.0667**	**0.0686**	<0.0541 U	<0.0571 U	**0.0556**	<0.0571 U	**0.206**	<0.0606 U
Benzoic Acid	65-85-0	NS	ug/l	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<2.78 UJ	<2.86 UJ	<2.7 UJ	<2.86 UJ	<2.78 UJ	<2.86 UJ	<3.03 UJ	<3.03 UJ
Benzyl Alcohol	100-51-6	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Benzyl Butyl Phthalate	85-68-7	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Biphenyl (Diphenyl)	92-52-4	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Bis(2-chloroethoxy) methane	111-91-1	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.14 U	<1.08 U	<1.14 U	<1.11 U	<1.14 U	<1.21 U	<1.21 U
Bis(2-chloroisopropyl) ether	108-60-1	5	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Bis(2-ethylhexyl) phthalate	117-81-7	5	ug/l	<0.556 U	1.12	<0.556 U	1.41	0.722	<0.571 U	<0.541 U	1.23	<0.556 U	<0.571 U	<0.606 U	<0.606 U
Caprolactam	105-60-2	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Carbazole	86-74-8	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Chrysene	218-01-9	**0.002**	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	**0.122**	**0.122**	**0.114**	**0.0541**	**0.08**	**0.0667**	<0.0571 U	**0.206**	<0.0606 U
Dibenz(a,h)anthracene	53-70-3	NS	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	<0.0556 U	<0.0556 U	<0.0571 U	<0.0541 U	<0.0571 U	<0.0556 U	<0.0571 U	<0.0606 U	<0.0606 U
Dibenzofuran	132-64-9	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Dibutyl phthalate	84-74-2	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Diethyl phthalate	84-66-2	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Dimethyl phthalate	131-11-3	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Dioctyl phthalate	117-84-0	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Fluoranthene	206-44-0	50	ug/l	0.156	0.0778	<0.0556 U	0.256	0.267	0.309	0.141	1.18	0.133	<0.0571 U	0.291	0.291
Fluorene	86-73-7	50	ug/l	1.03	<0.0556 U	<0.0556 U	<0.0556 U	0.311	0.263	0.746	0.731	<0.0556 U	0.183	<0.0606 U	0.182
Hexachlorobenzene	118-74-1	0.04	ug/l	<0.0222 U	<0.0222 U	<0.0222 U	<0.0222 U	<0.0222 U	<0.0229 U	<0.0216 U	<0.0229 U	<0.0222 U	<0.0229 U	<0.0242 U	<0.0242 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.571 U	<0.541 U	<0.571 U	<0.556 U	<0.571 U	<0.606 U	<0.606 U
Hexachlorocyclopentadiene	77-47-4	5	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.71 U	<5.41 U	<5.71 U	<5.56 U	<5.71 U	<6.06 U	<6.06 U
Hexachloroethane	67-72-1	5	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.571 U	<0.541 U	<0.571 U	<0.556 U	<0.571 U	<0.606 U	<0.606 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.002**	ug/l	<0.0556 U	<0.0556 U	<0.0556 U	**0.0778**	**0.0778**	**0.0571**	<0.0541 U	<0.0571 U	**0.0667**	<0.0571 U	**0.206**	<0.0606 U
Isophorone	78-59-1	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Naphthalene	91-20-3	10	ug/l	3.74	0.0556	<0.0556 U	2.6	0.378 J	0.251 J	0.508	0.126	<0.0556 U	0.0914	0.121	0.0727
Nitrobenzene	98-95-3	0.4	ug/l	<0.278 U	<0.278 U	<0.278 U	<0.278 U	<0.278 U	<0.286 U	<0.27 U	<0.286 U	<0.278 U	<0.286 U	<0.303 U	<0.303 U
n-Nitrosodimethylamine	62-75-9	NS	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.571 U	<0.541 U	<0.571 U	<0.556 U	<0.571 U	<0.606 U	<0.606 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
n-Nitrosodiphenylamine	86-30-6	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Pentachlorophenol	87-86-5	1	ug/l	<0.278 U	<0.278 U	<0.278 U	<0.278 U	<0.278 U	<0.286 U	<0.27 U	<0.286 UJ	<0.278 UJ	<0.286 UJ	<0.303 UJ	<0.303 UJ
Phenanthrene	85-01-8	50	ug/l	1.24	<0.0556 U	<0.0556 U	0.333	0.6	0.537	0.184	1.43	0.122	0.0914	0.182	0.097
Phenol	108-95-2	1	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U
Pyrene	129-00-0	50	ug/l	0.111	0.2	<0.0556 U	0.256	0.3	0.286	0.108	0.823	0.122	<0.0571 U	0.364	0.291
Pyridine	110-86-1	50	ug/l	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.78 U	<2.86 U	<2.7 U	<2.86 U	<2.78 U	<2.86 U	<3.03 U	<3.03 U

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-11	LMW-12	LMW-13	LMW-14	LMW-15	LMW-15	LMW-16	LMW-17	LMW-18	LMW-19	LMW-20	LMW-21
			Sample Name	LMW-11_112618	LMW-12_112718	LMW-13_112718	LMW-14_112718	190 LMW-15	191 DUP-1	192 LMW-16	195 LMW-17	197 LMW-18	196 LMW-19	198 LMW-20	199 LMW-21
			Sample Date	11/26/2018	11/27/2018	11/27/2018	11/27/2018	07/27/2020	07/27/2020	07/27/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Petroleum Hydrocarbons															
Total Extractable Petroleum Hydrocarbons (C09-C40)	TEPH (C9-C40)	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides															
4,4'-DDD	72-54-8	0.3	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
4,4'-DDE	72-55-9	0.2	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
4,4'-DDT	50-29-3	0.2	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Aldrin	309-00-2	0	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Alpha Chlordane	5103-71-9	NS	ug/l	<0.0041 U	<0.00432 U	0.0165	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Alpha Endosulfan	959-98-8	NS	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Beta Endosulfan	33213-65-9	NS	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Chlordane (alpha and gamma)	57-74-9	**0.05**	ug/l	<0.0205 U	<0.0216 U	**0.11**	<0.0222 U	<0.0216 U	<0.0216 U	<0.0216 U	<0.0219 U	<0.0216 U	<0.0219 U	<0.0216 U	<0.0211 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Dieldrin	60-57-1	0.004	ug/l	<0.00205 U	<0.00216 U	<0.00216 U	<0.00222 U	<0.00216 U	<0.00216 U	<0.00216 U	<0.00219 U	<0.00216 U	<0.00219 U	<0.00216 U	<0.00211 U
Endosulfan Sulfate	1031-07-8	NS	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Endrin	72-20-8	0	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Endrin Aldehyde	7421-93-4	5	ug/l	<0.0103 U	<0.0108 U	<0.0108 U	<0.0111 U	<0.0108 U	<0.0108 U	<0.0108 U	<0.0109 U	<0.0108 U	<0.0109 U	<0.0108 U	<0.0105 U
Endrin Ketone	53494-70-5	5	ug/l	<0.0103 U	<0.0108 U	<0.0108 U	<0.0111 U	<0.0108 U	<0.0108 U	<0.0108 U	<0.0109 U	<0.0108 U	<0.0109 U	<0.0108 U	<0.0105 U
Gamma Bhc (Lindane)	58-89-9	0.05	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Gamma-Chlordane	5566-34-7	NS	ug/l	<0.0103 U	<0.0108 U	0.011	<0.0111 U	<0.0108 U	<0.0108 U	<0.0108 U	<0.0109 U	<0.0108 U	<0.0109 U	<0.0108 U	<0.0105 U
Heptachlor	76-44-8	0.04	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Heptachlor Epoxide	1024-57-3	0.03	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Methoxychlor	72-43-5	35	ug/l	<0.0041 U	<0.00432 U	<0.00432 U	<0.00444 U	<0.00432 U	<0.00432 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00437 U	<0.00432 U	<0.00421 U
Toxaphene	8001-35-2	0.06	ug/l	<0.103 U	<0.108 U	<0.108 U	<0.111 U	<0.108 U	<0.108 U	<0.108 U	<0.109 U	<0.108 U	<0.109 U	<0.108 U	<0.105 U
Herbicides															
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	35	ug/l	NA	NA	NA	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	50	ug/l	NA	NA	NA	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Silvex (2,4,5-Tp)	93-72-1	0.26	ug/l	NA	NA	NA	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Polychlorinated Biphenyl															
PCB-1016 (Aroclor 1016)	12674-11-2	NS	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
Total PCBs	1336-36-3	0.09	ug/l	<0.0513 U	<0.0541 U	<0.0541 U	<0.0556 U	<0.0541 U	<0.0541 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0546 U	<0.0541 U	<0.0526 U
Metals - Dissolved															
Aluminum	7429-90-5	NS	ug/l	75.5	<55.6 U	<55.6 U	<55.6 U	65.2	95.8	<55.6 U	<55.6 U	63.5	97.9	<55.6 U	<55.6 U
Antimony	7440-36-0	**3**	ug/l	<1.11 U	1.52	1.47	<1.11 U	<1.11 U	<1.11 U	**4.3 J**	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Arsenic	7440-38-2	25	ug/l	5.07	1.76	1.9	2.27	1.5	1.46	<1.11 U	1.14	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Barium	7440-39-3	1,000	ug/l	179	41.5	<27.8 U	291	283	275	136	321 J	141	232	139	121
Beryllium	7440-41-7	3	ug/l	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 UJ	<0.333 U	<0.333 U	<0.333 U	<0.333 U
Cadmium	7440-43-9	5	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U
Calcium	7440-70-2	NS	ug/l	123,000	33,500	7,720	251,000	158,000	158,000	73,300	74,300	169,000	124,000	111,000	122,000
Chromium, Total	7440-47-3	50	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Cobalt	7440-48-4	NS	ug/l	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U
Copper	7440-50-8	200	ug/l	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<40.9 U	<37.4 U	<24.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U
Iron	7439-89-6	**300**	ug/l	**2,120**	<278 U	<278 U	**882**	**8,210 J**	**1,500 J**	**563**	<278 U	**8,050**	**2,780**	**3,150**	<278 U
Lead	7439-92-1	25	ug/l	9.89	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Magnesium	7439-95-4	**35,000**	ug/l	22,400	2,610	1,900	31,500	20,900	22,100	8,750	6,470 J	**74,200**	13,900	24,300	19,000
Manganese	7439-96-5	**300**	ug/l	**825**	157	<5.56 U	**1,130**	**1,300**	**1,260**	**1,120**	**487 J**	**864**	**900**	**492**	**410**
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Potassium	7440-09-7	NS	ug/l	28,000	4,020	1,750	28,900	22,700	23,800	10,900	8,350 J	47,100	18,000	14,100	13,900
Selenium	7782-49-2	**10**	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	6.53 J	8.88 J	<1.11 U	2.39	**18.2**	<1.11 U	4.59	2.13
Silver	7440-22-4	50	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 UJ	<5.56 UJ	<5.56 UJ	<5.56 UJ	<5.56 UJ	<5.56 UJ	<5.56 UJ	<5.56 UJ
Sodium	7440-23-5	**20,000**	ug/l	**179,000**	**22,800**	16,600	**309,000**	**316,000**	**322,000**	**90,700**	**67,500**	**615,000**	**134,000**	**133,000**	**123,000**
Thallium	7440-28-0	0.5	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2,000	ug/l	182	31.7	28.3	776	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-11	LMW-12	LMW-13	LMW-14	LMW-15	LMW-15	LMW-16	LMW-17	LMW-18	LMW-19	LMW-20	LMW-21
			Sample Name	LMW-11_112618	LMW-12_112718	LMW-13_112718	LMW-14_112718	190 LMW-15	191 DUP-1	192 LMW-16	195 LMW-17	197 LMW-18	196 LMW-19	198 LMW-20	199 LMW-21
			Sample Date	11/26/2018	11/27/2018	11/27/2018	11/27/2018	07/27/2020	07/27/2020	07/27/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020	07/28/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals - Total															
Aluminum	7429-90-5	NS	ug/l	<55.6 U	2,690 D	<55.6 U	93.3	764 J	3,400 J	<55.6 U	148	3,810	71.5	<55.6 U	61.9
Antimony	7440-36-0	**3**	ug/l	<1.11 U	1.33	1.23	**6.7**	<1.11 U	2.03	<1.11 U	<1.11 U	2.26	<1.11 U	<1.11 U	<1.11 U
Arsenic	7440-38-2	**25**	ug/l	7.65	3.79	2.41	**40.7**	6.16 J	12.1 J	1.47	5.57 J	16.6	2.5	4.55	<1.11 U
Barium	7440-39-3	1,000	ug/l	251	<278 U	502	501	426	511	199	379 J	423	308	169	162
Beryllium	7440-41-7	3	ug/l	<0.333 U	<0.333 U	<0.333 U	0.419	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U
Cadmium	7440-43-9	5	ug/l	<0.556 U	<0.556 U	<0.556 U	1.16	<0.556 U	<0.556 U	<0.556 U	<0.556 U	2.33	<0.556 U	<0.556 U	<0.556 U
Calcium	7440-70-2	NS	ug/l	124,000	40,700 D	466,000	479,000	156,000	160,000	78,500	74,700	170,000	109,000	108,000	114,000
Chromium, Hexavalent	18540-29-9	50	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Chromium, Total	7440-47-3	NS	ug/l	<5.56 U	<55.6 U	<5.56 U	<5.56 U	<5.56 U	17	<5.56 U	<5.56 U	17.5	<5.56 U	<5.56 U	<5.56 U
Chromium, Trivalent	16065-83-1	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	17.5	<10 U	<10 U	<10 U
Cobalt	7440-48-4	NS	ug/l	<4.44 U	<44.4 U	<4.44 U	18.2	<4.44 U	4.88	<4.44 U	<4.44 U	4.75	<4.44 U	<4.44 U	<4.44 U
Copper	7440-50-8	200	ug/l	<22.2 U	<222 U	<22.2 U	<22.2 U	<91.3 U	<257 U	<41.5 U	<23.3 U	<125 U	<22.2 U	<22.2 U	<22.2 U
Cyanide	57-12-5	200	ug/l	NA	NA	NA	NA	15.4	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Iron	7439-89-6	**300**	ug/l	**15,900**	<2,780 U	**16,700**	**16,800**	**45,900**	**52,300**	**13,500**	**13,400**	**54,200**	**31,900**	**17,600**	**12,500**
Lead	7439-92-1	**25**	ug/l	13.1	<55.6 U	10.8	20.7	**107 J**	**307 J**	<5.56 U	16.6	**516**	<5.56 U	<5.56 U	<5.56 U
Magnesium	7439-95-4	**35,000**	ug/l	21,600	3,550 D	**107,000**	**106,000**	20,300	21,600	9,030	6,350	**73,500**	11,900	22,800	17,300
Manganese	7439-96-5	**300**	ug/l	**847**	216 D	**785**	**800**	**1,280**	**1,390**	**1,270**	**497 J**	**934**	**801**	**472**	**393**
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	0.42	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	<11.1 U	<111 U	<11.1 U	19.1	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Potassium	7440-09-7	NS	ug/l	29,000 B	4,810 D	49,000	48,600	22,800	23,300	11,400	8,460	46,500	15,700	14,000	13,100
Selenium	7782-49-2	**10**	ug/l	<11.1 U	<11.1 U	<11.1 U	**18.2 D**	7.69	9.12	<1.11 U	2.08	**20.7**	4.28	6.73	3.33
Silver	7440-22-4	50	ug/l	<5.56 U	<55.6 U	<5.56 U	<5.56 U	<5.56 UJ	<5.56 UJ	<5.56 UJ	9.03 J	7.06 J	<5.56 UJ	<5.56 UJ	<5.56 UJ
Sodium	7440-23-5	**20,000**	ug/l	**206,000**	**26,600 D**	**1,130,000**	**1,130,000**	**298,000**	**304,000**	**93,900**	**64,600**	**586,000**	**112,000**	**127,000**	**113,000**
Thallium	7440-28-0	0.5	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	ug/l	<11.1 U	<111 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	12.2	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2,000	ug/l	<27.8 U	436 D	<27.8 U	30.2	83 J	233 J	<27.8 U	49.9	909	<27.8 U	28.8	<27.8 U
Per- and Polyfluoroalkyl Substances															
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	ug/l	NA	NA	NA	NA	<0.000399 U	<0.000399 U	<0.000399 U	<0.000399 U	<0.000399 U	<0.000399 U	<0.000399 U	<0.000399 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	ug/l	NA	NA	NA	NA	<0.000492 UJ	<0.000492 U	<0.000492 U	0.00204 J	<0.000492 U	<0.000492 U	<0.000492 U	<0.000492 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	ug/l	NA	NA	NA	NA	<0.000557 U	<0.000557 U	<0.000557 U	<0.000557 U	<0.000557 U	<0.000557 U	<0.000557 U	<0.000557 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	ug/l	NA	NA	NA	NA	<0.000529 U	<0.000529 U	<0.000529 U	<0.000529 U	<0.000529 U	<0.000529 U	<0.000529 U	<0.000529 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	ug/l	NA	NA	NA	NA	0.00236	0.0029	0.00859	0.00356	0.00482	<0.000294 U	0.00479	0.00852
Perfluorobutanoic acid (PFBA)	375-22-4	NS	ug/l	NA	NA	NA	NA	<0.0148 U	<0.0154 U	<0.0125 U	<0.0114 U	<0.0285 U	<0.00163 U	<0.016 U	<0.0301 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	ug/l	NA	NA	NA	NA	<0.000574 U	<0.000574 U	<0.000574 U	<0.000574 U	<0.000574 U	<0.000574 U	<0.000574 U	<0.000574 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	ug/l	NA	NA	NA	NA	<0.000524 U	<0.000524 U	0.00169 J	0.00177 J	0.000654 J	<0.000524 U	<0.000524 U	0.000587 J
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	ug/l	NA	NA	NA	NA	<0.000777 U	<0.000777 UJ	<0.000777 U	<0.000777 U	<0.000777 UJ	<0.000777 UJ	<0.000777 U	<0.000777 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	ug/l	NA	NA	NA	NA	<0.000415 U	<0.000415 U	<0.000415 U	<0.000415 U	<0.000415 U	0.000424 J	<0.000415 U	<0.000415 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	ug/l	NA	NA	NA	NA	0.00689	0.00706	0.00825	0.00544	0.023	0.00536	0.0115	0.0158
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	ug/l	NA	NA	NA	NA	0.000483 J	0.000527 J	0.00102 J	0.00146 J	0.000399 J	0.00182 J	0.00342	0.00264
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	ug/l	NA	NA	NA	NA	0.00537	0.00622	0.00659	0.00784	0.0163	0.00649	0.00882	0.0102
Perfluorononanoic Acid (PFNA)	375-95-1	NS	ug/l	NA	NA	NA	NA	0.001 J	0.000972 J	0.00304	0.00286	0.00185 J	0.00253	0.00245	0.0031
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	ug/l	NA	NA	NA	NA	<0.000296 UJ	<0.000296 U	<0.000296 U	<0.000296 U	<0.000296 UJ	<0.000296 U	<0.000296 U	<0.000296 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.0027**	ug/l	NA	NA	NA	NA	**0.00327 J**	**0.00291 J**	**0.0323 J**	**0.0313 J**	<0.000292 U	**0.0148 J**	**0.0206 J**	**0.00589 J**
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.0067**	ug/l	NA	NA	NA	NA	**0.0165**	**0.0165**	**0.00907**	**0.0143**	**0.024**	**0.0255**	**0.0473**	**0.0608**
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	ug/l	NA	NA	NA	NA	0.0115	0.0114	0.0164	<0.00905 U	0.0468	<0.0092 U	<0.00749 U	0.0246
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	ug/l	NA	NA	NA	NA	0.000651 J	0.000692 J	<0.000531 U	<0.000531 U	0.000592 J	0.000619 J	<0.000531 U	<0.000531 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	ug/l	NA	NA	NA	NA	<0.00137 U	<0.00137 U	<0.00137 U	<0.00137 U	<0.00137 U	<0.00137 U	<0.00137 U	<0.00137 U
Perfluoroundecanoic Acid (PFUnDA)	2058-94-8	NS	ug/l	NA	NA	NA	NA	<0.000657 U	<0.000657 U	0.000685 J	<0.000657 U	<0.000657 UJ	<0.000657 U	<0.000657 U	<0.000657 U
General Chemistry															
Alkalinity, Total (as CaCO3)	471-34-1	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride (As Cl)	16887-00-6	**250,000**	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
COD-Chemical Oxygen Demand	COD	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Nitrate (As N)	14797-55-8	10,000	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (As SO4)	14808-79-8	**250,000**	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	TDS	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	TOC	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-22	LMW-22	LMW-22	LMW-23	LMW-24	LMW-24	LMW-24	LMW-25	LMW-25	LMW-25	LMW-29	LMW-29	LMW-30	LMW-30
			Sample Name	200 LMW-22	211 LMW-22	216_LMW-22-COD	204 LMW-23	203 LMW-24	207 LMW-24	218_LMW-24-COD	202 LMW-25	209 LMW-25	219_LMW-25-COD	208 LMW-29	220_LMW-29-COD	206 LMW-30	221_LMW-30-COD
			Sample Date	07/28/2020	08/03/2020	08/06/2020	07/30/2020	07/30/2020	08/03/2020	08/06/2020	07/30/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	630-20-6	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	71-55-6	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	79-34-5	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	79-00-5	1	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 UJ	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	75-34-3	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	75-35-4	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	563-58-6	5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	87-61-6	5	ug/l	<0.2 UJ	NA	NA	<0.2 UJ	<0.2 UJ	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	96-18-4	0.04	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	95-93-2	**5**	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<0.2 UJ	NA	NA	<0.2 UJ	<0.2 UJ	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	95-63-6	**5**	ug/l	<0.2 U	NA	NA	0.65	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	ug/l	<0.2 UJ	NA	NA	<0.2 U	<0.2 UJ	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	3	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	107-06-2	0.6	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	78-87-5	1	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5	ug/l	<0.2 U	NA	NA	0.47 J	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	541-73-1	3	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	142-28-9	5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	3	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	<40 UJ	NA	NA	<40 UJ	<40 U	NA	NA	<40 UJ	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	594-20-7	5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	95-49-8	5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone (MBK)	591-78-6	50	ug/l	<0.2 UJ	NA	NA	<0.2 U	<0.2 UJ	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
4-Chlorotoluene	106-43-4	5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	67-64-1	50	ug/l	<4.6 U	NA	NA	<2.8 U	<2 U	NA	NA	<1 UJ	NA	NA	NA	NA	NA	NA
Acrolein	107-02-8	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 UJ	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Acrylonitrile	107-13-1	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Benzene	71-43-2	**1**	ug/l	0.25 J	NA	NA	<0.2 U	0.36 J	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Bromobenzene	108-86-1	5	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	74-97-5	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Bromodichloromethane	75-27-4	50	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Bromoform	75-25-2	50	ug/l	<0.2 UJ	NA	NA	<0.2 U	<0.2 UJ	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Bromomethane	74-83-9	5	ug/l	<0.2 UJ	NA	NA	<0.2 UJ	<0.2 UJ	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Carbon Disulfide	75-15-0	60	ug/l	0.39 J	NA	NA	<0.2 U	1.4	NA	NA	0.2 J	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	56-23-5	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Chlorobenzene	108-90-7	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Chloroethane	75-00-3	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Chloroform	67-66-3	7	ug/l	1.1	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Chloromethane	74-87-3	5	ug/l	<0.2 U	NA	NA	<0.2 UJ	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	156-59-2	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	10061-01-5	0.4	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Cyclohexane	110-82-7	NS	ug/l	<0.2 U	NA	NA	0.35 J	1	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Dibromochloromethane	124-48-1	50	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Dibromomethane	74-95-3	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	75-71-8	5	ug/l	<0.2 U	NA	NA	<0.2 UJ	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Ethylbenzene	100-41-4	**5**	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.2 U	NA	NA	<0.2 UJ	<0.2 UJ	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Isopropylbenzene (Cumene)	98-82-8	**5**	ug/l	<0.2 U	NA	NA	<0.2 U	1.5	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
M,P-Xylene	179601-23-1	**5**	ug/l	<0.5 U	NA	NA	<0.5 U	<0.5 U	NA	NA	<0.5 UJ	NA	NA	NA	NA	NA	NA
Methyl Acetate	79-20-9	NS	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	ug/l	0.67 J	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	ug/l	<0.2 UJ	NA	NA	<0.2 U	<0.2 UJ	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Methylcyclohexane	108-87-2	NS	ug/l	<0.2 U	NA	NA	1.4 J	3.3	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Methylene Chloride	75-09-2	5	ug/l	<1 U	NA	NA	<1 U	<1 U	NA	NA	<1 UJ	NA	NA	NA	NA	NA	NA
n-Butylbenzene	104-51-8	**5**	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
n-Propylbenzene	103-65-1	**5**	ug/l	<0.2 U	NA	NA	<0.2 U	0.88	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	**5**	ug/l	<0.2 U	NA	NA	0.35 J	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
p-Cymene (p-Isopropyltoluene)	CYMP	NS	ug/l	4.9	NA	NA	1.3	<0.2 U	NA	NA	0.2 J	NA	NA	NA	NA	NA	NA
Sec-Butylbenzene	135-98-8	**5**	ug/l	<0.2 U	NA	NA	<0.2 U	0.5	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Styrene	100-42-5	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
T-Butylbenzene	98-06-6	5	ug/l	<0.2 U	NA	NA	<0.2 UJ	0.43 J	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Tert-Butyl Alcohol	75-65-0	NS	ug/l	<0.5 UJ	NA	NA	<0.5 UJ	<0.5 UJ	NA	NA	<0.5 UJ	NA	NA	NA	NA	NA	NA
Tert-Butyl Methyl Ether	1634-04-4	10	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Tetrachloroethene (PCE)	127-18-4	5	ug/l	<0.2 U	NA	NA	2.2	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Toluene	108-88-3	**5**	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Total Xylenes	1330-20-7	**5**	ug/l	<0.6 U	NA	NA	0.65 J	<0.6 U	NA	NA	<0.6 UJ	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	156-60-5	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	10061-02-6	0.4	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Trans-1,4-Dichloro-2-Butene	110-57-6	5	ug/l	<0.2 UJ	NA	NA	<0.2 U	<0.2 UJ	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Trichloroethene (TCE)	79-01-6	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	75-69-4	5	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA
Vinyl Chloride	75-01-4	2	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 UJ	NA	NA	NA	NA	NA	NA

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-22	LMW-22	LMW-22	LMW-23	LMW-24	LMW-24	LMW-24	LMW-25	LMW-25	LMW-25	LMW-29	LMW-29	LMW-30	LMW-30
			Sample Name	200 LMW-22	211 LMW-22	216_LMW-22-COD	204 LMW-23	203 LMW-24	207 LMW-24	218_LMW-24-COD	202 LMW-25	209 LMW-25	219_LMW-25-COD	208 LMW-29	220_LMW-29-COD	206 LMW-30	221_LMW-30-COD
			Sample Date	07/28/2020	08/03/2020	08/06/2020	07/30/2020	07/30/2020	08/03/2020	08/06/2020	07/30/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																	
1,2,4,5-Tetrachlorobenzene	95-94-3	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	3	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
1,2-Diphenylhydrazine	122-66-7	0	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	541-73-1	3	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	3	ug/l	<2.94 U	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	**0.35**	ug/l	<0.4 U	NA	NA	<0.4 U	<0.4 U	NA	NA	<0.4 U	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	95-95-4	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	88-06-2	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	120-83-2	1	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	105-67-9	1	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	51-28-5	1	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	121-14-2	5	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	606-20-2	5	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	91-58-7	10	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2-Chlorophenol	95-57-8	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	91-57-6	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2-Methylphenol (o-Cresol)	95-48-7	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
2-Nitroaniline	88-74-4	5	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
2-Nitrophenol	88-75-5	NS	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	91-94-1	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
3-Nitroaniline	99-09-2	5	ug/l	<2.94 U	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	534-52-1	NS	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
4-Bromophenyl Phenyl Ether	101-55-3	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
4-Chloro-3-Methylphenol	59-50-7	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
4-Chloroaniline	106-47-8	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
4-Nitroaniline	100-01-6	5	ug/l	<2.94 U	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
4-Nitrophenol	100-02-7	NS	ug/l	<5.88 U	NA	NA	<5.56 U	<5.71 U	NA	NA	<5.41 U	NA	NA	NA	NA	NA	NA
Acenaphthene	83-32-9	20	ug/l	0.435	NA	NA	1.93	0.491	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Acenaphthylene	208-96-8	NS	ug/l	0.176	NA	NA	0.178	0.183	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Acetophenone	98-86-2	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Aniline (Phenylamine, Aminobenzene)	62-53-3	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Anthracene	120-12-7	50	ug/l	0.388	NA	NA	1	0.16	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Atrazine	1912-24-9	7.5	ug/l	<0.588 U	NA	NA	<0.556 U	<0.571 U	NA	NA	<0.541 U	NA	NA	NA	NA	NA	NA
Benzaldehyde	100-52-7	NS	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
Benzidine	92-87-5	5	ug/l	<5.88 U	NA	NA	<5.56 U	<5.71 U	NA	NA	<5.41 U	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	56-55-3	**0.002**	ug/l	**0.235**	NA	NA	**0.711**	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	50-32-8	**0**	ug/l	**0.2**	NA	NA	**0.744**	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	205-99-2	**0.002**	ug/l	**0.153**	NA	NA	**0.456**	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	191-24-2	NS	ug/l	0.118	NA	NA	0.433	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	207-08-9	**0.002**	ug/l	**0.129**	NA	NA	**0.3**	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Benzoic Acid	65-85-0	NS	ug/l	<2.94 UJ	NA	NA	<2.78 UJ	<2.86 UJ	NA	NA	<2.7 UJ	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	100-51-6	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	85-68-7	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Biphenyl (Diphenyl)	92-52-4	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Bis(2-chloroethoxy) methane	111-91-1	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	ug/l	<1.18 U	NA	NA	<1.11 U	<1.14 U	NA	NA	<1.08 U	NA	NA	NA	NA	NA	NA
Bis(2-chloroisopropyl) ether	108-60-1	5	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	117-81-7	5	ug/l	<0.588 U	NA	NA	<0.556 U	<0.571 U	NA	NA	<0.541 U	NA	NA	NA	NA	NA	NA
Caprolactam	105-60-2	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Carbazole	86-74-8	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Chrysene	218-01-9	**0.002**	ug/l	**0.294**	NA	NA	**0.878**	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	53-70-3	NS	ug/l	<0.0588 U	NA	NA	0.256	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Dibenzofuran	132-64-9	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Dibutyl phthalate	84-74-2	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Diethyl phthalate	84-66-2	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	131-11-3	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Dioctyl phthalate	117-84-0	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	50	ug/l	0.576	NA	NA	1.63	0.114	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Fluorene	86-73-7	50	ug/l	0.424	NA	NA	1.39	0.64	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	118-74-1	0.04	ug/l	<0.0235 U	NA	NA	<0.0222 U	<0.0229 U	NA	NA	<0.0216 U	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.588 U	NA	NA	<0.556 U	<0.571 U	NA	NA	<0.541 U	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	77-47-4	5	ug/l	<5.88 U	NA	NA	<5.56 U	<5.71 U	NA	NA	<5.41 U	NA	NA	NA	NA	NA	NA
Hexachloroethane	67-72-1	5	ug/l	<0.588 U	NA	NA	<0.556 U	<0.571 U	NA	NA	<0.541 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	193-39-5	**0.002**	ug/l	**0.0824**	NA	NA	**0.267**	<0.0571 U	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Isophorone	78-59-1	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Naphthalene	91-20-3	10	ug/l	0.176	NA	NA	4.98	0.171	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Nitrobenzene	98-95-3	0.4	ug/l	<0.294 U	NA	NA	<0.278 U	<0.286 U	NA	NA	<0.27 U	NA	NA	NA	NA	NA	NA
n-Nitrosodimethylamine	62-75-9	NS	ug/l	<0.588 U	NA	NA	<0.556 U	<0.571 U	NA	NA	<0.541 U	NA	NA	NA	NA	NA	NA
n-Nitrosodi-N-Propylamine	621-64-7	NS	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	86-30-6	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Pentachlorophenol	87-86-5	1	ug/l	<0.294 UJ	NA	NA	<0.278 U	<0.286 U	NA	NA	<0.27 U	NA	NA	NA	NA	NA	NA
Phenanthrene	85-01-8	50	ug/l	0.165	NA	NA	3.29	0.366	NA	NA	<0.0541 U	NA	NA	NA	NA	NA	NA
Phenol	108-95-2	1	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA
Pyrene	129-00-0	50	ug/l	0.941	NA	NA	1.99	0.103	NA	NA	0.108	NA	NA	NA	NA	NA	NA
Pyridine	110-86-1	50	ug/l	<2.94 U	NA	NA	<2.78 U	<2.86 U	NA	NA	<2.7 U	NA	NA	NA	NA	NA	NA

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-22	LMW-22	LMW-22	LMW-23	LMW-24	LMW-24	LMW-24	LMW-25	LMW-25	LMW-25	LMW-29	LMW-29	LMW-30	LMW-30
			Sample Name	200 LMW-22	211 LMW-22	216_LMW-22-COD	204 LMW-23	203 LMW-24	207 LMW-24	218_LMW-24-COD	202 LMW-25	209 LMW-25	219_LMW-25-COD	208 LMW-29	220_LMW-29-COD	206 LMW-30	221_LMW-30-COD
			Sample Date	07/28/2020	08/03/2020	08/06/2020	07/30/2020	07/30/2020	08/03/2020	08/06/2020	07/30/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Petroleum Hydrocarbons																	
Total Extractable Petroleum Hydrocarbons (C09-C40)	TEPH (C9-C40)	NS	ug/l	NA	2,040	NA	NA	NA	2,200	NA	NA	<109 U	NA	190	NA	2,250	NA
Pesticides																	
4,4'-DDD	72-54-8	0.3	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
4,4'-DDE	72-55-9	0.2	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
4,4'-DDT	50-29-3	0.2	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Aldrin	309-00-2	0	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Alpha Chlordane	5103-71-9	NS	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Alpha Endosulfan	959-98-8	NS	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Beta Endosulfan	33213-65-9	NS	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Chlordane (alpha and gamma)	57-74-9	**0.05**	ug/l	<0.0211 U	NA	NA	<0.0222 U	<0.0222 U	NA	NA	<0.0222 U	NA	NA	NA	NA	NA	NA
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Dieldrin	60-57-1	0.004	ug/l	<0.00211 U	NA	NA	<0.00222 U	<0.00222 U	NA	NA	<0.00222 U	NA	NA	NA	NA	NA	NA
Endosulfan Sulfate	1031-07-8	NS	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Endrin	72-20-8	0	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Endrin Aldehyde	7421-93-4	5	ug/l	<0.0105 U	NA	NA	<0.0111 U	<0.0111 U	NA	NA	<0.0111 U	NA	NA	NA	NA	NA	NA
Endrin Ketone	53494-70-5	5	ug/l	<0.0105 U	NA	NA	<0.0111 U	<0.0111 U	NA	NA	<0.0111 U	NA	NA	NA	NA	NA	NA
Gamma Bhc (Lindane)	58-89-9	0.05	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Gamma-Chlordane	5566-34-7	NS	ug/l	<0.0105 U	NA	NA	<0.0111 U	<0.0111 U	NA	NA	<0.0111 U	NA	NA	NA	NA	NA	NA
Heptachlor	76-44-8	0.04	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Heptachlor Epoxide	1024-57-3	0.03	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Methoxychlor	72-43-5	35	ug/l	<0.00421 U	NA	NA	<0.00444 U	<0.00444 U	NA	NA	<0.00444 U	NA	NA	NA	NA	NA	NA
Toxaphene	8001-35-2	0.06	ug/l	<0.105 U	NA	NA	<0.111 U	<0.111 U	NA	NA	<0.111 U	NA	NA	NA	NA	NA	NA
Herbicides																	
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	35	ug/l	<5 U	NA	NA	<5 U	<5 U	NA	NA	<5 U	NA	NA	NA	NA	NA	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	50	ug/l	<5 U	NA	NA	<5 U	<5 U	NA	NA	<5 U	NA	NA	NA	NA	NA	NA
Silvex (2,4,5-Tp)	93-72-1	0.26	ug/l	<5 U	NA	NA	<5 U	<5 U	NA	NA	<5 U	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyl																	
PCB-1016 (Aroclor 1016)	12674-11-2	NS	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
PCB-1221 (Aroclor 1221)	11104-28-2	NS	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
PCB-1232 (Aroclor 1232)	11141-16-5	NS	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
PCB-1242 (Aroclor 1242)	53469-21-9	NS	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
PCB-1248 (Aroclor 1248)	12672-29-6	NS	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
PCB-1254 (Aroclor 1254)	11097-69-1	NS	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
PCB-1260 (Aroclor 1260)	11096-82-5	NS	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
Total PCBs	1336-36-3	0.09	ug/l	<0.0526 U	NA	NA	<0.0556 U	<0.0556 U	NA	NA	<0.0556 U	NA	NA	NA	NA	NA	NA
Metals - Dissolved																	
Aluminum	7429-90-5	NS	ug/l	127	NA	NA	132	88.2	NA	NA	156	NA	NA	NA	NA	NA	NA
Antimony	7440-36-0	**3**	ug/l	<1.11 U	NA	NA	<1.11 U	<1.11 U	NA	NA	<1.11 U	NA	NA	NA	NA	NA	NA
Arsenic	7440-38-2	25	ug/l	3.23	NA	NA	3.31	2	NA	NA	2.42	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	1,000	ug/l	361	NA	NA	124	165	NA	NA	81.8	NA	NA	NA	NA	NA	NA
Beryllium	7440-41-7	3	ug/l	<0.333 U	NA	NA	<0.333 U	<0.333 U	NA	NA	<0.333 U	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	5	ug/l	<0.556 U	NA	NA	<0.556 U	<0.556 U	NA	NA	<0.556 U	NA	NA	NA	NA	NA	NA
Calcium	7440-70-2	NS	ug/l	342,000	NA	NA	263,000	157,000	NA	NA	291,000	NA	NA	NA	NA	NA	NA
Chromium, Total	7440-47-3	50	ug/l	<5.56 U	NA	NA	<5.56 U	<5.56 U	NA	NA	<5.56 U	NA	NA	NA	NA	NA	NA
Cobalt	7440-48-4	NS	ug/l	<4.44 U	NA	NA	<4.44 U	<4.44 U	NA	NA	<4.44 U	NA	NA	NA	NA	NA	NA
Copper	7440-50-8	200	ug/l	<22.2 U	NA	NA	<22.2 U	<22.2 U	NA	NA	<22.2 U	NA	NA	NA	NA	NA	NA
Iron	7439-89-6	**300**	ug/l	<278 U	NA	NA	**1,960**	<278 U	NA	NA	<278 U	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	25	ug/l	<5.56 U	NA	NA	<5.56 U	<5.56 U	NA	NA	<5.56 U	NA	NA	NA	NA	NA	NA
Magnesium	7439-95-4	**35,000**	ug/l	**180,000**	NA	NA	**708,000**	**141,000**	NA	NA	**849,000**	NA	NA	NA	NA	NA	NA
Manganese	7439-96-5	**300**	ug/l	**3,550**	NA	NA	158	273	NA	NA	68.6	NA	NA	NA	NA	NA	NA
Mercury	7439-97-6	0.7	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Nickel	7440-02-0	100	ug/l	<11.1 U	NA	NA	<11.1 U	<11.1 U	NA	NA	<11.1 U	NA	NA	NA	NA	NA	NA
Potassium	7440-09-7	NS	ug/l	77,100	NA	NA	241,000	55,000	NA	NA	256,000 D	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	**10**	ug/l	**36.2**	NA	NA	**198**	**40.8**	NA	NA	**186**	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	50	ug/l	<5.56 UJ	NA	NA	<5.56 UJ	<5.56 UJ	NA	NA	<5.56 UJ	NA	NA	NA	NA	NA	NA
Sodium	7440-23-5	**20,000**	ug/l	**1,510,000 D**	NA	NA	**5,820,000 D**	**1,220,000**	NA	NA	**6,960,000 D**	NA	NA	NA	NA	NA	NA
Thallium	7440-28-0	0.5	ug/l	<1.11 U	NA	NA	<1.11 U	<1.11 U	NA	NA	<1.11 U	NA	NA	NA	NA	NA	NA
Vanadium	7440-62-2	NS	ug/l	<11.1 U	NA	NA	<11.1 U	<11.1 U	NA	NA	<11.1 U	NA	NA	NA	NA	NA	NA
Zinc	7440-66-6	2,000	ug/l	<27.8 U	NA	NA	<27.8 U	<27.8 U	NA	NA	<27.8 U	NA	NA	NA	NA	NA	NA

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	NYSDEC SGVs	Location	LMW-22	LMW-22	LMW-22	LMW-23	LMW-24	LMW-24	LMW-24	LMW-25	LMW-25	LMW-25	LMW-29	LMW-29	LMW-30	LMW-30
			Sample Name	200 LMW-22	211 LMW-22	216_LMW-22-COD	204 LMW-23	203 LMW-24	207 LMW-24	218_LMW-24-COD	202 LMW-25	209 LMW-25	219_LMW-25-COD	208 LMW-29	220_LMW-29-COD	206 LMW-30	221_LMW-30-COD
			Sample Date	07/28/2020	08/03/2020	08/06/2020	07/30/2020	07/30/2020	08/03/2020	08/06/2020	07/30/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020	08/03/2020	08/06/2020
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals - Total																	
Aluminum	7429-90-5	NS	ug/l	632	NA	NA	3,140	208	NA	NA	131	NA	NA	NA	NA	NA	NA
Antimony	7440-36-0	**3**	ug/l	<1.11 U	NA	NA	1.4	<1.11 U	NA	NA	<1.11 U	NA	NA	NA	NA	NA	NA
Arsenic	7440-38-2	**25**	ug/l	6.72	NA	NA	19.3	2.89	NA	NA	2.93	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	1,000	ug/l	370	NA	NA	185	205	NA	NA	76.2	NA	NA	NA	NA	NA	NA
Beryllium	7440-41-7	3	ug/l	<0.333 U	NA	NA	<0.333 U	<0.333 U	NA	NA	<0.333 U	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	5	ug/l	<0.556 U	NA	NA	1.25	<0.556 U	NA	NA	<0.556 U	NA	NA	NA	NA	NA	NA
Calcium	7440-70-2	NS	ug/l	306,000	NA	NA	275,000	136,000	NA	NA	260,000	NA	NA	NA	NA	NA	NA
Chromium, Hexavalent	18540-29-9	50	ug/l	<10 U	NA	NA	<10 U	<10 U	NA	NA	<10 U	NA	NA	NA	NA	NA	NA
Chromium, Total	7440-47-3	NS	ug/l	<5.56 U	NA	NA	10.8	<5.56 U	NA	NA	<5.56 U	NA	NA	NA	NA	NA	NA
Chromium, Trivalent	16065-83-1	NS	ug/l	<10 U	NA	NA	10.8	<10 U	NA	NA	<10 U	NA	NA	NA	NA	NA	NA
Cobalt	7440-48-4	NS	ug/l	<4.44 U	NA	NA	<4.44 U	<4.44 U	NA	NA	<4.44 U	NA	NA	NA	NA	NA	NA
Copper	7440-50-8	200	ug/l	<29.5 U	NA	NA	73.8	<22.2 U	NA	NA	28.3	NA	NA	NA	NA	NA	NA
Cyanide	57-12-5	200	ug/l	<10 U	NA	NA	<10 U	43.6	NA	NA	<10 U	NA	NA	NA	NA	NA	NA
Iron	7439-89-6	**300**	ug/l	**7,640**	NA	NA	**8,640**	**2,560**	NA	NA	283	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	**25**	ug/l	20.8	NA	NA	**94.7**	6.87	NA	NA	<5.56 U	NA	NA	NA	NA	NA	NA
Magnesium	7439-95-4	**35,000**	ug/l	**166,000**	NA	NA	**703,000**	**126,000**	NA	NA	**747,000**	NA	NA	NA	NA	NA	NA
Manganese	7439-96-5	**300**	ug/l	**3,210**	NA	NA	263	246	NA	NA	65.3	NA	NA	NA	NA	NA	NA
Mercury	7439-97-6	0.7	ug/l	<0.2 U	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.2 U	NA	NA	NA	NA	NA	NA
Nickel	7440-02-0	100	ug/l	<11.1 U	NA	NA	<11.1 U	<11.1 U	NA	NA	<11.1 U	NA	NA	NA	NA	NA	NA
Potassium	7440-09-7	NS	ug/l	67,400	NA	NA	233,000	50,100	NA	NA	248,000	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	**10**	ug/l	**61.5**	NA	NA	**202**	**47.3**	NA	NA	**211**	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	50	ug/l	<5.56 UJ	NA	NA	<5.56 UJ	<5.56 UJ	NA	NA	<5.56 UJ	NA	NA	NA	NA	NA	NA
Sodium	7440-23-5	**20,000**	ug/l	**1,750,000 D**	NA	NA	**5,740,000 D**	**1,100,000**	NA	NA	**6,490,000 D**	NA	NA	NA	NA	NA	NA
Thallium	7440-28-0	0.5	ug/l	<1.11 U	NA	NA	<1.11 U	<1.11 U	NA	NA	<1.11 U	NA	NA	NA	NA	NA	NA
Vanadium	7440-62-2	NS	ug/l	<11.1 U	NA	NA	13	<11.1 U	NA	NA	<11.1 U	NA	NA	NA	NA	NA	NA
Zinc	7440-66-6	2,000	ug/l	30.8	NA	NA	184	<27.8 U	NA	NA	<27.8 U	NA	NA	NA	NA	NA	NA
Per- and Polyfluoroalkyl Substances																	
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	ug/l	<0.000399 U	NA	NA	<0.000399 U	<0.000399 U	NA	NA	<0.000399 U	NA	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	ug/l	<0.000492 U	NA	NA	<0.000492 U	<0.000492 U	NA	NA	<0.000492 U	NA	NA	NA	NA	NA	NA
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	ug/l	<0.000557 U	NA	NA	<0.000557 UJ	<0.000557 U	NA	NA	<0.000557 U	NA	NA	NA	NA	NA	NA
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	ug/l	<0.000529 U	NA	NA	<0.000529 U	<0.000529 U	NA	NA	<0.000529 U	NA	NA	NA	NA	NA	NA
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	ug/l	0.0103	NA	NA	0.00509	0.00674	NA	NA	0.00243	NA	NA	NA	NA	NA	NA
Perfluorobutanoic acid (PFBA)	375-22-4	NS	ug/l	<0.0193 U	NA	NA	<0.0156 U	<0.0161 U	NA	NA	<0.00817 U	NA	NA	NA	NA	NA	NA
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	ug/l	<0.000574 U	NA	NA	<0.000574 U	<0.000574 U	NA	NA	<0.000574 U	NA	NA	NA	NA	NA	NA
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	ug/l	0.00182 J	NA	NA	<0.000524 U	0.000605 J	NA	NA	<0.000524 U	NA	NA	NA	NA	NA	NA
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	ug/l	<0.000777 U	NA	NA	<0.000777 UJ	<0.000777 UJ	NA	NA	<0.000777 U	NA	NA	NA	NA	NA	NA
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	ug/l	<0.000415 U	NA	NA	<0.000415 U	0.0012 J	NA	NA	<0.000415 U	NA	NA	NA	NA	NA	NA
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	ug/l	0.0214	NA	NA	0.0063	0.0242	NA	NA	0.00412	NA	NA	NA	NA	NA	NA
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	ug/l	0.0106	NA	NA	0.00384	0.888 D	NA	NA	0.008	NA	NA	NA	NA	NA	NA
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	ug/l	0.0248	NA	NA	0.00446	0.0193	NA	NA	0.00612	NA	NA	NA	NA	NA	NA
Perfluorononanoic Acid (PFNA)	375-95-1	NS	ug/l	0.00361	NA	NA	0.00071 J	0.00268	NA	NA	0.00105 J	NA	NA	NA	NA	NA	NA
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	ug/l	<0.000296 U	NA	NA	0.000529 J	<0.000296 UJ	NA	NA	<0.000296 U	NA	NA	NA	NA	NA	NA
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.0027**	ug/l	**0.0266 J**	NA	NA	**0.0048**	**0.0291**	NA	NA	**0.00534**	NA	NA	NA	NA	NA	NA
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.0067**	ug/l	**0.0618**	NA	NA	**0.0207**	**0.0669**	NA	NA	**0.01**	NA	NA	NA	NA	NA	NA
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	ug/l	0.0266	NA	NA	<0.00738 U	0.025	NA	NA	<0.00841 U	NA	NA	NA	NA	NA	NA
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	ug/l	<0.000531 U	NA	NA	0.000651 J	<0.000531 UJ	NA	NA	<0.000531 U	NA	NA	NA	NA	NA	NA
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	ug/l	<0.00137 U	NA	NA	<0.00137 U	<0.00137 U	NA	NA	<0.00137 U	NA	NA	NA	NA	NA	NA
Perfluoroundecanoic Acid (PFUnDA)	2058-94-8	NS	ug/l	<0.000657 U	NA	NA	<0.000657 U	<0.000657 U	NA	NA	<0.000657 U	NA	NA	NA	NA	NA	NA
General Chemistry																	
Alkalinity, Total (as CaCO3)	471-34-1	NS	ug/l	NA	610,000	NA	NA	NA	460,000	NA	NA	150,000	NA	480,000	NA	500,000	NA
Chloride (As Cl)	16887-00-6	**250,000**	ug/l	NA	**4,200,000 D**	NA	NA	NA	**2,070,000 D**	NA	NA	**19,500,000 D**	NA	**11,100,000 D**	NA	133,000 D	NA
COD-Chemical Oxygen Demand	COD	NS	ug/l	NA	NA	580,000 D	NA	NA	NA	310,000 D	NA	NA	2,100,000 D	NA	1,500,000 D	NA	98,000
Nitrogen, Nitrate (As N)	14797-55-8	10,000	ug/l	NA	<50 U	NA	NA	NA	<50 U	NA	NA	<50 U	NA	<50 U	NA	<50 U	NA
Sulfate (As SO4)	14808-79-8	**250,000**	ug/l	NA	**331,000 D**	NA	NA	NA	56,700 D	NA	NA	**364,000 D**	NA	**640,000 D**	NA	<1,000 U	NA
Total Dissolved Solids	TDS	NS	ug/l	NA	8,010,000	NA	NA	NA	3,590,000	NA	NA	23,500,000	NA	14,000,000	NA	994,000	NA
Total Organic Carbon	TOC	NS	ug/l	NA	13,800	NA	NA	NA	10,600	NA	NA	5,570	NA	5,910	NA	8,090	NA

Table 6
Site Management Plan
Groundwater Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Notes:

CAS - Chemical Abstract Service
NS - No standard
ug/l - microgram per liter
NA - Not analyzed
RL - Reporting limit
<RL - Not detected

Groundwater sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 Codes, Rules, and Regulations (NYCRR) Part 703.5 and the NYSDEC Technical and Operation Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water and published addenda (herein collectively referenced as "NYSDEC SGVs").

Qualifiers:

D - The concentration reported is a result of a diluted sample.
B - The analyte was found in the associated analysis batch blank.
J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:

10 - Result exceeds NYSDEC SGVs

Table 7
Site Management Plan
Soil Vapor Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Analyte	CAS Number	Location	Ambient-1	LSV-2	LSV-3	LSV-4	LSV-5	LSV-6	LSV-7	LSV-8	LSV-8	LSV-9	LSV-10	LSV-11	LSV-13	LSV-14	LSV-15	LSV-15
		Sample Name	178 AMBIENT-1	LSV-2_112718	LSV-3_112718	LSV-4_112718	LSV-5_112718	LSV-6_112718	LSV-7_112718	LSV-8_112718	DUP-4_112718	LSV-9_112718	LSV-10_112718	LSV-11_112718	174 LSV-13	175 LSV-14	176 LSV-15	177 DUP-1
		Sample Date	07/16/2020	11/27/2018	11/27/2018	11/27/2018	11/27/2018	11/27/2018	11/27/2018	11/27/2018	11/27/2018	11/27/2018	11/27/2018	11/27/2018	07/16/2020	07/16/2020	07/16/2020	07/16/2020
		Sample Type	AA	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV	SV
		Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane	630-20-6	ug/m3	<0.52 U	<1.02 U	<1.03 U	<1.07 U	<1.08 U	<1.05 U	<1.06 U	<0.979 U	<1.05 U	<1.09 U	<10.4 U	<9.89 U	<1.1 U	<1.1 U	<2.1 U	<2.4 U
1,1,1-Trichloroethane	71-55-6	ug/m3	<0.41 U	6.15 D	4.52 D	<0.853 U	<0.86 U	<0.837 U	<0.84 U	<0.778 U	<0.834 U	<0.864 U	<8.24 U	<7.86 U	<0.86 U	<0.84 U	<1.7 U	<1.9 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/m3	<0.52 U	<1.02 U	<1.03 U	<1.07 U	<1.08 U	<1.05 U	<1.06 U	<0.979 U	<1.05 U	<1.09 U	<10.4 U	<9.89 U	<1.1 U	<1.1 U	<2.1 U	<2.4 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	ug/m3	<0.58 U	<1.14 U	<1.15 U	<1.2 U	<1.21 U	<1.18 U	<1.18 U	<1.09 U	<1.17 U	<1.21 U	<11.6 U	<11 U	<1.2 U	<1.2 U	<2.4 U	<2.7 U
1,1,2-Trichloroethane	79-00-5	ug/m3	<0.41 U	<0.809 U	<0.822 U	<0.853 U	<0.86 U	<0.837 U	<0.84 U	<0.778 U	<0.834 U	<0.864 U	<8.24 U	<7.86 U	<0.86 U	<0.84 U	<1.7 U	<1.9 U
1,1-Dichloroethane	75-34-3	ug/m3	<0.3 U	<0.6 U	<0.61 U	<0.633 U	<0.638 U	<0.621 U	<0.623 U	<0.577 U	<0.619 U	<0.641 U	<6.12 U	<5.83 U	<0.64 U	<0.62 U	<1.3 U	<1.4 U
1,1-Dichloroethene	75-35-4	ug/m3	<0.074 U	<0.588 U	<0.597 U	<0.62 U	<0.625 U	<0.608 U	<0.611 U	<0.565 U	<0.606 U	<0.628 U	<5.99 U	<5.71 U	<0.16 U	<0.15 U	<0.31 U	<0.34 U
1,2,4-Trichlorobenzene	120-82-1	ug/m3	<0.56 U	<1.1 U	<1.12 U	<1.16 U	<1.17 U	<1.14 U	<1.14 U	<1.06 U	2.16 D	<1.17 U	<11.2 U	<10.7 U	<1.2 U	<1.1 U	<2.3 U	<2.6 U
1,2,4-Trimethylbenzene	95-63-6	ug/m3	0.59 D	19.6 D	14.7 D	8.38 D	9.45 D	17.8 D	16.4 D	6.24 D	10.9 D	12.4 D	1350 D	<7.08 U	4.7 D	2.0 D	1.8 D	2.0 D
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	ug/m3	<0.58 U	<1.14 U	<1.16 U	<1.2 U	<1.21 U	<1.18 U	<1.18 U	<1.1 U	<1.17 U	<1.22 U	<11.6 U	<11.1 U	<1.2 U	<1.2 U	<2.4 U	<2.7 U
1,2-Dichlorobenzene	95-50-1	ug/m3	<0.45 U	<0.892 U	<0.905 U	<0.94 U	<0.948 U	<0.922 U	<0.926 U	<0.857 U	<0.919 U	<0.952 U	<9.08 U	<8.66 U	<0.95 U	<0.92 U	<1.9 U	<2.1 U
1,2-Dichloroethane	107-06-2	ug/m3	<0.3 U	<0.6 U	<0.609 U	<0.633 U	<0.638 U	<0.621 U	<0.623 U	<0.577 U	<0.619 U	<0.641 U	715 D	<5.83 U	<0.64 U	<0.62 U	<1.3 U	<1.4 U
1,2-Dichloropropane	78-87-5	ug/m3	<0.35 U	<0.685 U	<0.696 U	<0.723 U	<0.728 U	<0.709 U	<0.712 U	<0.659 U	<0.707 U	<0.731 U	<6.98 U	<6.66 U	<0.73 U	<0.71 U	<1.4 U	<1.6 U
1,2-Dichlorotetrafluoroethane	76-14-2	ug/m3	<0.52 U	<1.04 U	<1.05 U	<1.09 U	<1.1 U	<1.07 U	<1.08 U	<0.997 U	<1.07 U	<1.11 U	<10.6 U	<10.1 U	<1.1 U	<1.1 U	<2.2 U	<2.4 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	ug/m3	<0.37 U	5.32 D	3.92 D	2.92 D	2.56 D	4.90 D	4.62 D	1.96 D	3.61 D	4.44 D	<7.43 U	<7.08 U	3.7 D	<0.76 U	<1.5 U	<1.7 U
1,3-Butadiene	106-99-0	ug/m3	<0.5 U	<0.984 U	<1 U	<1.04 U	<1.05 U	<1.02 U	<1.02 U	<0.946 U	<1.01 U	<1.05 U	<10 U	<9.56 U	<1 U	<1 U	<2.1 U	<2.3 U
1,3-Dichlorobenzene	541-73-1	ug/m3	<0.45 U	<0.892 U	<0.905 U	<0.94 U	<0.948 U	<0.922 U	<0.926 U	<0.857 U	<0.919 U	<0.952 U	<9.08 U	<8.66 U	<0.95 U	<0.92 U	<1.9 U	<2.1 U
1,3-Dichloropropane	142-28-9	ug/m3	<0.35 U	<0.685 U	<0.696 U	<0.723 U	<0.728 U	<0.709 U	<0.712 U	<0.659 U	<0.707 U	<0.732 U	<6.98 U	<6.66 U	<0.73 U	<0.71 U	<1.4 U	<1.6 U
1,4-Dichlorobenzene	106-46-7	ug/m3	<0.45 U	<0.892 U	<0.905 U	<0.94 U	<0.948 U	<0.922 U	<0.926 U	<0.857 U	<0.919 U	<0.952 U	<9.08 U	<8.66 U	<0.95 U	<0.92 U	<1.9 U	<2.1 U
1,4-Dioxane (P-Dioxane)	123-91-1	ug/m3	<0.54 U	<1.07 U	<1.09 U	<1.13 U	<1.14 U	<1.11 U	<1.11 U	<1.03 U	<1.1 U	<1.14 U	<10.9 U	<10.4 U	<1.1 U	<1.1 U	<2.2 U	<2.5 U
2-Hexanone (MBK)	591-78-6	ug/m3	<0.62 U	10.3 D	26.4 D	<1.28 U	<1.29 U	32.7 D	19.7 D	<1.17 U	<1.25 U	26.8 D	<12.4 U	<11.8 U	32 D	7.4 D	6.8 D	7.4 D
4-Ethyltoluene	622-96-8	ug/m3	0.48 D	18.4 D	14.9 D	8.38 D	8.45 D	19.3 D	17.7 D	5.82 D	10.4 D	11.8 D	1960 D	<7.08 U	6.0 D	1.6 D	1.8 D	1.9 D
Acetone	67-64-1	ug/m3	4.1 D	53.0 D	193 D	9.59 D	29.5 D	206 D	86.5 D	62.3 D	99.0 D	160 D	1210 D	602 D	170 D	110 D	93 D	94 D
Acrylonitrile	107-13-1	ug/m3	<0.16 U	<0.322 U	<0.327 U	<0.339 U	<0.342 U	<0.333 U	<0.334 U	<0.309 U	<0.332 U	<0.344 U	<3.28 U	<3.13 U	<0.34 U	<0.33 U	<0.68 U	<0.75 U
Allyl Chloride (3-Chloropropene)	107-05-1	ug/m3	<1.2 U	<2.32 U	<2.36 U	<2.45 U	<2.47 U	<2.4 U	<2.41 U	<2.23 U	<2.39 U	<2.48 U	<23.6 U	<22.6 U	<2.5 U	<2.4 U	<4.9 U	<5.4 U
Benzene	71-43-2	ug/m3	0.29 D	13.2 D	14.0 D	3.60 D	7.75 D	23.9 D	24.7 D	8.84 D	10.6 D	25.9 D	<4.83 U	<4.6 U	50 D	2.2 D	2.7 D	2.6 D
Benzyl Chloride	100-44-7	ug/m3	<0.39 U	<0.768 U	<0.78 U	<0.81 U	<0.816 U	<0.794 U	<0.797 U	<0.738 U	<0.792 U	<0.82 U	<7.82 U	<7.46 U	<0.82 U	<0.8 U	<1.6 U	<1.8 U
Bromodichloromethane	75-27-4	ug/m3	<0.5 U	<0.994 U	<1.01 U	<1.05 U	<1.06 U	<1.03 U	<1.03 U	<0.955 U	<1.02 U	<1.06 U	<10.1 U	<9.65 U	<1.1 U	<1 U	<2.1 U	<2.3 U
Bromoethene	593-60-2	ug/m3	<0.33 U	<0.649 U	<0.659 U	<0.684 U	<0.689 U	<0.671 U	<0.674 U	<0.624 U	<0.669 U	<0.692 U	<6.61 U	<6.3 U	<0.69 U	<0.67 U	<1.4 U	<1.5 U
Bromoform	75-25-2	ug/m3	<0.78 U	<1.53 U	<1.56 U	<1.62 U	<1.63 U	<1.59 U	<1.59 U	<1.47 U	<1.58 U	<1.64 U	<15.6 U	<14.9 U	<1.6 U	<1.6 U	<3.2 U	<3.6 U
Bromomethane	74-83-9	ug/m3	<0.29 U	<0.576 U	<0.585 U	<0.607 U	<0.612 U	<0.596 U	<0.598 U	<0.554 U	<0.594 U	<0.615 U	<5.87 U	<5.6 U	<0.61 U	<0.6 U	<1.2 U	<1.3 U
Carbon Disulfide	75-15-0	ug/m3	<0.23 U	7.62 D	7.93 D	3.60 D	1.91 D	8.03 D	4.75 D	2.40 D	3.14 D	7.00 D	<4.71 U	<4.49 U	7.5 D	1.8 D	2.2 D	2.5 D
Carbon Tetrachloride	56-23-5	ug/m3	0.47 D	0.373 D	<0.237 U	<0.246 U	<0.248 U	<0.241 U	<0.242 U	<0.224 U	<0.24 U	<0.249 U	<2.38 U	<2.27 U	<0.25 U	6.9 D	<0.49 U	<0.55 U
Chlorobenzene	108-90-7	ug/m3	<0.35 U	<0.683 U	<0.693 U	<0.72 U	<0.726 U	<0.706 U	<0.709 U	<0.656 U	<0.704 U	<0.729 U	<6.96 U	<6.63 U	<0.73 U	<0.71 U	<1.4 U	<1.6 U
Chloroethane	75-00-3	ug/m3	<0.2 U	<0.391 U	<0.397 U	<0.413 U	<0.416 U	<0.405 U	<0.406 U	<0.376 U	<0.403 U	<0.418 U	<3.99 U	<3.8 U	<0.42 U	<0.41 U	<0.82 U	<0.92 U
Chloroform	67-66-3	ug/m3	<0.37 U	<0.724 U	<0.735 U	<0.764 U	<0.77 U	<0.749 U	<0.752 U	<0.696 U	<0.747 U	<0.773 U	<7.38 U	<7.04 U	11 D	<0.75 U	<1.5 U	<1.7 U
Chloromethane	74-87-3	ug/m3	1.3 D	<0.306 U	<0.311 U	<0.323 U	<0.325 U	<0.317 U	<0.318 U	<0.294 U	<0.316 U	<0.327 U	<3.12 U	<2.98 U	0.36 D	1.3 D	0.77 D	<0.72 U
Cis-1,2-Dichloroethene	156-59-2	ug/m3	<0.074 U	<0.588 U	<0.597 U	<0.62 U	<0.625 U	<0.608 U	<0.611 U	<0.565 U	<0.606 U	<0.628 U	<5.99 U	<5.71 U	<0.16 U	<0.15 U	<0.31 U	<0.34 U
Cis-1,3-Dichloropropene	10061-01-5	ug/m3	<0.34 U	<0.673 U	<0.684 U	<0.71 U	<0.715 U	<0.696 U	<0.699 U	<0.647 U	<0.694 U	<0.718 U	<6.86 U	<6.54 U	<0.72 U	<0.7 U	<1.4 U	<1.6 U
Cyclohexane	110-82-7	ug/m3	<0.26 U	2.40 D	1.14 D	37.5 D	8.79 D	2.43 D	3.55 D	38.1 D	<0.526 U	23.6 D	NA	<4.96 U	3.5 D	0.69 D	<1.1 U	<1.2 U
Dibromochloromethane	124-48-1	ug/m3	<0.64 U	<1.26 U	<1.28 U	<1.33 U	<1.34 U	<1.31 U	<1.31 U	<1.21 U	<1.3 U	<1.35 U	<12.9 U	<12.3 U	<1.3 U	<1.3 U	<2.7 U	<3 U
Dichlorodifluoromethane	75-71-8	ug/m3	1.5 D	3.45 D	2.38 D	2.40 D	2.42 D	2.88 D	2.82 D	1.62 D	1.89 D	2.11 D	<7.47 U	<7.13 U	1.4 D	1.7 D	1.8 D	2.1 D
Ethyl Acetate	141-78-6	ug/m3	<0.54 U	<1.07 U	<1.09 U	<1.13 U	<1.14 U	<1.11 U	<1.11 U	<1.03 U	<1.1 U	<1.14 U	<10.9 U	<10.4 U	<1.1 U	6.6 D	<2.2 U	<2.5 U
Ethylbenzene	100-41-4	ug/m3	<0.33 U	12.9 D	12.7 D	3.33 D	4.86 D	15.1 D	14.5 D	5.26 D	8.50 D	9.76 D	2280 D	163 D	5.8 D	4.6 D	2.6 D	2.9 D
Hexachlorobutadiene	87-68-3	ug/m3	<0.8 U	<1.58 U	<1.61 U	<1.67 U	<1.68 U	<1.64 U	<1.64 U	<1.52 U	<1.63 U	<1.69 U	<16.1 U	<15.4 U	<1.7 U	<1.6 U	<3.3 U	<3.7 U
Isopropanol	67-63-0	ug/m3	0.94 D	<0.729 U	<0.74 U	<0.769 U	<0.775 U	<0.754 U	<0.757 U	1.75 D	<0.752 U	<0.778 U	<7.43 U	<7.08 U	20 D	170 D	<1.5 U	<1.7 U
M,P-Xylene	179601-23-1	ug/m3	0.95 D	45.4 D	49.4 D	17.0 D	22.1 D	58.1 D	54.0 D	19.3 D	31.9 D	33.0 D	5660 D	414 D	17 D	17 D	8.2 D	8.7 D
Methyl Ethyl Ketone (2-Butanone)	78-93-3	ug/m3	0.53 D	41.6 D	107 D	10.6 D	11.0 D	131 D	70.4 D	28.5 D	46.5 D	92.3 D	<4.46 U	<4.25 U	60 D	24 D	17 D	18 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	ug/m3	<0.31 U	26.5 D	<0.617 U	<0.641 U	<0.646 U	<0.628 U	<0.631 U	<0.584 U	<0.626 U	<0.648 U	<6.19 U	<5.9 U	<0.65 U	3.8 D	<1.3 U	<1.4 U
Methyl Methacrylate	80-62-6	ug/m3	<0.31 U	<0.607 U	<0.617 U	<0.64 U	<0.645 U	<0.628 U	<0.63 U	<0.584 U	<0.626 U	<0.648 U	<6.19 U	<5.9 U	<0.65 U	1.1 D	<1.3 U	<1.4 U
Methylene Chloride	75-09-2	ug/m3	0.60 D	<1.03 U	<1.05 U	<1.09 U	<1.09 U	<1.07 U	<1.07 U	<0.991 U	<1.06 U	<1.1 U	<10.5 U	<10 U	<1.1 U	2.6 D	<2.2 U	<2.4 U
n-Heptane	142-82-5	ug/m3	0.34 D	13.4 D	7.22 D	19.9 D	5.56 D	12.7 D	10.5 D	<0.584 U	<0.627 U	<0.649 U	<6.19 U	<5.91 U	15 D	5.7 D	1.8 D	2.3 D
n-Hexane	110-54-3	ug/m3	0.37 D	33.6 D	18.5 D	57.3 D	12.1 D	38.7 D	34.0 D	29.7 D	42.6 D	33.8 D	10600 D	5650 D	37 D	5.7 D	2.3 D	2.6 D
o-Xylene (1,2-Dimethylbenzene)	95-47-6	ug/m3	0.33 D	14.4 D	14.5 D	6.11 D	6.36 D	15.9 D	14.3 D	5.39 D	9.10 D	9.97 D	2400 D	98.2 D	2.5 D	4.1 D	1.6 D	1.8 D
Propylene	115-07-1	ug/m3	0.48 D	4.44 D	4.35 D	1.67 D	2.20 D	7.60 D	3.63 D	2.53 D	4.45 D	4.06 D	1130 D	91.3 D	4.7 D	<0.26 U	1.9 D	1.7 D
Styrene	100-42-5	ug/m3	<0.32 U	0.758 D	<0.642 U	0.933 D	1.01 D	<0.653 U	0.656 D	0.668 D	1.11 D	0.809 D	<6.44 U	<6.14 U	<0.67 U	1.1 D	<1.3 U	<1.5 U
Tert-Butyl Methyl Ether	1634-04-4	ug/m3	<0.27 U	<0.535 U	<0.543 U	<0.564 U	<0.568 U	<0.553 U	<0.555 U	<0.514 U	<0.551 U	<0.571 U	<5.45 U	<5.2 U	<0.57 U	<0.55 U	<1.1 U	<1.3 U
Tetrachloroethene (PCE)	127-18-4	ug/m3	<0.51 U	99.5 D	78.0 D	18.7 D	92.6 D	33.4 D	48.5 D	4.64 D	4.04 D	13.7 D	<2.56 U	<2.44 U	16 D	54 D	790 D	850 D
Tetrahydrofuran	109-99-9	ug/m3	<0.44 U	17.8 D	<0.888 U	26.6 D	<0.93 U	<0.905 U	<0.908 U	<0.841 U	<0.902 U	16.2 D	<8.91 U	<8.5 U	<0.93 U	<0.91 U	<1.8 U	<2 U
Toluene	108-88-3	ug/m3	1.1 D	58.6 D	119 D	9.78 D	31.7 D	104 D	87.7 D	34.0 D	51.5 D	58.7 D	1630 D	353 D	7.8 D	25 D	6.6 D	7.2 D
Trans-1,2-Dichloroethene	156-60-5	ug/m3	<0.3 U	<0.588 U	<0.597 U	<0.62 U	<0.625 U	<0.608 U	<0.611 U	<0.565 U	<0.606 U	<0.628 U	<5.99 U	<5.71 U	<0.63 U	<0.61 U	<1.2 U	<1.4 U
Trans-1,3-Dichloropropene	10061-02-6	ug/m3	<0.34 U	<0.673 U	<0.684 U	<0.71 U	<0.715 U	<0.696 U	<0.699 U	<0.647 U	<0.694 U	<0.718 U	<6.86 U	<6.54 U	<0.72 U	<0.7 U	<1.4 U	<1.6 U
Trichloroethene (TCE)	79-01-6	ug/m3	<0.1 U	0.478 D	<0.202 U	<0.21 U	<0.212 U	<0.206 U	<0.207 U	<0.192 U	<0.205 U	<0.213 U	<2.03 U	<1.94 U	<0.21 U	<0.21 U	<0.42 U	<0.47 U
Trichlorofluoromethane	75-69-4	ug/m3	1.3 D	39.4 D	4.99 D	6.68 D	2.83 D	9.22 D	10.2 D	4.97 D	6.53 D	7.20 D	<8.49 U	<8.1 U	2.0 D	2.8 D	5.4 D	5.9 D
Vinyl Acetate	108-05-4	ug/m3	<0.26 UJ	<0.522 U	<0.53 U	<0.551 U	<0.555 U	<0.54 U	<0.542 U	10.6 D	<0.538 U	4.90 D	<5.32 U	<5.07 U	<0.56 UJ	<0.54 UJ	<1.1 UJ	<1.2 UJ
Vinyl Chloride	75-01-4	ug/m3	<0.096 U	<0.379 U	<0.385 U	<0.4 U	<0.403 U	<0.392 U	<0.394 U	<0.365 U	<0.391 U	<0.405 U	41.3 D	<3.68 U	<0.2 U	<0.2 U	<0.4 U	<0.44 U

Table 7
Site Management Plan
Soil Vapor Sample Analytical Results

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

Notes:
AA - Ambient Air
SV - Soil Vapor
CAS - Chemical Abstract Service
NS - No standard
ug/m3 - microgram per cubic meter
NA - Not analyzed
RL - Reporting limit
<RL - Not detected
Ambient air sample analytical results are shown for reference only.

Qualifiers:
D - The concentration reported is a result of a diluted sample.

UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.

U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Table 8
Site Management Plan
Proposed Monitoring Well Construction Detail Summary

28-90 Review Avenue
Long Island City, New York
NYSDEC BCP Site No.: C241236
Langan Project No.: 100652601

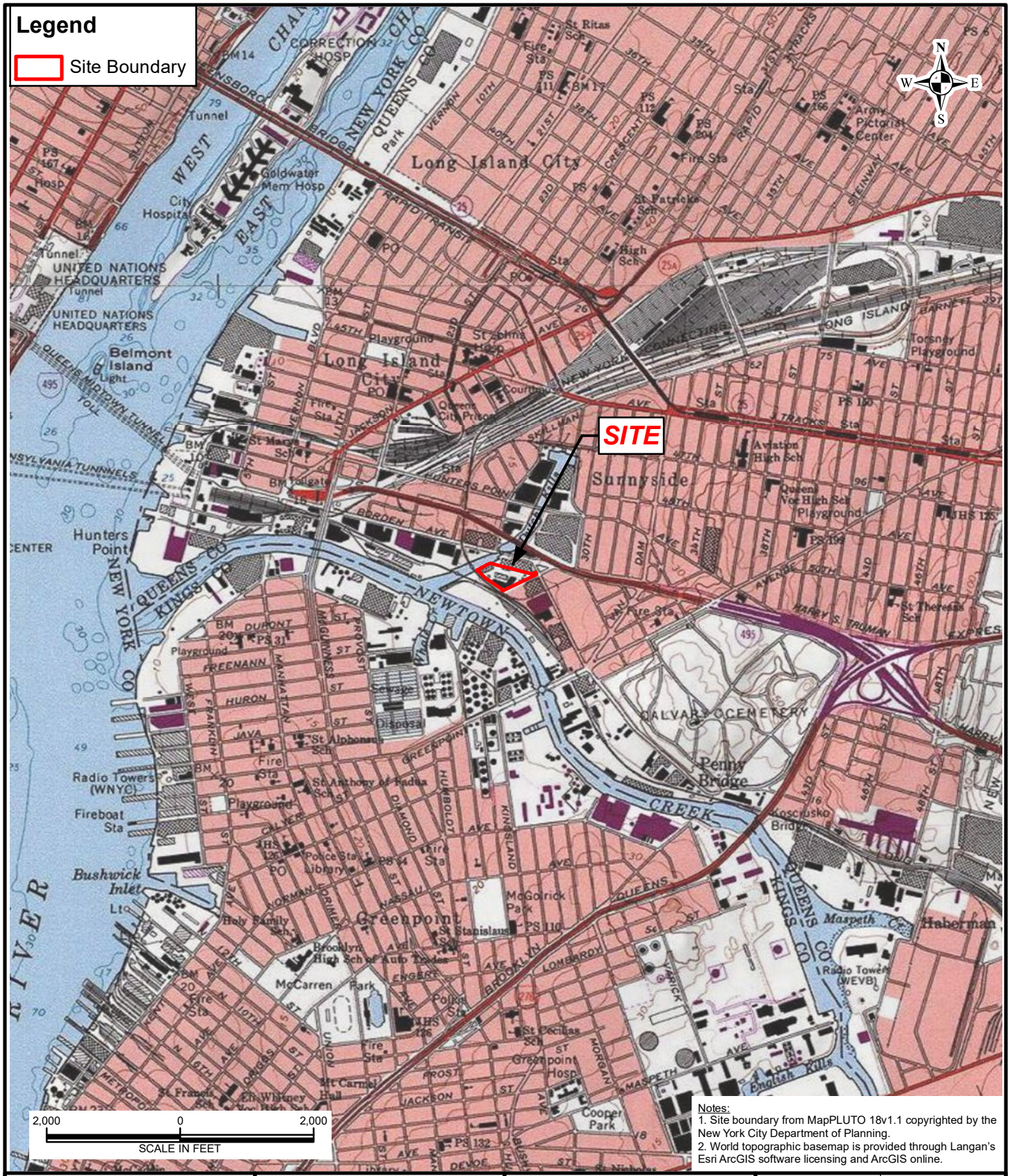
Monitoring Well ID	Well Location	Physical Access Limitations	Well Inner Diameter (inch)	Well Casing and Screen Type	Pre-Packed Well Screen	Well Screen Slot Size (inch)	Well Screen Length (ft)	Approx. Borehole Diameter (inch)	Filter Pack Thickess (inch)	Filter Pack Type	Drilling/Installation Method
LMW-32	Refer to SMP Figure 10	No	2.00	Sch. 40 PVC	No	0.020	10.00	6.00	2.00	WG #00	Hollow Stem Auger
LMW-33	Refer to SMP Figure 10	No	2.00	Sch. 40 PVC	No	0.020	10.00	6.00	2.00	WG #00	Hollow Stem Auger
LMW-34	Refer to SMP Figure 10	No	2.00	Sch. 40 PVC	No	0.020	10.00	6.00	2.00	WG #00	Hollow Stem Auger
LMW-35	Refer to SMP Figure 10	No	2.00	Sch. 40 PVC	No	0.020	10.00	6.00	2.00	WG #00	Hollow Stem Auger
LMW-36	Refer to SMP Figure 10	No	2.00	Sch. 40 PVC	No	0.020	10.00	6.00	2.00	WG #00	Hollow Stem Auger

General Well Construction Notes:

1. A 6-inch bedding layer of filter pack will be placed at bottom of each borehole before placing well screen
2. The top of the well screen will be installed about 2 to 3 feet above the observed water table to account for seasonal fluctuations of the water table elevation.
3. Filter pack will extend about 2 feet above top of well screen
4. Filter pack will be clean, inert, manufactured filtration sand/gravel media
5. A 2-foot thick bentonite (sodium bentonite) will be placed above the top of filter pack. Bentonite seal will be hydrated using potable water or water sourced from a hydrant or other public water supply source.
6. Well annulus above bentonite seal to be filled with non-impacted soil cuttings and/or clean sand.
7. Monitoring wells to be completed with a flush-mounted metal manhole cover with a diameter at least 2-inches greater than outer diameter of well casing and well plug.
8. Exterior monitoring wells will be finished with a 2-ft x 2-ft x 6-inch deep concrete pad

APPENDIX B

FIGURES



Notes:
1. Site boundary from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
2. World topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com

Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

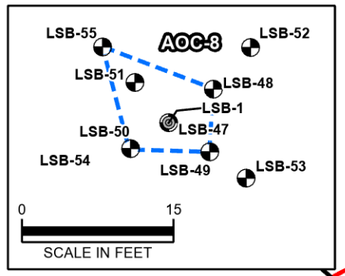
Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
USGS SITE LOCATION MAP

Project No. 100652601	Figure 1
Date 1/8/2021	
Scale 1"=2,000'	
Drawn By AR	
Last Revised 1/22/2021	

© 2013 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\ArcMap_Documents\2020-11 -BCP RAWP\Figure 1 - Site Location Map1.mxd Date: 1/22/2021 User: ibaker Time: 1:36:27 PM





LMW-32
LSB-41
LMW-33
LSB-8/LMW-6/LSV-5
LSB-3/LMW-2/LSV-1
LSB-42
LSB-11/LMW-9
LMW-35
LSB-68
LMW-36
LSB-67
LSB-46/LMW-25
LSB-40/LMW-23
LSB-7/LSV-3
LSB-29/LMW-17
LSB-43/
LMW-28
VEE-01
LSB-12/LSV-8
LSB-70/LMW-27
LSB-45/LMW-26
LSB-39
LSB-4/LMW-3/LSV-2
LSB-58/LMW-29
LSB-25
VEE-02
LSB-44/LMW-24
LSB-32/LMW-19
AOC-3
LSB-65
STORM DRAIN
ENTRANCE
W-4
LSB-69
LSB-71
LMW-31
LB-64
LSB-19/LMW-13
LSB-2/LMW-1
LSB-59
VEE-03
LSB-26/LMW-15/LSV-13
AOC-5
AOC-6
LSB-16/LSV-11
LSB-28
LSB-9/LMW-7/LSV-6
LSB-18/LMW-12/LSV-12
LSB-66
LSB-56
LSB-5/LMW-4/LSV-4
LSB-21
LSB-14/LSV-9
W-3
AOC-1
LSB-23
LSB-10/LMW-8/LSV-7
W-1
W-5
LSB-57
LSB-60
LSB-38
LSB-61
LSB-20/LMW-14
LSB-37/LMW-22
LSB-22
LSB-62
LSB-33
LSB-15/LMW-11/LSV-10
W-6
LSB-6/LMW-5
AOC-2
LSB-36
AOC-4
LSB-30/LMW-18/LSV-14
LSB-63
W-2
LSB-72/LMW-30
LSB-17
LSB-35/LMW-21
STORM DRAIN
LSB-24
LSB-13/LMW-10
LSB-34/LMW-20/LSV-15

60
0
60
SCALE IN FEET

Legend

- Site Boundary
- Area of Concern (AOC)
- Former 275,000-gallon AST
- Existing Building Footprint
- NAPL Extents
- Historical Monitoring Well Location (Tyree 1990)

2020 Vacuum Enhanced Extraction Pilot Test

- Monitoring Well Location
- Vacuum Enhanced Extraction Well Location

2020 Supplemental Remedial Investigation

- Soil Boring
- Soil Boring/Monitoring Well Location
- Soil Boring/Monitoring Well/ Soil Vapor Sampling Location

2018 Remedial Investigation

- Soil Boring
- Soil Boring/Monitoring Well/ Soil Vapor Sampling Location
- Soil Boring/Soil Vapor Sampling Location
- Soil Boring/Monitoring Well Location

AOCs
AOC-1: Former Gasoline Filling Area
AOC-2: Former Gasoline ASTs Area
AOC-3 Former Gasoline Truck Filling Area
AOC-4: Former Heavy Petroleum Distillate AST Area
AOC-5: Former Pump House Area
AOC-6: Former Garage Area
AOC-7: Historical Operations as a Trucking Terminal (Site-Wide)
AOC-8: PCB Hotspot
AOC-9: Soil Vapor Impacts (Site-Wide)

Notes:
1. Langan environmental boring locations are approximate and based on geolocation with a Trimble Geo 7x Handheld GNSS System.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
3. Areas of Concern (AOCs) digitized from figures provided in historical reports and 1936 Sanborn Fire Insurance Map.
4. Historic Monitoring Well Locations obtained from Tyree Brothers Environmental Services Inc., "AA Truck Rental" dated 06/1990.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

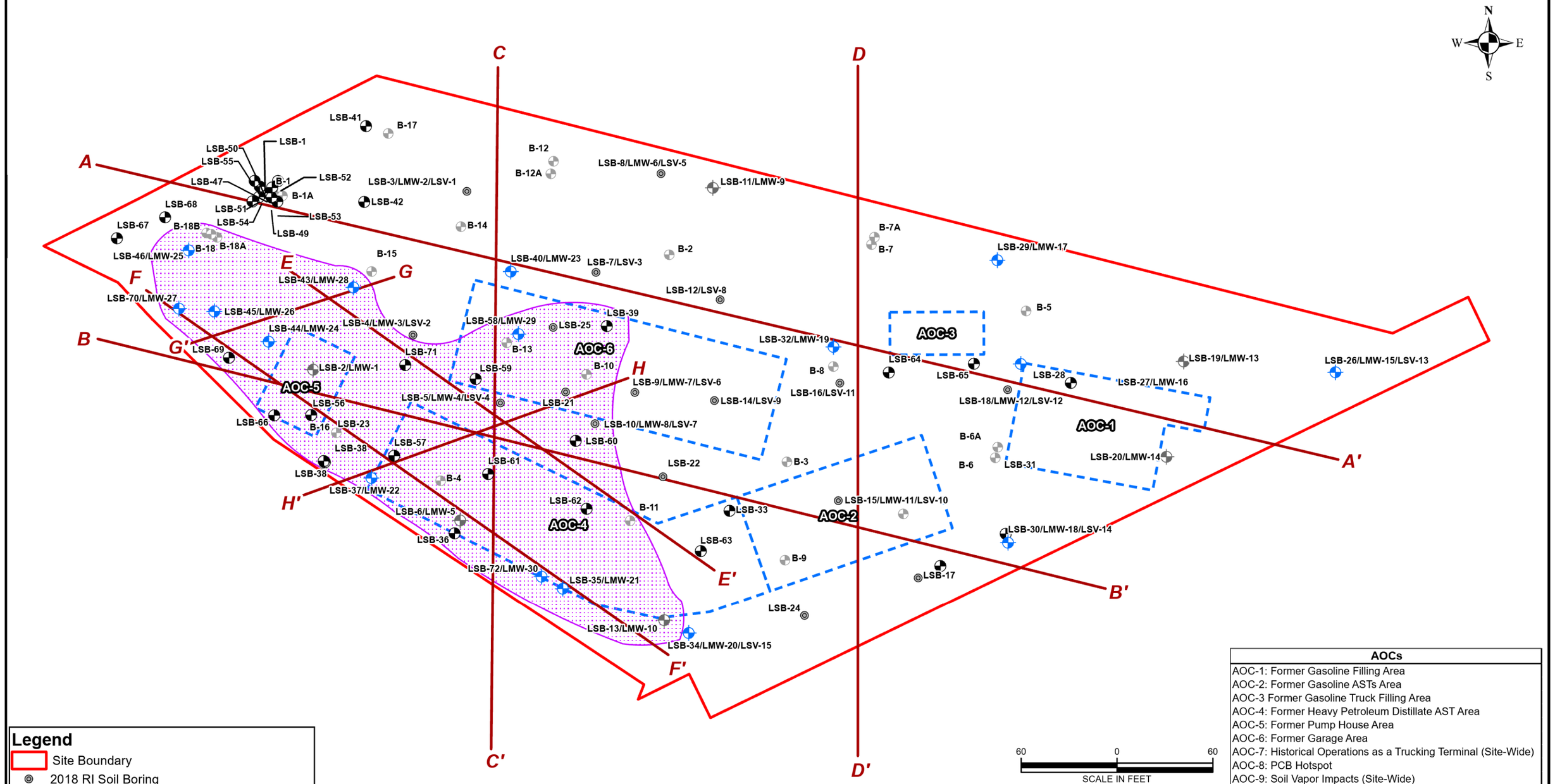
Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
SITE PLAN

Project No.	100652601
Date	1/8/2021
Scale	1"=60'
Drawn By	IHB
Last Revised	6/20/2025
Figure	2

© 2012 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\APRX\28-90 Review Avenue Collector\28-90 Review Avenue Collector.aprx Date: 6/20/2025 User: ibaker Time: 11:13 AM



AOCs
AOC-1: Former Gasoline Filling Area
AOC-2: Former Gasoline ASTs Area
AOC-3 Former Gasoline Truck Filling Area
AOC-4: Former Heavy Petroleum Distillate AST Area
AOC-5: Former Pump House Area
AOC-6: Former Garage Area
AOC-7: Historical Operations as a Trucking Terminal (Site-Wide)
AOC-8: PCB Hotspot
AOC-9: Soil Vapor Impacts (Site-Wide)

Legend

- Site Boundary
- 2018 RI Soil Boring
- 2018 RI Soil Boring/Monitoring Well Location
- Langan Geotechnical Boring Location
- 2020 SRI Soil Boring
- 2020 SRI Soil Boring/Monitoring Well Location
- Area of Concern (AOC)
- NAPL Impacts
- Cross Sectional Profile

Notes:
1. Langan environmental boring locations are approximate and based on geolocation with a Trimble Geo 7x Handheld GNSS System.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
3. Areas of Concern (AOCs) digitized from figures provided in historical reports and 1936 Sanborn Fire Insurance Map.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

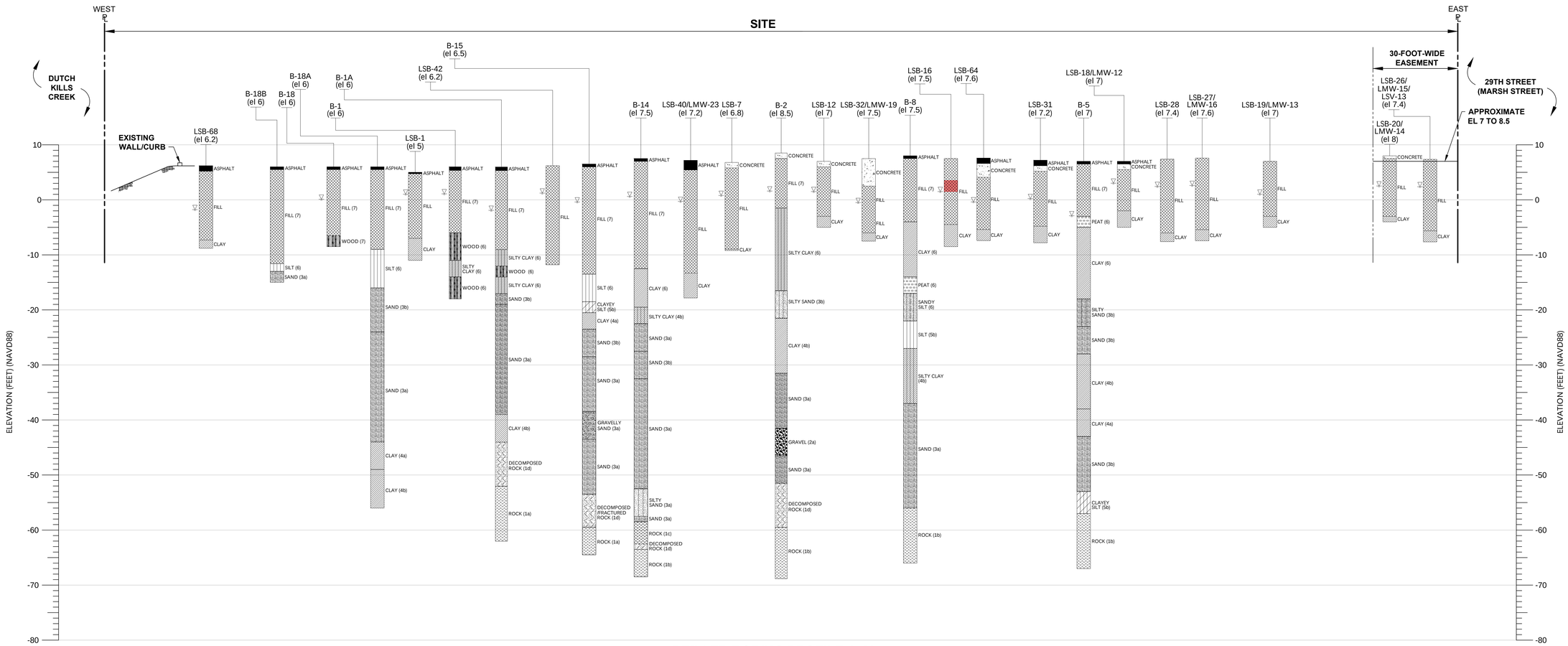
Project
28-90 REVIEW AVENUE
NYSDEC BCP SITE No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
SUBSURFACE PROFILE MAP KEY

Project No.	100652601
Date	1/22/2021
Scale	1"=60'
Drawn By	ATR
Last Revised	6/20/2025

Figure **3A**

© 2012 Langan



DRILLED BORING PROFILE A-A'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE

BORING KEY:

B-X
(el XX±)

(XX)

LEGEND:

B-X	DRILLED BORING IDENTIFICATION
el XX±	APPROXIMATE SURFACE ELEVATION AT THE TIME OF BORING (NAVD88)
▽	GROUNDWATER LEVEL FIRST OBSERVED IN THE BORING
■	PRODUCT OBSERVED WITHIN SOIL BORING

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED, SEE BORING LOGS INCLUDED IN ATTACHMENT B.
2. ALL BORING LOCATIONS ARE APPROXIMATE. GROUND SURFACE ELEVATIONS ARE INFERRED FROM FROM "TOPOGRAPHIC BOUNDARY AND UTILITY," PREPARED BY LANGAN, SIGNED 3/8/2019.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88.
4. BORINGS B-1 THROUGH B-4 WERE PERFORMED BETWEEN 14 AND 20 JUNE 2017 AND BORINGS B-5 THROUGH B-18 WERE PERFORMED BETWEEN 20 JUNE AND 13 JULY 2018 BY CRAIG GEOTECHNICAL DRILLING COMPANY, INC.UNDER THE FULL TIME INSPECTION OF LANGAN.
5. ENVIRONMENTAL SOIL BORINGS LSB-1 THROUGH LSB-25 WERE COMPLETED BETWEEN 19 AND 21 NOVEMBER 2018 AS PART OF THE 2018 REMEDIAL INVESTIGATION AND ENVIRONMENTAL SOIL BORINGS LSB-26 THROUGH LSB-72 WERE COMPLETED BETWEEN 7 AND 16 JULY 2020 AS PART OF THE 2020 REMEDIAL INVESTIGATION.

8 0 4 8
VERTICAL SCALE IN FEET

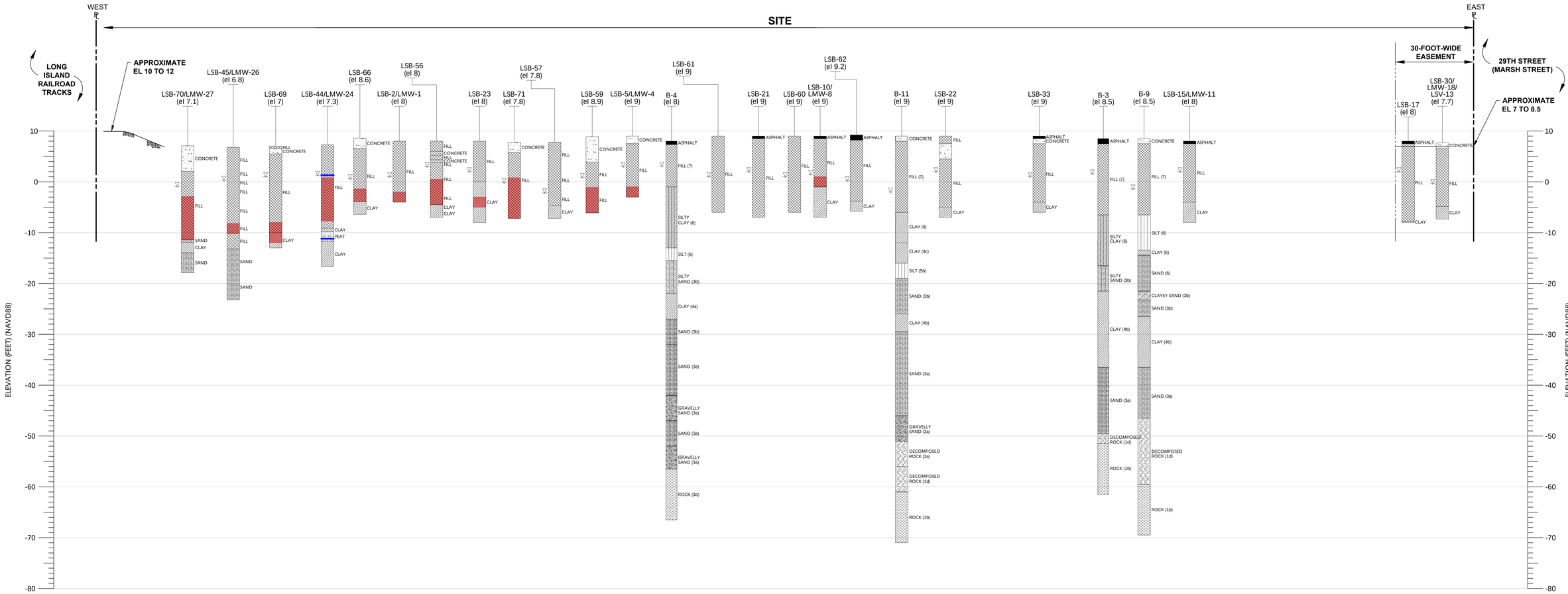
WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project	28-90 REVIEW AVENUE NYSDEC BCP SITE No.: C241236 BLOCK No. 294, LOT No. 106 LONG ISLAND CITY QUEENS COUNTY NEW YORK
Drawing Title	DRILLED BORING PROFILE A-A'
Project No.	100652601
Date	01/22/2021
Drawn By	AC
Checked By	AB
Drawing No.	3B

© 2020 Langan

Filename: \\langan.com\data\PAR\data9\100652601\Cadd Data - 100652601\Sheet Files\Geotechnical\100652601-BF201-0104.dwg Date: 1/22/2021 Time: 13:02 User: aruane Style Table: Langan.stb Layout: A-A



DRILLED BORING PROFILE B-B'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE

BORING KEY:

B-X
(el XX±)
(XX)

LEGEND:

B-X	DRILLED BORING IDENTIFICATION
el XX±	APPROXIMATE SURFACE ELEVATION AT THE TIME OF BORING (NAVD88)
▽	GROUNDWATER LEVEL FIRST OBSERVED IN THE BORING
	PRODUCT OBSERVED WITHIN SOIL BORING
	PRODUCT OBSERVED DURING MONITORING WELL GAUGING

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED, SEE BORING LOGS INCLUDED IN ATTACHMENT B.
2. ALL BORING LOCATIONS ARE APPROXIMATE. GROUND SURFACE ELEVATIONS ARE INFERRED FROM FROM "TOPOGRAPHIC BOUNDARY AND UTILITY," PREPARED BY LANGAN, SIGNED 3/8/2019.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88.
4. BORINGS B-1 THROUGH B-4 WERE PERFORMED BETWEEN 14 AND 20 JUNE 2017 AND BORINGS B-5 THROUGH B-18 WERE PERFORMED BETWEEN 20 JUNE AND 13 JULY 2018 BY CRAIG GEOTECHNICAL DRILLING COMPANY, INC.UNDER THE FULL TIME INSPECTION OF LANGAN.
5. ENVIRONMENTAL SOIL BORINGS LSB-1 THROUGH LSB-25 WERE COMPLETED BETWEEN 19 AND 21 NOVEMBER 2018 AS PART OF THE 2018 REMEDIAL INVESTIGATION AND ENVIRONMENTAL SOIL BORINGS LSB-26 THROUGH LSB-72 WERE COMPLETED BETWEEN 7 AND 16 JULY 2020 AS PART OF THE 2020 REMEDIAL INVESTIGATION.

8 0 4 8
VERTICAL SCALE IN FEET

WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

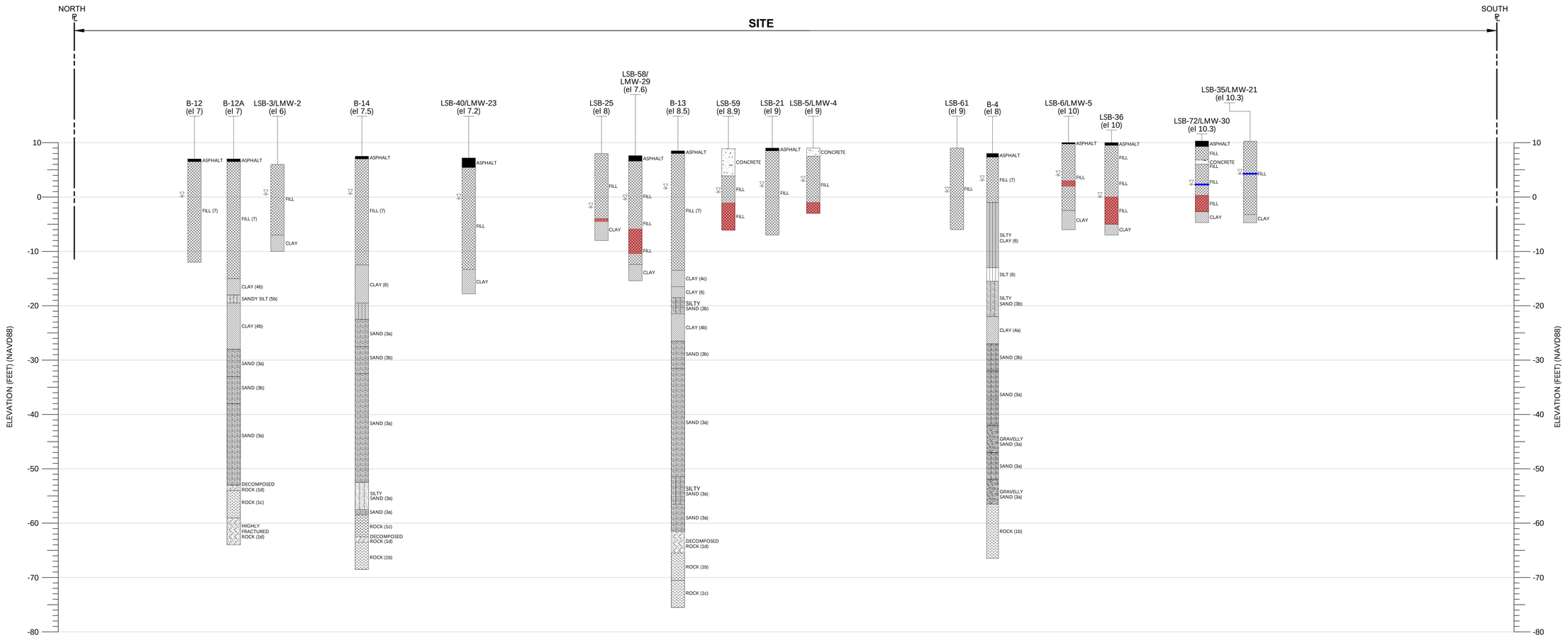
Project
28-90 REVIEW AVENUE
NYSDEC BCP SITE No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY **NEW YORK**

Drawing Title
DRILLED BORING PROFILE B-B'

Project No. **100652601**
Date **01/22/2021**
Drawn By **AC**
Checked By **AB**
Drawing No. **3C**

© 2021 Langan

Filename: I:\langan.com\data\PAR\data9\100652601\Cadd Data - 100652601\Sheet Files\Geotechnical\100652601-BF201-0104.dwg Date: 1/22/2021 Time: 13:03 User: aruane Style Table: Langan.stb Layout: B-B



DRILLED BORING PROFILE C-C'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE

BORING KEY:

B-X
(el XX±)
(XX)

LEGEND:

B-X	DRILLED BORING IDENTIFICATION
el XX±	APPROXIMATE SURFACE ELEVATION AT THE TIME OF BORING (NAVD88)
▽	GROUNDWATER LEVEL FIRST OBSERVED IN THE BORING
■	PRODUCT OBSERVED WITHIN SOIL BORING
▬	PRODUCT OBSERVED DURING MONITORING WELL GAUGING

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED, SEE BORING LOGS INCLUDED IN ATTACHMENT B.
2. ALL BORING LOCATIONS ARE APPROXIMATE. GROUND SURFACE ELEVATIONS ARE INFERRED FROM FROM "TOPOGRAPHIC BOUNDARY AND UTILITY," PREPARED BY LANGAN, SIGNED 3/8/2019.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88.
4. BORINGS B-1 THROUGH B-4 WERE PERFORMED BETWEEN 14 AND 20 JUNE 2017 AND BORINGS B-5 THROUGH B-18 WERE PERFORMED BETWEEN 20 JUNE AND 13 JULY 2018 BY CRAIG GEOTECHNICAL DRILLING COMPANY, INC.UNDER THE FULL TIME INSPECTION OF LANGAN.
5. ENVIRONMENTAL SOIL BORINGS LSB-1 THROUGH LSB-25 WERE COMPLETED BETWEEN 19 AND 21 NOVEMBER 2018 AS PART OF THE 2018 REMEDIAL INVESTIGATION AND ENVIRONMENTAL SOIL BORINGS LSB-26 THROUGH LSB-72 WERE COMPLETED BETWEEN 7 AND 16 JULY 2020 AS PART OF THE 2020 REMEDIAL INVESTIGATION.

8 0 4 8
VERTICAL SCALE IN FEET

WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
NYSDEC BCP SITE No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY **NEW YORK**

Drawing Title
DRILLED BORING PROFILE C-C'

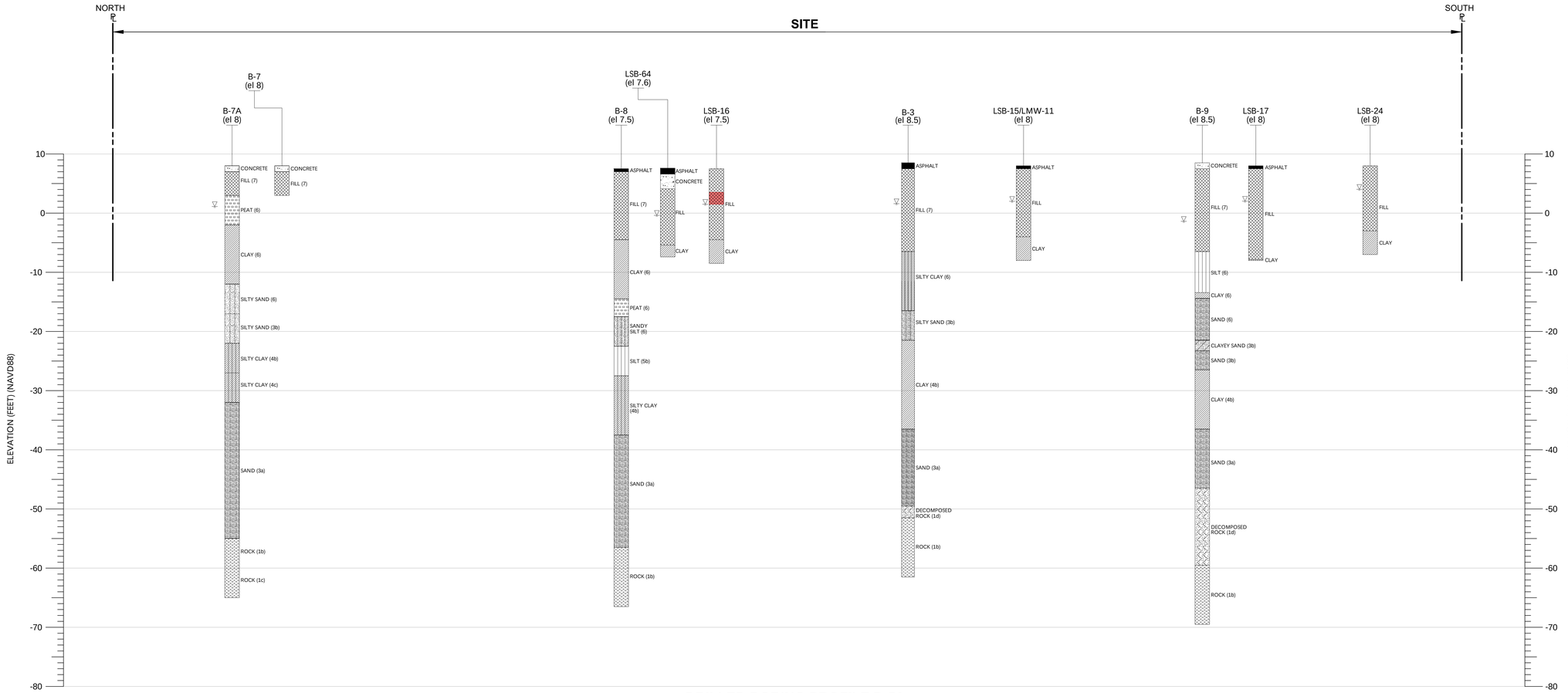
Project No. **100652601**
Date **01/22/2021**
Drawn By **AC**
Checked By **AB**

Drawing No. **3D**

© 2020 Langan

Filename: \\langan.com\data\PAR\data9\100652601\Cadd Data - 100652601\Sheet Files\Geotechnical\100652601-BF201-0104.dwg Date: 1/22/2021 Time: 13:03 User: aruane Style Table: Langan.stb Layout: C-C

LANGAN
PROJECT NO. ########



DRILLED BORING PROFILE D-D'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE

BORING KEY:

B-X
(el XX±)
(XX)

LEGEND:

B-X	DRILLED BORING IDENTIFICATION
el XX±	APPROXIMATE SURFACE ELEVATION AT THE TIME OF BORING (NAVD88)
▽	GROUNDWATER LEVEL FIRST OBSERVED IN THE BORING
■	PRODUCT OBSERVED WITHIN SOIL BORING

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED, SEE BORING LOGS INCLUDED IN ATTACHMENT B.
2. ALL BORING LOCATIONS ARE APPROXIMATE. GROUND SURFACE ELEVATIONS ARE INFERRED FROM FROM "TOPOGRAPHIC BOUNDARY AND UTILITY," PREPARED BY LANGAN, SIGNED 3/8/2019.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88.
4. BORINGS B-1 THROUGH B-4 WERE PERFORMED BETWEEN 14 AND 20 JUNE 2017 AND BORINGS B-5 THROUGH B-18 WERE PERFORMED BETWEEN 20 JUNE AND 13 JULY 2018 BY CRAIG GEOTECHNICAL DRILLING COMPANY, INC.UNDER THE FULL TIME INSPECTION OF LANGAN.
5. ENVIRONMENTAL SOIL BORINGS LSB-1 THROUGH LSB-25 WERE COMPLETED BETWEEN 19 AND 21 NOVEMBER 2018 AS PART OF THE 2018 REMEDIAL INVESTIGATION AND ENVIRONMENTAL SOIL BORINGS LSB-26 THROUGH LSB-72 WERE COMPLETED BETWEEN 7 AND 16 JULY 2020 AS PART OF THE 2020 REMEDIAL INVESTIGATION.

8 0 4 8
VERTICAL SCALE IN FEET

WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
NYSDEC BCP SITE No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
DRILLED BORING PROFILE D-D'

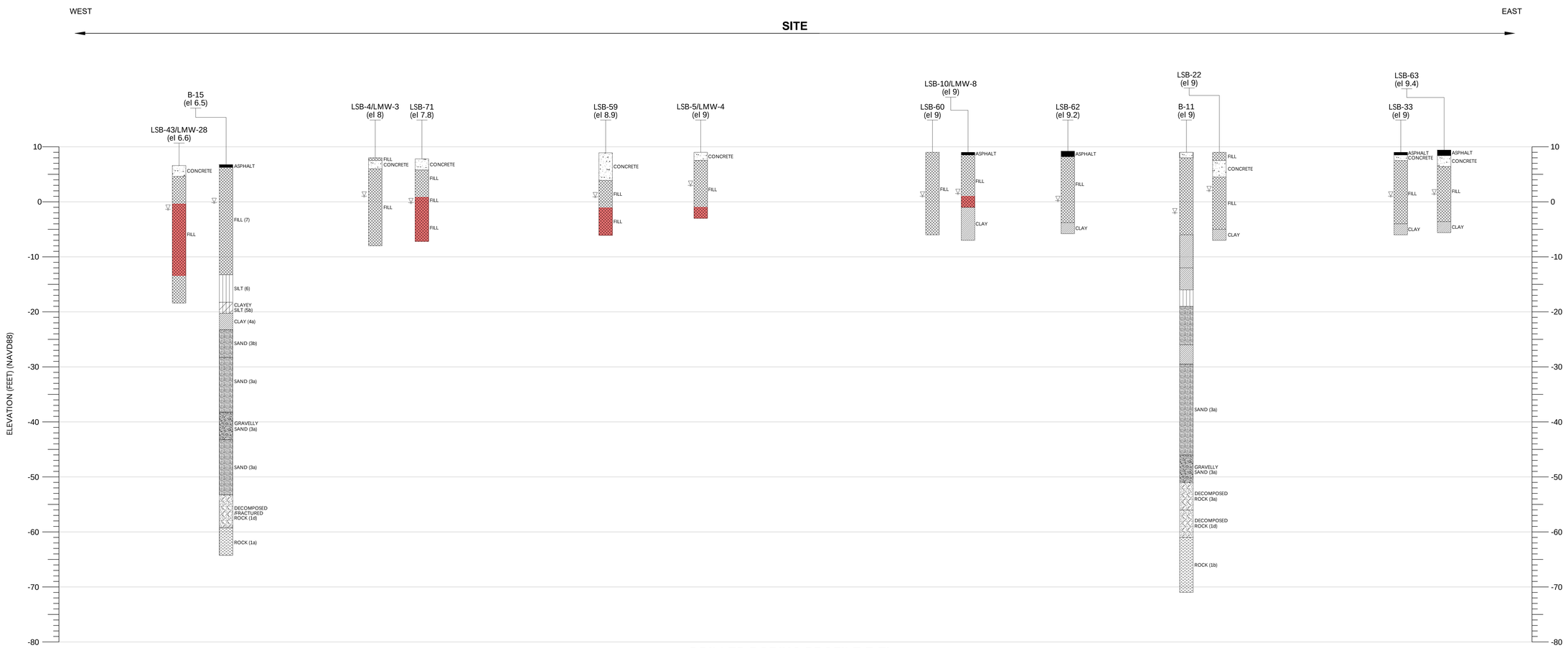
Project No.	100652601
Date	01/22/2021
Drawn By	AC
Checked By	AB

Drawing No. 3E

© 2021 Langan

Filename: \\langan.com\data\PAR\data\6\100652601\Cadd Data - 100652601\SheetFiles\Geotechnical\100652601-BF201-0104.dwg Date: 1/22/2021 Time: 13:04 User: aruane Style Table: Langan.stb Layout: D-D

LANGAN PROJECT NO. ########



DRILLED BORING PROFILE E-E'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE

BORING KEY:

B-X
(el XX±)
(XX)

LEGEND:

B-X	DRILLED BORING IDENTIFICATION
el XX±	APPROXIMATE SURFACE ELEVATION AT THE TIME OF BORING (NAVD88)
▽	GROUNDWATER LEVEL FIRST OBSERVED IN THE BORING
■	PRODUCT OBSERVED WITHIN SOIL BORING

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED, SEE BORING LOGS INCLUDED IN ATTACHMENT B.
2. ALL BORING LOCATIONS ARE APPROXIMATE. GROUND SURFACE ELEVATIONS ARE INFERRED FROM FROM "TOPOGRAPHIC BOUNDARY AND UTILITY," PREPARED BY LANGAN, SIGNED 3/8/2019.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88.
4. BORINGS B-1 THROUGH B-4 WERE PERFORMED BETWEEN 14 AND 20 JUNE 2017 AND BORINGS B-5 THROUGH B-18 WERE PERFORMED BETWEEN 20 JUNE AND 13 JULY 2018 BY CRAIG GEOTECHNICAL DRILLING COMPANY, INC.UNDER THE FULL TIME INSPECTION OF LANGAN.
5. ENVIRONMENTAL SOIL BORINGS LSB-1 THROUGH LSB-25 WERE COMPLETED BETWEEN 19 AND 21 NOVEMBER 2018 AS PART OF THE 2018 REMEDIAL INVESTIGATION AND ENVIRONMENTAL SOIL BORINGS LSB-26 THROUGH LSB-72 WERE COMPLETED BETWEEN 7 AND 16 JULY 2020 AS PART OF THE 2020 REMEDIAL INVESTIGATION.

8 0 4 8
VERTICAL SCALE IN FEET

WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

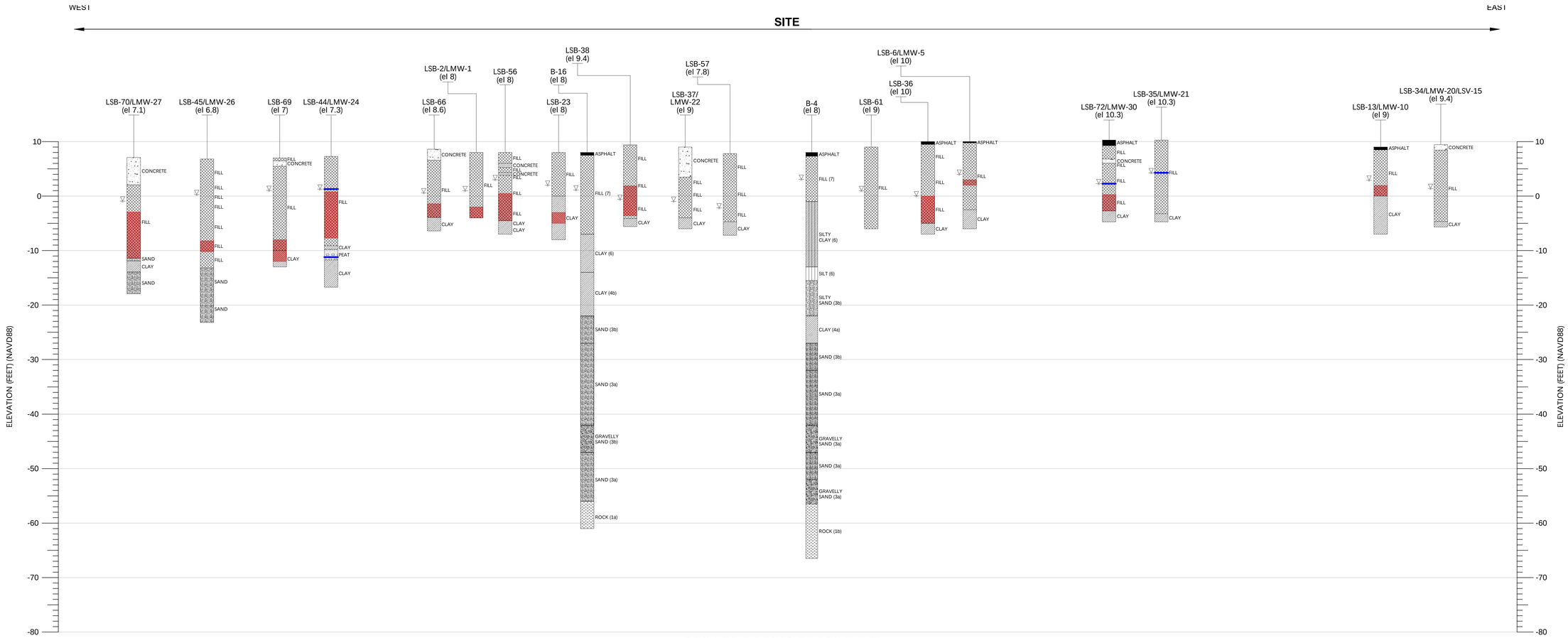
LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project	28-90 REVIEW AVENUE NYSDEC BCP SITE No.: C241236 BLOCK No. 294, LOT No. 106 LONG ISLAND CITY QUEENS COUNTY NEW YORK
Drawing Title	DRILLED BORING PROFILE E-E'
Project No.	100652601
Date	01/22/2021
Drawn By	AC
Checked By	AB
Drawing No.	3F

© 2020 Langan

Filename: \\langan.com\data\PAR\data5\100652601\Cadd Data - 100652601\Sheet Files\Geotechnical\100652601-BF201-0104.dwg Date: 1/22/2021 Time: 13:04 User: anuane Style Table: Langan.stb Layout: E-E

LANGAN
PROJECT NO. ########



DRILLED BORING PROFILE F-F'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE

BORING KEY:

B-X
(el XX±)
(XX)

LEGEND:

B-X	DRILLED BORING IDENTIFICATION
el XX±	APPROXIMATE SURFACE ELEVATION AT THE TIME OF BORING (NAVD88)
▽	GROUNDWATER LEVEL FIRST OBSERVED IN THE BORING
	PRODUCT OBSERVED WITHIN SOIL BORING
	PRODUCT OBSERVED DURING MONITORING WELL GAUGING

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED, SEE BORING LOGS INCLUDED IN ATTACHMENT B.
2. ALL BORING LOCATIONS ARE APPROXIMATE. GROUND SURFACE ELEVATIONS ARE INFERRED FROM FROM "TOPOGRAPHIC BOUNDARY AND UTILITY," PREPARED BY LANGAN, SIGNED 3/8/2019.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88.
4. BORINGS B-1 THROUGH B-4 WERE PERFORMED BETWEEN 14 AND 20 JUNE 2017 AND BORINGS B-5 THROUGH B-18 WERE PERFORMED BETWEEN 20 JUNE AND 13 JULY 2018 BY CRAIG GEOTECHNICAL DRILLING COMPANY, INC.UNDER THE FULL TIME INSPECTION OF LANGAN.
5. ENVIRONMENTAL SOIL BORINGS LSB-1 THROUGH LSB-25 WERE COMPLETED BETWEEN 19 AND 21 NOVEMBER 2018 AS PART OF THE 2018 REMEDIAL INVESTIGATION AND ENVIRONMENTAL SOIL BORINGS LSB-26 THROUGH LSB-72 WERE COMPLETED BETWEEN 7 AND 16 JULY 2020 AS PART OF THE 2020 REMEDIAL INVESTIGATION.

8 0 4 8
VERTICAL SCALE IN FEET

WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

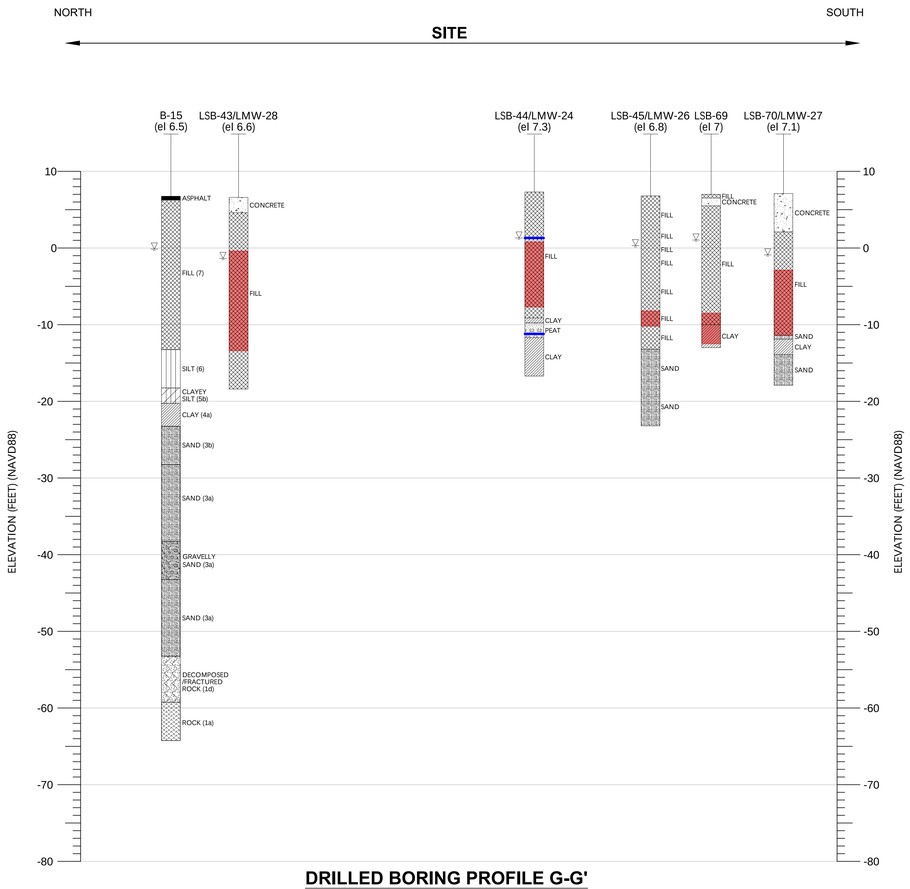
LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project	28-90 REVIEW AVENUE NYSDEC BCP SITE No.: C241236 BLOCK No. 294, LOT No. 106 LONG ISLAND CITY QUEENS COUNTY NEW YORK
Drawing Title	DRILLED BORING PROFILE F-F'
Project No.	100652601
Date	01/22/2021
Drawn By	AC
Checked By	AB
Drawing No.	3G

© 2020 Langan

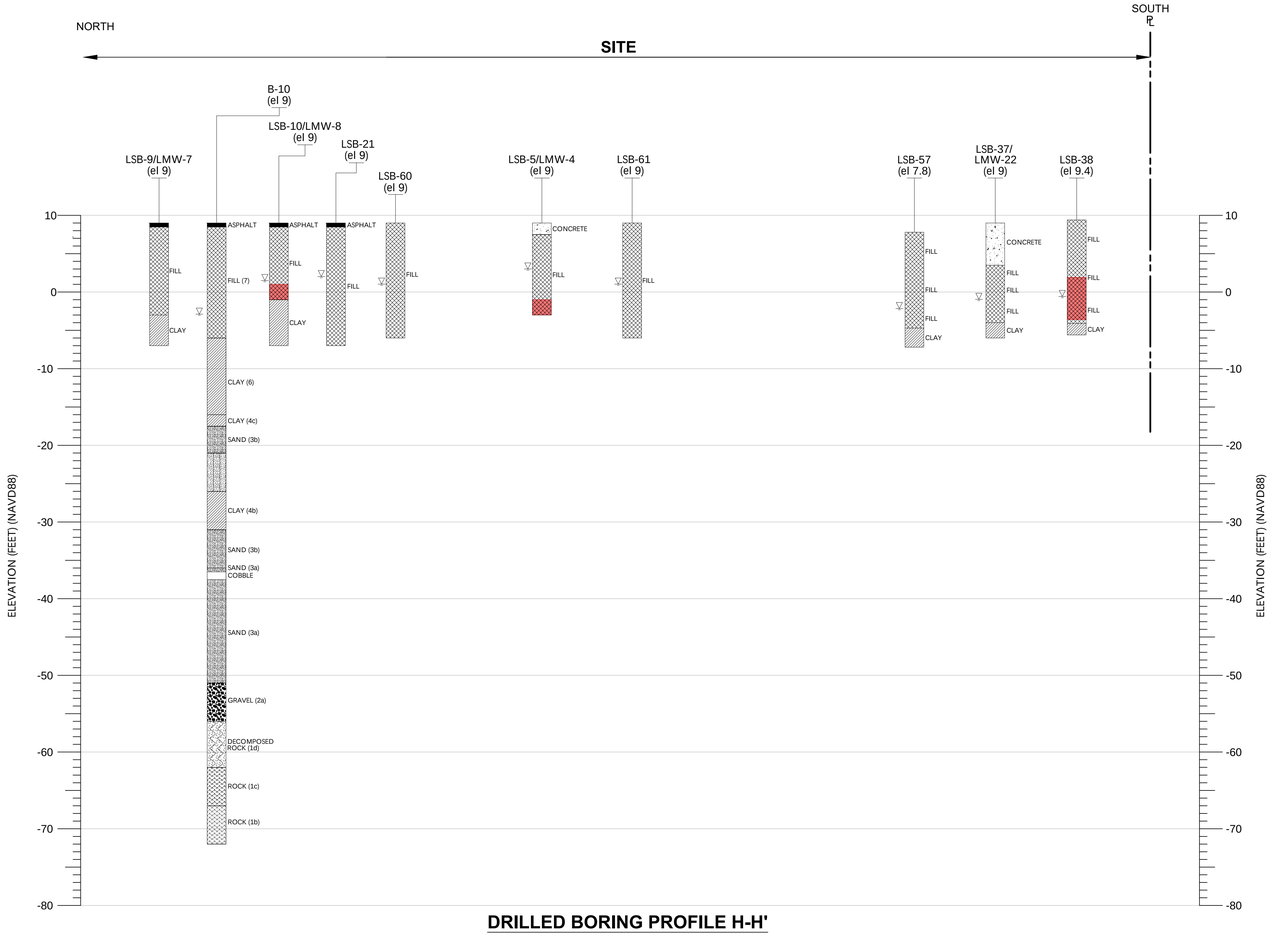
Filename: \\langan.com\data\PAR\data\6\100652601\Cadd Data - 100652601\SheetFiles\Geotechnical\100652601-BF201-0105.dwg Date: 6/28/2021 Time: 11:41 User: acofrancesco Style Table: Langan.stb Layout: F-F

LANGAN
PROJECT NO. ########



DRILLED BORING PROFILE G-G'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE



DRILLED BORING PROFILE H-H'

VERTICAL SCALE: 1" = 8'
HORIZONTAL SCALE: NOT TO SCALE

BORING KEY:

B-X
(el XX±)
(XX)

LEGEND:

B-X	DRILLED BORING IDENTIFICATION
el XX±	APPROXIMATE SURFACE ELEVATION AT THE TIME OF BORING (NAVD88)
▽	GROUNDWATER LEVEL FIRST OBSERVED IN THE BORING
	PRODUCT OBSERVED WITHIN SOIL BORING
	PRODUCT OBSERVED DURING MONITORING WELL GAUGING

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED, SEE BORING LOGS INCLUDED IN ATTACHMENT B.
2. ALL BORING LOCATIONS ARE APPROXIMATE. GROUND SURFACE ELEVATIONS ARE INFERRED FROM FROM "TOPOGRAPHIC BOUNDARY AND UTILITY," PREPARED BY LANGAN, SIGNED 3/8/2019.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88.
4. BORINGS B-1 THROUGH B-4 WERE PERFORMED BETWEEN 14 AND 20 JUNE 2017 AND BORINGS B-5 THROUGH B-18 WERE PERFORMED BETWEEN 20 JUNE AND 13 JULY 2018 BY CRAIG GEOTECHNICAL DRILLING COMPANY, INC.UNDER THE FULL TIME INSPECTION OF LANGAN.
5. ENVIRONMENTAL SOIL BORINGS LSB-1 THROUGH LSB-25 WERE COMPLETED BETWEEN 19 AND 21 NOVEMBER 2018 AS PART OF THE 2018 REMEDIAL INVESTIGATION AND ENVIRONMENTAL SOIL BORINGS LSB-26 THROUGH LSB-72 WERE COMPLETED BETWEEN 7 AND 16 JULY 2020 AS PART OF THE 2020 REMEDIAL INVESTIGATION.

8 0 4 8
VERTICAL SCALE IN FEET

WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
NYSDEC BCP SITE No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

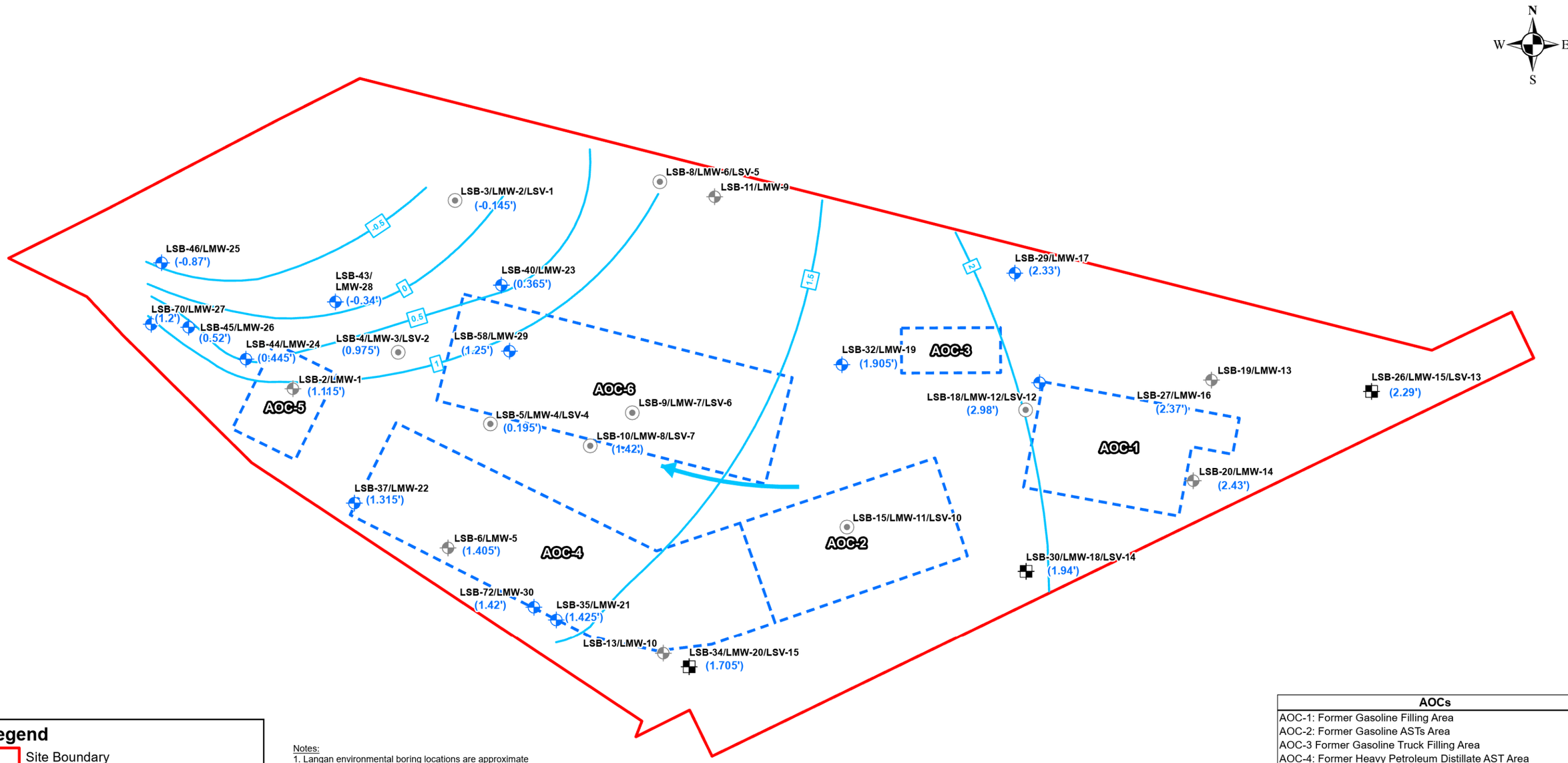
Drawing Title
DRILLED BORING PROFILE G-G' AND H-H'

Project No.	100652601
Date	01/22/2021
Drawn By	AC
Checked By	AB

Drawing No. 3H

© 2021 Langan

Filename: \\langan.com\data\PAR\data6\100652601\Cadd Data - 100652601\SheetFiles\Geotechnical\100652601-BF201-0104.dwg Date: 1/22/2021 Time: 13:05 User: aruane Style Table: Langan.stb Layout: G-G & H-H



Legend

- Site Boundary
- Area of Concern (AOC)
- Groundwater Elevation Contour
- Groundwater Flow Direction
- 2020 SRI Soil Boring/Monitoring Well Location
- 2020 SRI Soil Boring/Monitoring Well/ Soil Vapor Sampling Location
- 2018 RI Soil Boring/Monitoring Well/ Soil Vapor Sampling Location
- 2018 RI Soil Boring/Monitoring Well Location

Notes:

1. Langan environmental boring locations are approximate and based on geolocation with a Trimble Geo 7x Handheld GNSS System.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
3. Areas of Concern (AOCs) digitized from figures provided in the reports referenced in the legend and 1936 Sanborn Fire Insurance Map.
4. Groundwater elevations are referenced to North American Vertical Datum of 1988 (NAVD88).
5. Monitoring wells installed during the 2018 RI are 1-inch diameter wells and monitoring wells installed during the 2020 SRI are 2-inch diameter wells.
6. Synoptic groundwater levels were measured on 31 July 2020.
7. 2018 RI monitoring wells LMW-6, LMW-7, LMW-9, LMW-10, LMW-11, and LMW-13 could not be located during the 2020 SRI.
8. Contours are computer generated using Surfer® 16 (Golden Software, LLC), created 8/18/2020 and refined by hand.
9. Groundwater Elevations for LMW-4 and LMW-12 are excluded from the contouring data set.

AOCs
AOC-1: Former Gasoline Filling Area
AOC-2: Former Gasoline ASTs Area
AOC-3 Former Gasoline Truck Filling Area
AOC-4: Former Heavy Petroleum Distillate AST Area
AOC-5: Former Pump House Area
AOC-6: Former Garage Area
AOC-7: Historical Operations as a Trucking Terminal (Site-Wide)
AOC-8: PCB Hotspot
AOC-9: Soil Vapor Impacts (Site-Wide)

60 0 60
SCALE IN FEET

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
POTENTIOMETRIC SURFACE MAP

Project No.	100652601
Date	7/23/2020
Scale	1"=60'
Drawn By	IHB
Last Revised	6/20/2025

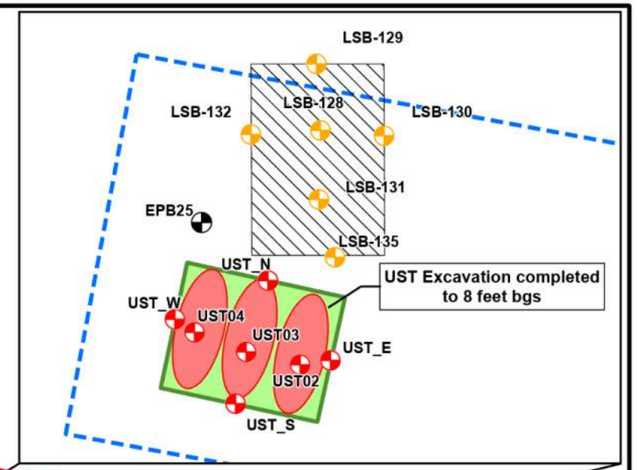
Figure 4

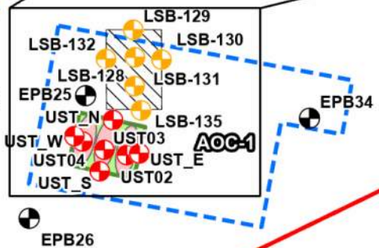
© 2012 Langan

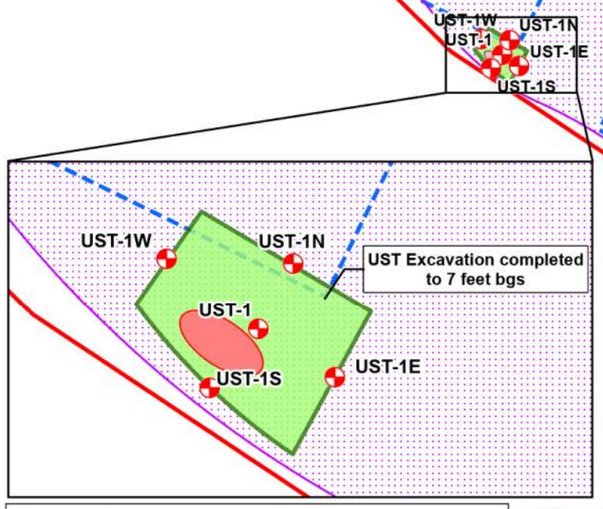
Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\APRX\28-90 Review Avenue Collector\28-90 Review Avenue Collector.aprx Date: 6/20/2025 User: ibaker Time: 11:10 AM

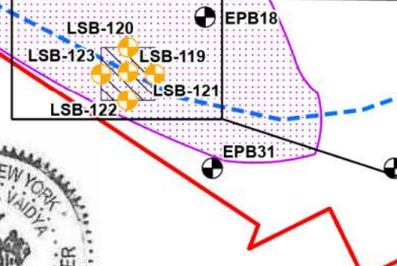
N
W E
S

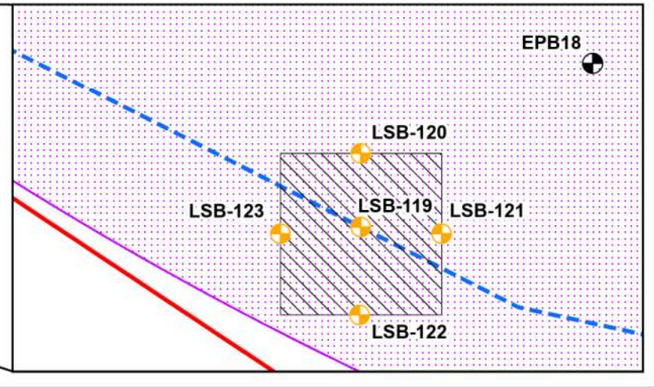
AOC-8
EPB07
EPB10
EPB08
EPB06
EPB05
EPB01
EPB14
EPB15
EPB11
EPB12
EPB13
EPB02
EPB29
EPB28
EPB19
EPB20
EPB21
AOC-3
EPB16
AOC-5
AOC-6
EPB03
EPB17
EPB24
EPB22
EPB27
EPB35
EPB34
EPB04
EPB09
AOC-4
AOC-2
EPB23
EPB30
EPB26
EPB18
EPB33
EPB31
EPB32











Legend

- Site Boundary
- Extents of UST Excavation Area
- Area of Concern (AOC)
- Extents of ISS Monolith
- Lead Hotspot excavated to 14 feet bgs
- UST Location
- Bottom Documentation Sample Locations
- Hotspot Delineation Sample Locations
- UST Sample Location



Satyajit Vaidya , P.E.
NYS P.E. # 089797

60 0 60
SCALE IN FEET

Notes:
1. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
2. Areas of Concern (AOCs) digitized from figures provided in historical reports and 1936 Sanborn Fire Insurance Map.
3. All sample locations are based on field measurements.

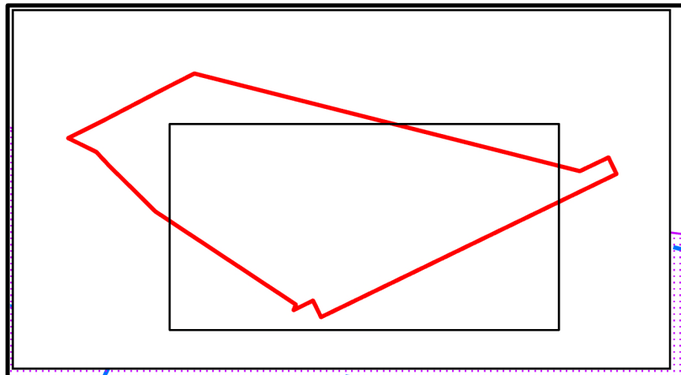
LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, LLC
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
EXCAVATION EXTENTS AND ENDPOINT DOCUMENTATION SAMPLE LOCATION PLAN

Project No.	100652601
Date	5/27/2025
Scale	1"=60'
Drawn By	IHB
Last Revised	12/10/2025
Figure	5

© 2012 Langan



Location	LSB-132
Sample Name	LSB-132_11.5-13.5
Sample Date	02/06/2023
Sample Depth	11.5-13.5
Metals - Total	
Lead	28.8

Location	LSB-128	LSB-128
Sample Name	LSB-128_14-16	DUP-4_020623
Sample Date	02/06/2023	02/06/2023
Sample Depth	14-16	14-16
Metals - Total		
Lead	53.4 J	26.7 J

Location	LSB-129
Sample Name	LSB-129_11.5-13.5
Sample Date	02/06/2023
Sample Depth	11.5-13.5
Metals - Total	
Lead	20.2

N
W E
S

AOC-6

AOC-3

AOC-2

AOC-4

AOC-1

LSB-129
LSB-132
LSB-128
LSB-130
LSB-131
LSB-135
LSB-120
LSB-123
LSB-119
LSB-121
LSB-122

Location	LSB-130
Sample Name	LSB-130_11.5-13.5
Sample Date	02/06/2023
Sample Depth	11.5-13.5
Metals - Total	
Lead	74.7

Location	LSB-131
Sample Name	LSB-131_11.5-13.5
Sample Date	02/06/2023
Sample Depth	11.5-13.5
Metals - Total	
Lead	1,230

Location	LSB-135
Sample Name	LSB-135_11.5-13.5
Sample Date	02/06/2023
Sample Depth	11.5-13.5
Metals - Total	
Lead	75.4

Location	LSB-120
Sample Name	LSB-120_11-13
Sample Date	02/06/2023
Sample Depth	11-13
Metals - Total	
Lead	783

Location	LSB-123
Sample Name	LSB-123_11-13
Sample Date	02/07/2023
Sample Depth	11-13
Metals - Total	
Lead	289

Location	LSB-122
Sample Name	LSB-122_11-13
Sample Date	02/07/2023
Sample Depth	11-13
Metals - Total	
Lead	29.6

Location	LSB-119
Sample Name	LSB-119_14-16
Sample Date	02/06/2023
Sample Depth	14-16
Metals - Total	
Lead	18.1

Location	LSB-121
Sample Name	LSB-121_11-13
Sample Date	02/09/2023
Sample Depth	11-13
Metals - Total	
Lead	54.9

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs
Metals - Total			
Lead	63	450	1,000

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Commercial SCOs

Legend

- Site Boundary
- Extents of UST Excavation Area
- Area of Concern (AOC)
- Extents of ISS Monolith
- Lead Hotspot excavated to 14 feet bgs
- Hotspot Delineation Sample Locations

40 0 40
SCALE IN FEET

Notes:
1. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
2. Areas of Concern (AOCs) digitized from figures provided in historical reports and 1936 Sanborn Fire Insurance Map.
3. All sample locations are based on field measurements.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, LLC
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

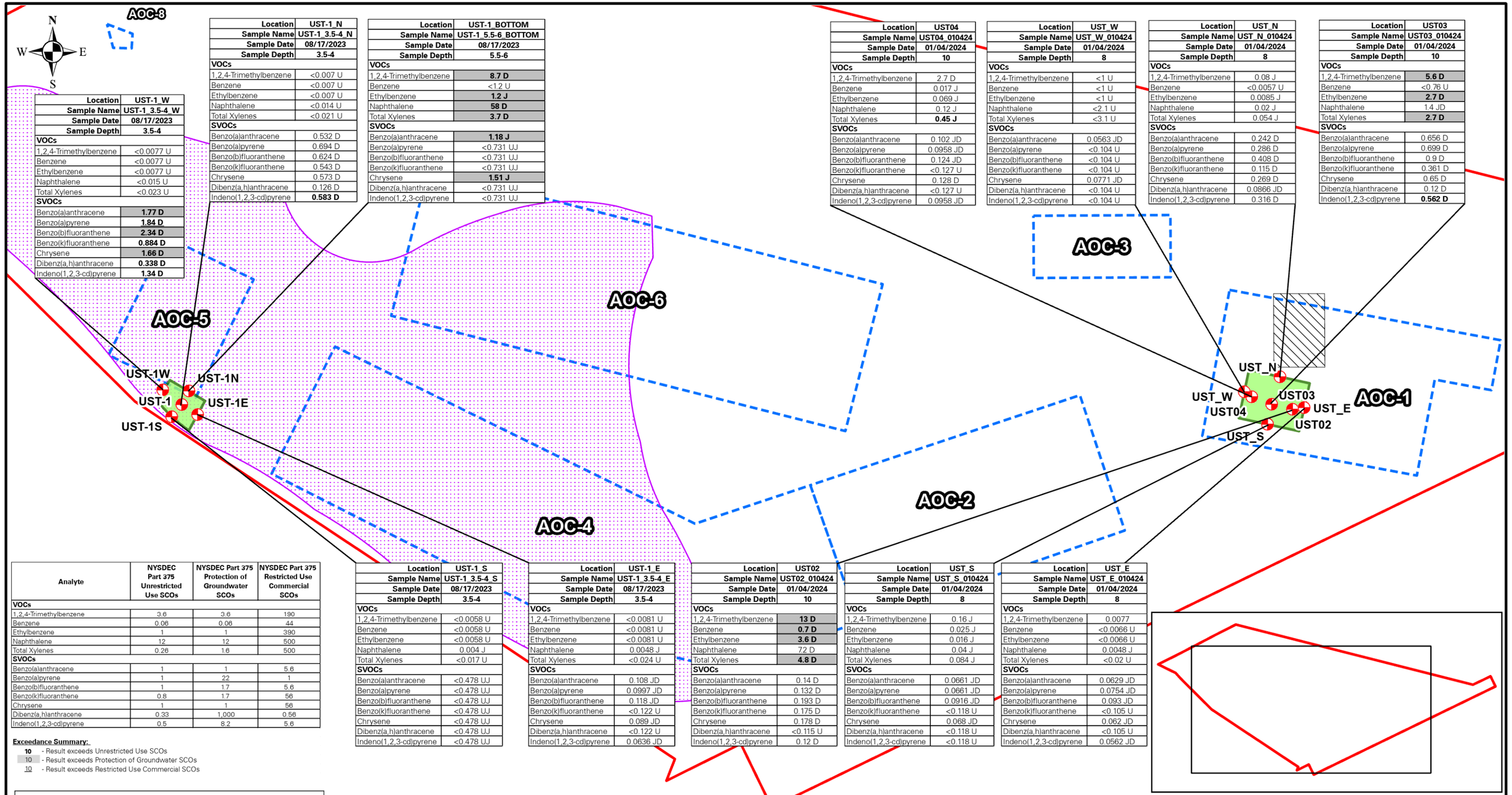
Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
LEAD DELINEATION SAMPLE ANALYTICAL RESULTS

Project No.	Figure
100652601	5A
Date: 6/17/2025	
Scale: 1"=40'	
Drawn By: IHB	
Last Revised: 6/23/2025	

© 2012 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\APRX\28-90 Review Avenue Collector\28-90 Review Avenue Collector.aprx Date: 6/23/2025 User: jfraser Time: 5:36 PM



Location	UST-1_W
Sample Name	UST-1_3.5-4_W
Sample Date	08/17/2023
Sample Depth	3.5-4
VOCs	
1,2,4-Trimethylbenzene	<0.0077 U
Benzene	<0.0077 U
Ethylbenzene	<0.0077 U
Naphthalene	<0.015 U
Total Xylenes	<0.023 U
SVOCs	
Benzo(a)anthracene	**1.77 D**
Benzo(a)pyrene	**1.84 D**
Benzo(b)fluoranthene	**2.34 D**
Benzo(k)fluoranthene	**0.884 D**
Chrysene	**1.66 D**
Dibenz(a,h)anthracene	**0.338 D**
Indeno(1,2,3-cd)pyrene	**1.34 D**

Location	UST-1_N
Sample Name	UST-1_3.5-4_N
Sample Date	08/17/2023
Sample Depth	3.5-4
VOCs	
1,2,4-Trimethylbenzene	<0.007 U
Benzene	<0.007 U
Ethylbenzene	<0.007 U
Naphthalene	<0.014 U
Total Xylenes	<0.021 U
SVOCs	
Benzo(a)anthracene	0.532 D
Benzo(a)pyrene	0.694 D
Benzo(b)fluoranthene	0.624 D
Benzo(k)fluoranthene	0.543 D
Chrysene	0.573 D
Dibenz(a,h)anthracene	0.126 D
Indeno(1,2,3-cd)pyrene	**0.583 D**

Location	UST-1_BOTTOM
Sample Name	UST-1_5.5-6_BOTTOM
Sample Date	08/17/2023
Sample Depth	5.5-6
VOCs	
1,2,4-Trimethylbenzene	**8.7 D**
Benzene	<1.2 U
Ethylbenzene	**1.2 J**
Naphthalene	**58 D**
Total Xylenes	**3.7 D**
SVOCs	
Benzo(a)anthracene	**1.18 J**
Benzo(a)pyrene	<0.731 UJ
Benzo(b)fluoranthene	<0.731 UJ
Benzo(k)fluoranthene	<0.731 UJ
Chrysene	**1.51 J**
Dibenz(a,h)anthracene	<0.731 UJ
Indeno(1,2,3-cd)pyrene	<0.731 UJ

Location	UST04
Sample Name	UST04_010424
Sample Date	01/04/2024
Sample Depth	10
VOCs	
1,2,4-Trimethylbenzene	2.7 D
Benzene	0.017 J
Ethylbenzene	0.069 J
Naphthalene	0.12 J
Total Xylenes	**0.45 J**
SVOCs	
Benzo(a)anthracene	0.102 JD
Benzo(a)pyrene	0.0958 JD
Benzo(b)fluoranthene	0.124 JD
Benzo(k)fluoranthene	<0.127 U
Chrysene	0.128 D
Dibenz(a,h)anthracene	<0.127 U
Indeno(1,2,3-cd)pyrene	0.0958 JD

Location	UST_W
Sample Name	UST_W_010424
Sample Date	01/04/2024
Sample Depth	8
VOCs	
1,2,4-Trimethylbenzene	<1 U
Benzene	<1 U
Ethylbenzene	<1 U
Naphthalene	<2.1 U
Total Xylenes	<3.1 U
SVOCs	
Benzo(a)anthracene	0.0563 JD
Benzo(a)pyrene	<0.104 U
Benzo(b)fluoranthene	<0.104 U
Benzo(k)fluoranthene	<0.104 U
Chrysene	0.0771 JD
Dibenz(a,h)anthracene	<0.104 U
Indeno(1,2,3-cd)pyrene	<0.104 U

Location	UST_N
Sample Name	UST_N_010424
Sample Date	01/04/2024
Sample Depth	8
VOCs	
1,2,4-Trimethylbenzene	0.08 J
Benzene	<0.0057 U
Ethylbenzene	0.0085 J
Naphthalene	0.02 J
Total Xylenes	0.054 J
SVOCs	
Benzo(a)anthracene	0.242 D
Benzo(a)pyrene	0.286 D
Benzo(b)fluoranthene	0.408 D
Benzo(k)fluoranthene	0.115 D
Chrysene	0.269 D
Dibenz(a,h)anthracene	0.0866 JD
Indeno(1,2,3-cd)pyrene	0.316 D

Location	UST03
Sample Name	UST03_010424
Sample Date	01/04/2024
Sample Depth	10
VOCs	
1,2,4-Trimethylbenzene	**5.6 D**
Benzene	<0.76 U
Ethylbenzene	**2.7 D**
Naphthalene	1.4 JD
Total Xylenes	**2.7 D**
SVOCs	
Benzo(a)anthracene	0.656 D
Benzo(a)pyrene	0.699 D
Benzo(b)fluoranthene	0.9 D
Benzo(k)fluoranthene	0.361 D
Chrysene	0.65 D
Dibenz(a,h)anthracene	0.12 D
Indeno(1,2,3-cd)pyrene	**0.562 D**

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs
VOCs			
1,2,4-Trimethylbenzene	3.6	3.6	190
Benzene	0.06	0.06	44
Ethylbenzene	1	1	390
Naphthalene	12	12	500
Total Xylenes	0.26	1.6	500
SVOCs			
Benzo(a)anthracene	1	1	5.6
Benzo(a)pyrene	1	22	1
Benzo(b)fluoranthene	1	1.7	5.6
Benzo(k)fluoranthene	0.8	1.7	56
Chrysene	1	1	56
Dibenz(a,h)anthracene	0.33	1,000	0.56
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs

10 - Result exceeds Protection of Groundwater SCOs

10 - Result exceeds Restricted Use Commercial SCOs

Location	UST-1_S
Sample Name	UST-1_3.5-4_S
Sample Date	08/17/2023
Sample Depth	3.5-4
VOCs	
1,2,4-Trimethylbenzene	<0.0058 U
Benzene	<0.0058 U
Ethylbenzene	<0.0058 U
Naphthalene	0.004 J
Total Xylenes	<0.017 U
SVOCs	
Benzo(a)anthracene	<0.478 UJ
Benzo(a)pyrene	<0.478 UJ
Benzo(b)fluoranthene	<0.478 UJ
Benzo(k)fluoranthene	<0.478 UJ
Chrysene	<0.478 UJ
Dibenz(a,h)anthracene	<0.478 UJ
Indeno(1,2,3-cd)pyrene	<0.478 UJ

Location	UST-1_E
Sample Name	UST-1_3.5-4_E
Sample Date	08/17/2023
Sample Depth	3.5-4
VOCs	
1,2,4-Trimethylbenzene	<0.0081 U
Benzene	<0.0081 U
Ethylbenzene	<0.0081 U
Naphthalene	0.0048 J
Total Xylenes	<0.024 U
SVOCs	
Benzo(a)anthracene	0.108 JD
Benzo(a)pyrene	0.0997 JD
Benzo(b)fluoranthene	0.118 JD
Benzo(k)fluoranthene	<0.122 U
Chrysene	0.089 JD
Dibenz(a,h)anthracene	<0.122 U
Indeno(1,2,3-cd)pyrene	0.0636 JD

Location	UST02
Sample Name	UST02_010424
Sample Date	01/04/2024
Sample Depth	10
VOCs	
1,2,4-Trimethylbenzene	**13 D**
Benzene	**0.7 D**
Ethylbenzene	**3.6 D**
Naphthalene	72 D
Total Xylenes	**4.8 D**
SVOCs	
Benzo(a)anthracene	0.14 D
Benzo(a)pyrene	0.132 D
Benzo(b)fluoranthene	0.193 D
Benzo(k)fluoranthene	0.175 D
Chrysene	0.178 D
Dibenz(a,h)anthracene	<0.115 U
Indeno(1,2,3-cd)pyrene	0.12 D

Location	UST_S
Sample Name	UST_S_010424
Sample Date	01/04/2024
Sample Depth	8
VOCs	
1,2,4-Trimethylbenzene	0.16 J
Benzene	0.025 J
Ethylbenzene	0.016 J
Naphthalene	0.04 J
Total Xylenes	0.084 J
SVOCs	
Benzo(a)anthracene	0.0661 JD
Benzo(a)pyrene	0.0661 JD
Benzo(b)fluoranthene	0.0916 JD
Benzo(k)fluoranthene	<0.118 U
Chrysene	0.068 JD
Dibenz(a,h)anthracene	<0.118 U
Indeno(1,2,3-cd)pyrene	<0.118 U

Location	UST_E
Sample Name	UST_E_010424
Sample Date	01/04/2024
Sample Depth	8
VOCs	
1,2,4-Trimethylbenzene	0.0077
Benzene	<0.0066 U
Ethylbenzene	<0.0066 U
Naphthalene	0.0048 J
Total Xylenes	<0.02 U
SVOCs	
Benzo(a)anthracene	0.0629 JD
Benzo(a)pyrene	0.0754 JD
Benzo(b)fluoranthene	0.093 JD
Benzo(k)fluoranthene	<0.105 U
Chrysene	0.062 JD
Dibenz(a,h)anthracene	<0.105 U
Indeno(1,2,3-cd)pyrene	0.0562 JD

Legend

- Site Boundary
- Extents of UST Excavation Area
- Area of Concern (AOC)
- Extents of ISS Monolith
- Lead Hotspot excavated to 14 feet bgs
- UST Sample Location

40 0 40

SCALE IN FEET

Notes:
1. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
2. Areas of Concern (AOCs) digitized from figures provided in historical reports and 1936 Sanborn Fire Insurance Map.
3. All sample locations are based on field measurements.

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com

Langan Engineering & Environmental Services, LLC
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

NYSDEC BCP Site No.: C241236

BLOCK No. 294, LOT No. 106

LONG ISLAND CITY

QUEENS COUNTY NEW YORK

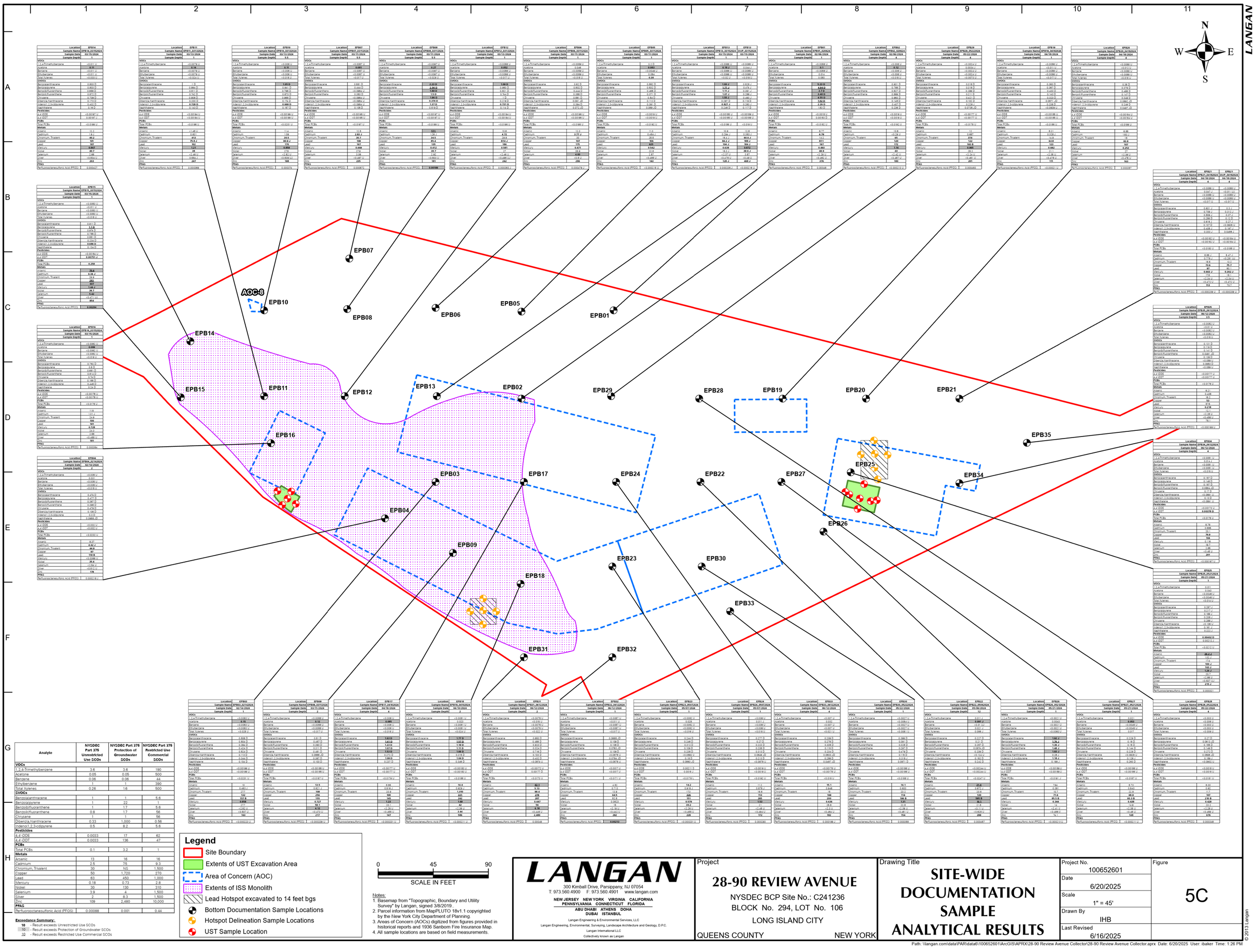
Drawing Title

UST ENDPOINT SAMPLE ANALYTICAL RESULTS

Project No.	100652601
Date	5/27/2025
Scale	1"=40'
Drawn By	IHB
Last Revised	6/20/2025
Figure	5B

© 2012 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\APRX\28-90 Review Avenue Collector\28-90 Review Avenue Collector.aprx Date: 6/20/2025 User: ibaker Time: 11:55 AM



Location	EPB14
Sample Name	EPB14_031520240
Sample Date	03/15/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.011 U
Acetone	**0.11**
Benzene	<0.011 U
Ethylbenzene	<0.011 U
Total Xylenes	<0.033 U
SVOCs	
Benzo(a)anthracene	0.802 J
Benzo(a)pyrene	0.892 D
Benzo(b)fluoranthene	0.893 J
Benzo(k)fluoranthene	0.872 D
Chrysene	0.795 J
Dibenz(a,h)anthracene	0.172 D
Indeno(1,2,3-cd)pyrene	0.429 D
Naphthalene	0.18 D
Pesticides	
4,4'-DDE	<0.00190 U
4,4'-DDT	0.00197 J
PCBs	
Total PCBs	<0.0199 U
Metals	
Arsenic	10.1
Cadmium	1.8 J
Chromium, Trivalent	**40.2**
Copper	**101**
Lead	**197**
Mercury	**0.927**
Nickel	**40.7**
Selenium	3.68 J
Silver	<0.834 U
Zinc	**293**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000247

Location	EPB11
Sample Name	EPB11_031320240
Sample Date	03/13/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0078 U
Acetone	**0.14**
Benzene	<0.0078 U
Ethylbenzene	<0.0078 U
Total Xylenes	<0.024 U
SVOCs	
Benzo(a)anthracene	1.2
Benzo(a)pyrene	0.889 D
Benzo(b)fluoranthene	0.811 D
Benzo(k)fluoranthene	0.742 D
Chrysene	0.805 D
Dibenz(a,h)anthracene	0.220 D
Indeno(1,2,3-cd)pyrene	**0.726 D**
Naphthalene	0.143 D
Pesticides	
4,4'-DDE	<0.00184 U
4,4'-DDT	<0.00184 U
PCBs	
Total PCBs	<0.0198 U
Metals	
Arsenic	<1.48 U
Cadmium	0.831 J
Chromium, Trivalent	**413**
Copper	**75.9 J**
Lead	**162**
Mercury	**1.21**
Nickel	**38**
Selenium	<2.48 U
Silver	0.884 J
Zinc	**247**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000089

Location	EPB10
Sample Name	EPB10_031320240
Sample Date	03/13/2024
Sample Depth	0.5
VOCs	
1,2,4-Trimethylbenzene	<0.006 U
Acetone	**0.11**
Benzene	<0.006 U
Ethylbenzene	<0.006 U
Total Xylenes	<0.018 U
SVOCs	
Benzo(a)anthracene	**1.05 D**
Benzo(a)pyrene	0.841 D
Benzo(b)fluoranthene	0.768 D
Benzo(k)fluoranthene	0.672 D
Chrysene	0.805 D
Dibenz(a,h)anthracene	0.176 D
Indeno(1,2,3-cd)pyrene	**0.669 D**
Naphthalene	0.187 D
Pesticides	
4,4'-DDE	<0.00186 U
4,4'-DDT	<0.00186 U
PCBs	
Total PCBs	<0.0201 U
Metals	
Arsenic	11.4
Cadmium	1.08 J
Chromium, Trivalent	**20.5**
Copper	**80.9 J**
Lead	**170**
Mercury	**0.958**
Nickel	27.6
Selenium	<2.48 U
Silver	<0.839 U
Zinc	**166**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000074

Location	EPB07
Sample Name	EPB07_031320240
Sample Date	03/13/2024
Sample Depth	0.5
VOCs	
1,2,4-Trimethylbenzene	<0.0087 U
Acetone	**0.091**
Benzene	<0.0087 U
Ethylbenzene	<0.0087 U
Total Xylenes	<0.0171 U
SVOCs	
Benzo(a)anthracene	0.841 J
Benzo(a)pyrene	0.444 D
Benzo(b)fluoranthene	0.0864 J
Benzo(k)fluoranthene	0.382 D
Chrysene	0.0864 J
Dibenz(a,h)anthracene	0.0864 U
Indeno(1,2,3-cd)pyrene	0.0864 U
Naphthalene	0.108 D
Pesticides	
4,4'-DDE	<0.00186 U
4,4'-DDT	<0.00186 U
PCBs	
Total PCBs	<0.0197 U
Metals	
Arsenic	4.5
Cadmium	0.0864 U
Chromium, Trivalent	30.7
Copper	31.4
Lead	135
Mercury	0.412
Nickel	20.7
Selenium	2.80
Silver	<0.800 U
Zinc	295
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000879 J

Location	EPB08
Sample Name	EPB08_031320240
Sample Date	03/13/2024
Sample Depth	5.5
VOCs	
1,2,4-Trimethylbenzene	<0.0087 U
Acetone	**0.27**
Benzene	<0.0087 U
Ethylbenzene	<0.0087 U
Total Xylenes	<0.0261 U
SVOCs	
Benzo(a)anthracene	**2.23 D**
Benzo(a)pyrene	**2.04 D**
Benzo(b)fluoranthene	**1.59 D**
Benzo(k)fluoranthene	**1.5 D**
Chrysene	**1.96 D**
Dibenz(a,h)anthracene	**0.274 D**
Indeno(1,2,3-cd)pyrene	**1.37 D**
Naphthalene	0.819 D
Pesticides	
4,4'-DDE	<0.00197 U
4,4'-DDT	<0.00197 U
PCBs	
Total PCBs	<0.0198 U
Metals	
Arsenic	**121**
Cadmium	1.24 J
Chromium, Trivalent	**34.5**
Copper	**85.4**
Lead	**135**
Mercury	**0.412**
Nickel	**30.7**
Selenium	2.80
Silver	<0.800 U
Zinc	**185**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	**0.00189**

Location	EPB12
Sample Name	EPB12_031320240
Sample Date	03/13/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0088 U
Acetone	**0.092**
Benzene	<0.0088 U
Ethylbenzene	<0.0088 U
Total Xylenes	<0.017 U
SVOCs	
Benzo(a)anthracene	**1.09 D**
Benzo(a)pyrene	0.883 D
Benzo(b)fluoranthene	0.821 D
Benzo(k)fluoranthene	0.744 D
Chrysene	1.0
Dibenz(a,h)anthracene	0.218 D
Indeno(1,2,3-cd)pyrene	**0.731 D**
Naphthalene	0.114 D
Pesticides	
4,4'-DDE	<0.00194 U
4,4'-DDT	<0.00194 U
PCBs	
Total PCBs	<0.0198 U
Metals	
Arsenic	10.6
Cadmium	**4.72**
Chromium, Trivalent	29.9
Copper	**514 J**
Lead	**186**
Mercury	**0.561**
Nickel	27
Selenium	<2.48 U
Silver	<0.488 U
Zinc	**242**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000283 J

Location	EPB06
Sample Name	EPB06_031120240
Sample Date	03/11/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0089 U
Acetone	0.046
Benzene	<0.0089 U
Ethylbenzene	<0.0089 U
Total Xylenes	<0.018 U
SVOCs	
Benzo(a)anthracene	0.843 D
Benzo(a)pyrene	0.832 D
Benzo(b)fluoranthene	0.444 D
Benzo(k)fluoranthene	0.444 D
Chrysene	0.088 D
Dibenz(a,h)anthracene	0.841 D
Indeno(1,2,3-cd)pyrene	0.091 JD
Naphthalene	0.284 D
Pesticides	0.072 JD
Pesticides	
4,4'-DDE	<0.0019 U
4,4'-DDT	<0.0019 U
PCBs	
Total PCBs	<0.0198 U
Metals	
Arsenic	10.4
Cadmium	0.454 J
Chromium, Trivalent	26.6
Copper	505
Lead	**625**
Mercury	0.542
Nickel	22.8
Selenium	3.81
Silver	<0.488 U
Zinc	**543**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000218 J

Location	EPB05
Sample Name	EPB05_031120240
Sample Date	03/11/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	0.2 D
Acetone	**0.083**
Benzene	0.044
Ethylbenzene	**0.28**
Total Xylenes	**1.09**
SVOCs	
Benzo(a)anthracene	**1.61 D**
Benzo(a)pyrene	**1.27 J**
Benzo(b)fluoranthene	1.11 J
Benzo(k)fluoranthene	**1.07 J**
Chrysene	**1.52 J**
Dibenz(a,h)anthracene	0.241 D
Indeno(1,2,3-cd)pyrene	0.287 JD
Naphthalene	0.381 D
Pesticides	0.246 D
Pesticides	
4,4'-DDE	<0.0018 U
4,4'-DDT	<0.0018 U
PCBs	
Total PCBs	<0.0196 U
Metals	
Arsenic	11.3
Cadmium	10.9
Chromium, Trivalent	34.6
Copper	**505**
Lead	**625**
Mercury	0.542
Nickel	22.8
Selenium	3.81
Silver	<0.488 U
Zinc	**543**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000218 J

Location	EPB13
Sample Name	EPB13_031520240
Sample Date	03/15/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0086 U
Acetone	<0.0086 U
Benzene	<0.0086 U
Ethylbenzene	<0.0086 U
Total Xylenes	<0.0258 U
SVOCs	
Benzo(a)anthracene	**1.92 J**
Benzo(a)pyrene	**1.77 J**
Benzo(b)fluoranthene	**1.57 J**
Benzo(k)fluoranthene	**1.32 J**
Chrysene	**1.82 J**
Dibenz(a,h)anthracene	0.286 J
Indeno(1,2,3-cd)pyrene	**1.37 J**
Naphthalene	0.474 J
Pesticides	
4,4'-DDE	<0.0019 U
4,4'-DDT	<0.0019 U
PCBs	
Total PCBs	<0.0198 U
Metals	
Arsenic	10.8
Cadmium	0.294 J
Chromium, Trivalent	18.4 J
Copper	**82.2 J**
Lead	**104 J**
Mercury	**0.639**
Nickel	18.2 J
Selenium	<2.37 U
Silver	<0.478 U
Zinc	**128 J**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000228 J

Location	DUP_031520240
Sample Name	DUP_031520240
Sample Date	03/15/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0086 U
Acetone	<0.0086 U
Benzene	<0.0086 U
Ethylbenzene	<0.0086 U
Total Xylenes	<0.0258 U
SVOCs	
Benzo(a)anthracene	**1.97 J**
Benzo(a)pyrene	**1.72 J**
Benzo(b)fluoranthene	**1.51 J**
Benzo(k)fluoranthene	**1.27 J**
Chrysene	**1.75 J**
Dibenz(a,h)anthracene	0.275 J
Indeno(1,2,3-cd)pyrene	**1.32 J**
Naphthalene	0.456 J
Pesticides	
4,4'-DDE	<0.0019 U
4,4'-DDT	<0.0019 U
PCBs	
Total PCBs	<0.0196 U
Metals	
Arsenic	10.8
Cadmium	0.283 J
Chromium, Trivalent	18.2 J
Copper	**80.8 J**
Lead	**104 J**
Mercury	**0.572**
Nickel	18.1 J
Selenium	<2.38 U
Silver	<0.482 U
Zinc	**469 J**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000218 J

Location	EPB01
Sample Name	EPB01_022624
Sample Date	02/26/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0088 U
Acetone	**0.1**
Benzene	<0.0088 U
Ethylbenzene	0.014
Total Xylenes	0.065
SVOCs	
Benzo(a)anthracene	**0.23 D**
Benzo(a)pyrene	**0.84 D**
Benzo(b)fluoranthene	**0.7 D**
Benzo(k)fluoranthene	**0.49 D**
Chrysene	**0.55 D**
Dibenz(a,h)anthracene	**1.02 D**
Indeno(1,2,3-cd)pyrene	**2.25 D**
Naphthalene	1.83 D
Pesticides	
4,4'-DDE	<0.0019 U
4,4'-DDT	0.00183 D
PCBs	
Total PCBs	<0.0195 U
Metals	
Arsenic	8.77
Cadmium	**0.79**
Chromium, Trivalent	14.1
Copper	**81.1**
Lead	**197**
Mercury	**0.464**
Nickel	**49.9**
Selenium	<2.38 U
Silver	<0.482 U
Zinc	**375**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.00048

Location	EPB02
Sample Name	EPB02_022624
Sample Date	02/26/2024
Sample Depth	4
VOCs	
1,2,4-Trimethylbenzene	<0.0088 U
Acetone	**0.12**
Benzene	<0.0088 U
Ethylbenzene	<0.0088 U
Total Xylenes	<0.0088 J
SVOCs	
Benzo(a)anthracene	0.831 J
Benzo(a)pyrene	0.788 D
Benzo(b)fluoranthene	0.827 D
Benzo(k)fluoranthene	0.669 D
Chrysene	0.845 D
Dibenz(a,h)anthracene	0.168 D
Indeno(1,2,3-cd)pyrene	0.401 D
Naphthalene	0.336 D
Pesticides	
4,4'-DDE	<0.0019 U
4,4'-DDT	<0.0019 U
PCBs	
Total PCBs	<0.0192 U
Metals	
Arsenic	10.6
Cadmium	<0.24 U
Chromium, Trivalent	65
Copper	120
Lead	**172**
Mercury	**0.78**
Nickel	49
Selenium	<2.42 U
Silver	<0.487 U
Zinc	**190**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	<0.000013 U

Location	EPB29
Sample Name	EPB29_052220240
Sample Date	05/22/2024
Sample Depth	4
VOCs	
1,2,4-Trimethylbenzene	<0.0024 U
Acetone	0.0034 J
Benzene	<0.0024 U
Ethylbenzene	<0.0024 U
Total Xylenes	<0.0071 U
SVOCs	
Benzo(a)anthracene	0.219 D
Benzo(a)pyrene	0.318 D
Benzo(b)fluoranthene	0.386 D
Benzo(k)fluoranthene	0.211 D
Chrysene	0.421 D
Dibenz(a,h)anthracene	0.101 D
Indeno(1,2,3-cd)pyrene	0.218 J
Naphthalene	0.0728 JD
Pesticides	
4,4'-DDE	<0.00177 U
4,4'-DDT	<0.00177 U
PCBs	
Total PCBs	<0.0178 U
Metals	
Arsenic	8.41
Cadmium	0.228 J
Chromium, Trivalent	14.8
Copper	**82.8**
Lead	**123**
Mercury	**0.662**
Nickel	21.1
Selenium	<2.38 U
Silver	<0.478 U
Zinc	**191**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000021

Location	EPB19
Sample Name	EPB19_041820240
Sample Date	04/18/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0088 U
Acetone	<0.011 U
Benzene	<0.0088 U
Ethylbenzene	<0.0088 U
Total Xylenes	<0.017 U
SVOCs	
Benzo(a)anthracene	0.382 D
Benzo(a)pyrene	0.387 D
Benzo(b)fluoranthene	0.453 D
Benzo(k)fluoranthene	0.143 D
Chrysene	0.333 D
Dibenz(a,h)anthracene	0.0871 JD
Indeno(1,2,3-cd)pyrene	0.208 D
Naphthalene	0.0609 JD
Pesticides	
4,4'-DDE	<0.00186 U
4,4'-DDT	<0.00186 U
PCBs	
Total PCBs	<0.0198 U
Metals	
Arsenic	8.66
Cadmium	1.83 J
Chromium, Trivalent	13
Copper	**82.8**
Lead	**107**
Mercury	**0.253**
Nickel	27
Selenium	<2.38 U
Silver	<0.478 U
Zinc	**163**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000087

Location	EPB20
Sample Name	EPB20_041920240
Sample Date	04/19/2024
Sample Depth	4
VOCs	
1,2,4-Trimethylbenzene	<0.0088 U
Acetone	<0.012 U
Benzene	<0.0088 U
Ethylbenzene	<0.0088 U
Total Xylenes	<0.018 U
SVOCs	
Benzo(a)anthracene	0.28 D
Benzo(a)pyrene	0.379 D
Benzo(b)fluoranthene	0.488 D
Benzo(k)fluoranthene	0.147 D
Chrysene	0.348 D
Dibenz(a,h)anthracene	0.0961 JD
Indeno(1,2,3-cd)pyrene	0.248 D
Naphthalene	0.0497 JD
Pesticides	
4,4'-DDE	<0.00184 U
4,4'-DDT	<0.00184 U
PCBs	
Total PCBs	<0.0198 U
Metals	
Arsenic	8.66
Cadmium	1.83 J
Chromium, Trivalent	13
Copper	**82.8**
Lead	**107**
Mercury	**0.253**
Nickel	27
Selenium	<2.38 U
Silver	<0.478 U
Zinc	**163**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000087

Location	EPB15
Sample Name	EPB15_031520240
Sample Date	03/15/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0083 U
Acetone	<0.011 U
Benzene	<0.0083 U
Ethylbenzene	<0.0083 U
Total Xylenes	<0.016 U
SVOCs	
Benzo(a)anthracene	0.811 D
Benzo(a)pyrene	**1.13 D**
Benzo(b)fluoranthene	0.875 D
Benzo(k)fluoranthene	0.788 D
Chrysene	0.851 D
Dibenz(a,h)anthracene	0.224 D
Indeno(1,2,3-cd)pyrene	**0.686 D**
Naphthalene	0.159 D
Pesticides	
4,4'-DDE	<0.00184 U
4,4'-DDT	**0.00751 J**
PCBs	
Total PCBs	**0.258**
Metals	
Arsenic	**20.4**
Cadmium	**6.34 J**
Chromium, Trivalent	28.8
Copper	**283**
Lead	**507**
Mercury	**1.64 J**
Nickel	**39.7**
Selenium	**5.42**
Silver	<0.471 U
Zinc	**954**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	**0.00254**

Location	EPB16
Sample Name	EPB16_031520240
Sample Date	03/15/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0082 U
Acetone	**0.099**
Benzene	<0.0082 U
Ethylbenzene	<0.0082 U
Total Xylenes	<0.0218 U
SVOCs	
Benzo(a)anthracene	0.782 D
Benzo(a)pyrene	0.8 D
Benzo(b)fluoranthene	0.661 D
Benzo(k)fluoranthene	0.614 D
Chrysene	0.74 D
Dibenz(a,h)anthracene	0.188 D
Indeno(1,2,3-cd)pyrene	0.448 D
Naphthalene	0.24 D
Pesticides	
4,4'-DDE	<0.00178 U
4,4'-DDT	<0.00178 U
PCBs	
Total PCBs	<0.0178 U
Metals	
Arsenic	11.6
Cadmium	1.01 J
Chromium, Trivalent	24.8
Copper	**100**
Lead	**161**
Mercury	**0.728**
Nickel	24.0
Selenium	3.68
Silver	<0.488 U
Zinc	**161**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000084

Location	EPB04
Sample Name	EPB04_021420240
Sample Date	02/14/2024
Sample Depth	2
VOCs	
1,2,4-Trimethylbenzene	<0.006 U
Acetone	0.031
Benzene	<0.006 U
Ethylbenzene	<0.006 U
Total Xylenes	<0.018 U
SVOCs	
Benzo(a)anthracene	0.474 D
Benzo(a)pyrene	0.471 D
Benzo(b)fluoranthene	0.396 D
Benzo(k)fluoranthene	0.279 D
Chrysene	0.479 D
Dibenz(a,h)anthracene	0.106 D
Indeno(1,2,3-cd)pyrene	0.3 D
Naphthalene	0.0885 JD
Pesticides	
4,4'-DDE	<0.002 U
4,4'-DDT	<0.002 U
PCBs	
Total PCBs	<0.0202 U
Metals	
Arsenic	6.07
Cadmium	**0.62 J**
Chromium, Trivalent	**46**
Copper	**97**
Lead	**110 D**
Mercury	<0.0098 U
Nickel	**20.4**
Selenium	<2.84 U
Silver	<0.812 U
Zinc	**176**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000218 J

Location	EPB09
Sample Name	EPB09_031720240
Sample Date	03/17/2024
Sample Depth	0
VOCs	
1,2,4-Trimethylbenzene	<0.0088 U
Acetone	**0.12**
Benzene	<0.0088 U
Ethylbenzene	<0.0088 U
Total Xylenes	<0.017 U
SVOCs	
Benzo(a)anthracene	0.481 D
Benzo(a)pyrene	0.386 D
Benzo(b)fluoranthene	0.311 D
Benzo(k)fluoranthene	0.481 D
Chrysene	0.0886 JD
Dibenz(a,h)anthracene	0.067 D
Indeno(1,2,3-cd)pyrene	0.103 D
Naphthalene	0.168 D
Pesticides	
4,4'-DDE	<0.00186 U
4,4'-DDT	<0.00186 U
PCBs	
Total PCBs	<0.0187 U
Metals	
Arsenic	13.5
Cadmium	0.821 J
Chromium, Trivalent	**109**
Copper	**256**
Lead	**155**
Mercury	**0.727**
Nickel	**50.1**
Selenium	**4.12**
Silver	<0.473 U
Zinc	**217**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000228 U

Location	EPB17
Sample Name	EPB17_041620240
Sample Date	04/16/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.006 U
Acetone	**0.085**
Benzene	<0.006 U
Ethylbenzene	<0.006 U
Total Xylenes	<0.018 U
SVOCs	
Benzo(a)anthracene	**1.03 D**
Benzo(a)pyrene	**1.0 D**
Benzo(b)fluoranthene	**1.23 D**
Benzo(k)fluoranthene	**1.07 D**
Chrysene	**1.53 D**
Dibenz(a,h)anthracene	0.272 D
Indeno(1,2,3-cd)pyrene	**1.09 D**
Naphthalene	0.227 D
Pesticides	
4,4'-DDE	<0.00177 U
4,4'-DDT	<0.00177 U
PCBs	
Total PCBs	<0.0179 U
Metals	
Arsenic	8.35
Cadmium	0.818 J
Chromium, Trivalent	23.8
Copper	**168**
Lead	**145**
Mercury	**1.23**
Nickel	33.1
Selenium	<2.38 U
Silver	<0.488 U
Zinc	**147**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	<0.000201 U

Location	EPB18
Sample Name	EPB18_041620240
Sample Date	04/16/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0081 U
Acetone	0.023
Benzene	<0.0081 U
Ethylbenzene	<0.0081 U
Total Xylenes	<0.0243 U
SVOCs	
Benzo(a)anthracene	**1.77 D**
Benzo(a)pyrene	**1.52 D**
Benzo(b)fluoranthene	**1.16 D**
Benzo(k)fluoranthene	**1.11 D**
Chrysene	**1.66 D**
Dibenz(a,h)anthracene	0.318 D
Indeno(1,2,3-cd)pyrene	**1.04 D**
Naphthalene	0.348 D
Pesticides	
4,4'-DDE	<0.00183 U
4,4'-DDT	<0.00183 U
PCBs	
Total PCBs	<0.0173 U
Metals	
Arsenic	14.4
Cadmium	0.809 J
Chromium, Trivalent	**60.4**
Copper	**221**
Lead	**242**
Mercury	**0.447**
Nickel	**56**
Selenium	**6.18**
Silver	<0.449 U
Zinc	**486**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	<0.000211 U

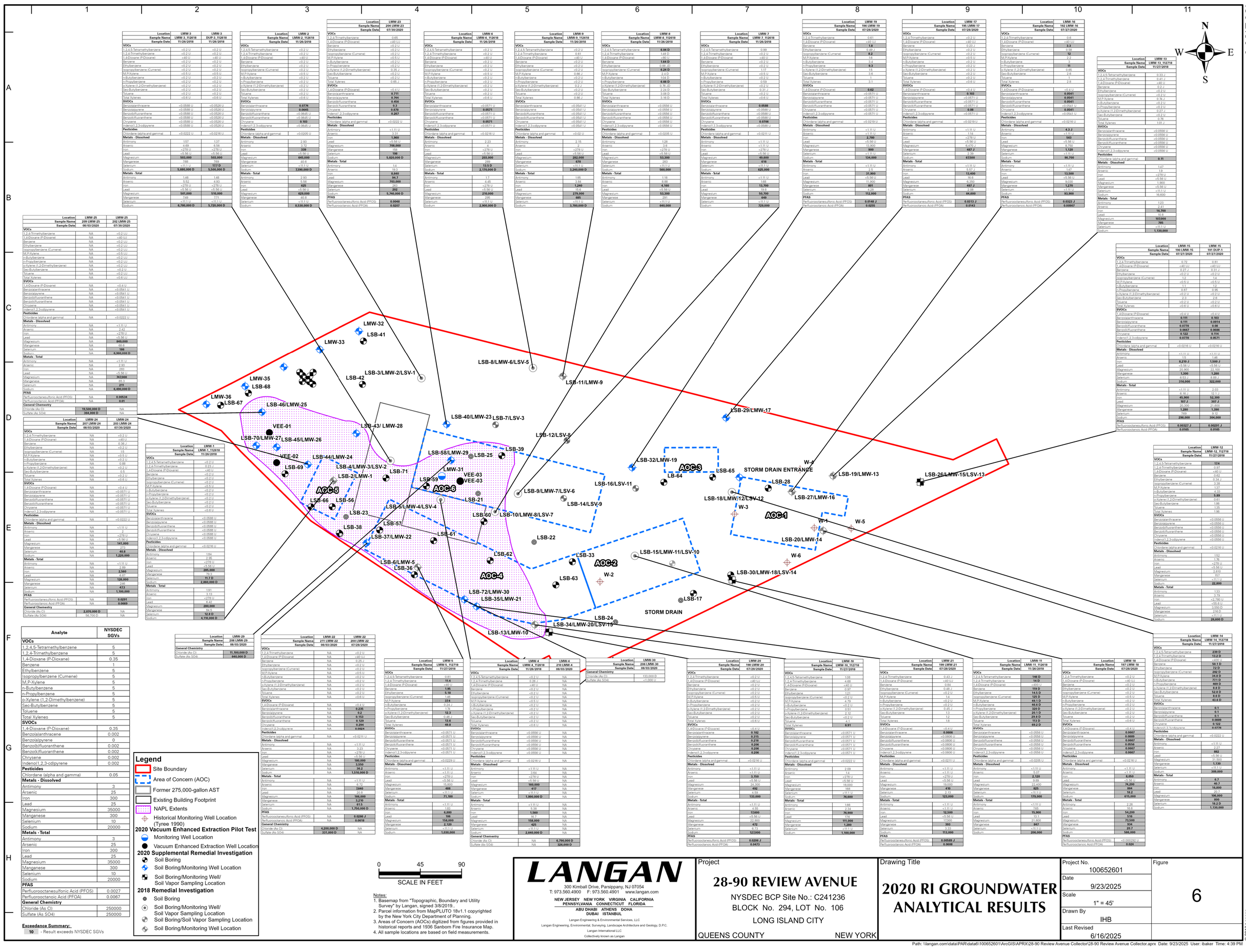
Location	EPB31
Sample Name	EPB31_061220240
Sample Date	06/12/2024
Sample Depth	2
VOCs	
1,2,4-Trimethylbenzene	<0.0078 U
Acetone	<0.018 U
Benzene	<0.0078 U
Ethylbenzene	<0.0078 U
Total Xylenes	<0.0234 U
SVOCs	
Benzo(a)anthracene	0.883 D
Benzo(a)pyrene	0.483 J
Benzo(b)fluoranthene	0.822 D
Benzo(k)fluoranthene	0.324 D
Chrysene	0.748 D
Dibenz(a,h)anthracene	0.193 D
Indeno(1,2,3-cd)pyrene	0.453 D
Naphthalene	0.0873 JD
Pesticides	
4,4'-DDE	<0.00177 U
4,4'-DDT	0.0017 J
PCBs	
Total PCBs	<0.0178 U
Metals	
Arsenic	11.1
Cadmium	**5.13**
Chromium, Trivalent	**60.4**
Copper	**226**
Lead	**297**
Mercury	**0.447**
Nickel	**56**
Selenium	**6.18**
Silver	<0.449 U
Zinc	**2,480**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.00048

Location	EPB32
Sample Name	EPB32_061220240
Sample Date	06/12/2024
Sample Depth	4
VOCs	
1,2,4-Trimethylbenzene	<0.0087 U
Acetone	<0.017 U
Benzene	<0.0087 U
Ethylbenzene	<0.0087 U
Total Xylenes	<0.0262 U
SVOCs	
Benzo(a)anthracene	0.0868 JD
Benzo(a)pyrene	0.198 D
Benzo(b)fluoranthene	0.276 D
Benzo(k)fluoranthene	0.198 D
Chrysene	0.0868 JD
Dibenz(a,h)anthracene	0.0868 U
Indeno(1,2,3-cd)pyrene	0.0868 U
Naphthalene	0.0875 U
Pesticides	
4,4'-DDE	<0.00183 U
4,4'-DDT	<0.00183 U
PCBs	
Total PCBs	<0.0173 U
Metals	
Arsenic	14.2
Cadmium	0.773
Chromium, Trivalent	13.8
Copper	**64.5**
Lead	**151**
Mercury	0.0832
Nickel	**35.2**
Selenium	<2.18 U
Silver	<0.488 U
Zinc	**292**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	**0.00213**

Location	EPB23
Sample Name	EPB23_051720240
Sample Date	05/17/2024
Sample Depth	1
VOCs	
1,2,4-Trimethylbenzene	<0.0082 U
Acetone	0.028
Benzene	<0.0082 U
Ethylbenzene	<0.0082 U
Total Xylenes	<0.0247 U
SVOCs	
Benzo(a)anthracene	0.344 D
Benzo(a)pyrene	0.248 D
Benzo(b)fluoranthene	0.312 D
Benzo(k)fluoranthene	0.109 J
Chrysene	0.318 D
Dibenz(a,h)anthracene	0.0868 JD
Indeno(1,2,3-cd)pyrene	0.118 D
Naphthalene	0.0862 JD
Pesticides	
4,4'-DDE	0.0011 J
4,4'-DDT	0.0018 J
PCBs	
Total PCBs	<0.0178 U
Metals	
Arsenic	11.1
Cadmium	0.878 J
Chromium, Trivalent	16.8
Copper	**113**
Lead	**205**
Mercury	**1.53**
Nickel	31.1
Selenium	<2.48 U
Silver	<0.489 U
Zinc	**172**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.00036 J

Location	EPB24
Sample Name	EPB24_051720240
Sample Date	05/17/2024
Sample Depth	5
VOCs	
1,2,4-Trimethylbenzene	<0.0086 U
Acetone	0.017 J
Benzene	<0.0086 U
Ethylbenzene	<0.0086 U
Total Xylenes	<0.0258 U
SVOCs	
Benzo(a)anthracene	0.317 D
Benzo(a)pyrene	0.247 D
Benzo(b)fluoranthene	0.232 D
Benzo(k)fluoranthene	0.0878 J
Chrysene	0.312 D
Dibenz(a,h)anthracene	0.0849 JD
Indeno(1,2,3-cd)pyrene	0.212 D
Naphthalene	0.0878 J
Pesticides	
4,4'-DDE	<0.0019 U
4,4'-DDT	<0.0019 U
PCBs	
Total PCBs	<0.0192 U
Metals	
Arsenic	11.1
Cadmium	0.878 J
Chromium, Trivalent	16.8
Copper	**113**
Lead	**205**
Mercury	**1.53**
Nickel	31.1
Selenium	<2.48 U
Silver	<0.489 U
Zinc	**172**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.000218 J

Location	EPB33
Sample Name	EPB33_061220240
Sample Date	06/12/2024
Sample Depth	4
VOCs	
1,2,4-Trimethylbenzene	<0.0077 U
Acetone	0.025
Benzene	<0.0077 U
Ethylbenzene	<0.0077 U
Total Xylenes	<0.0231 U
SVOCs	
Benzo(a)anthracene	0.338 D
Benzo(a)pyrene	0.278 D
Benzo(b)fluoranthene	0.308 D
Benzo(k)fluoranthene	0.118 D
Chrysene	0.334 D
Dibenz(a,h)anthracene	0.0845 JD
Indeno(1,2,3-cd)pyrene	0.118 J
Naphthalene	0.0497 JD
Pesticides	



	Location	LMW-25	LMW-25
	Sample Name	209 LMW-25	202 LMW-25
	Sample Date	08/03/2020	07/30/2020
VOCs			
1,2,4-Trimethylbenzene	NA		<0.2 U
1,4-Dioxane (P-Dioxane)	NA		<40 U
Benzene	NA		<0.2 U
Ethylbenzene	NA		<0.2 U
Isopropylbenzene (Cumene)	NA		<0.2 U
M,P-Xylene	NA		<0.5 U
n-Butylbenzene	NA		<0.2 U
n-Propylbenzene	NA		<0.2 U
o-Xylene (1,2-Dimethylbenzene)	NA		<0.2 U
Sec-Butylbenzene	NA		<0.2 U
Toluene	NA		<0.2 U
Total Xylenes	NA		<0.6 U
SVOCs			
1,4-Dioxane (P-Dioxane)	NA		<0.4 U
Benzo(a)anthracene	NA		<0.0541 U
Benzo(a)pyrene	NA		<0.0541 U
Benzo(b)fluoranthene	NA		<0.0541 U
Benzo(k)fluoranthene	NA		<0.0541 U
Chrysene	NA		<0.0541 U
Indeno(1,2,3-cd)pyrene	NA		<0.0541 U
Pesticides			
Chlordane (alpha and gamma)	NA		<0.0222 U
Metals - Dissolved			
Antimony	NA		<1.11 U
Arsenic	NA		2.42
Iron	NA		<278 U
Lead	NA		<5.56 U
Magnesium	NA		**849,000**
Manganese	NA		68.6
Selenium	NA		**186**
Sodium	NA		**6,960,000 D**
Metals - Total			
Antimony	NA		<1.11 U
Arsenic	NA		2.93
Iron	NA		283
Lead	NA		<5.56 U
Magnesium	NA		**767,000**
Manganese	NA		69.3
Selenium	NA		**211**
Sodium	NA		**6,490,000 D**
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	NA		**0.00534**
Perfluorooctanoic Acid (PFOA)	NA		**0.01**
General Chemistry			
Chloride (As Cl)		**19,500,000 D**	NA
Sulfate (As SO4)		**364,000 D**	NA

	Location	LMW-24	LMW-24
	Sample Name	207 LMW-24	203 LMW-24
	Sample Date	08/03/2020	07/30/2020
VOCs			
1,2,4-Trimethylbenzene	NA		<0.2 U
1,4-Dioxane (P-Dioxane)	NA		<40 U
Benzene	NA		0.36 J
Ethylbenzene	NA		<0.2 U
Isopropylbenzene (Cumene)	NA		1.5
M,P-Xylene	NA		<0.5 U
n-Butylbenzene	NA		<0.2 U
n-Propylbenzene	NA		0.88
o-Xylene (1,2-Dimethylbenzene)	NA		<0.2 U
Sec-Butylbenzene	NA		0.5
Toluene	NA		<0.2 U
Total Xylenes	NA		<0.6 U
SVOCs			
1,4-Dioxane (P-Dioxane)	NA		<0.4 U
Benzo(a)anthracene	NA		<0.0571 U
Benzo(a)pyrene	NA		<0.0571 U
Benzo(b)fluoranthene	NA		<0.0571 U
Benzo(k)fluoranthene	NA		<0.0571 U
Chrysene	NA		<0.0571 U
Indeno(1,2,3-cd)pyrene	NA		<0.0571 U
Pesticides			
Chlordane (alpha and gamma)	NA		<0.0222 U
Metals - Dissolved			
Antimony	NA		<1.11 U
Arsenic	NA		1
Iron	NA		<278 U
Lead	NA		<5.56 U
Magnesium	NA		**141,000**
Manganese	NA		273
Selenium	NA		**40.8**
Sodium	NA		**1,220,000**
Metals - Total			
Antimony	NA		<1.11 U
Arsenic	NA		2.169
Iron	NA		**2,560**
Lead	NA		6.87
Magnesium	NA		**126,000**
Manganese	NA		246
Selenium	NA		**42.3**
Sodium	NA		**1,100,000**
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	NA		**0.0291**
Perfluorooctanoic Acid (PFOA)	NA		**0.0669**
General Chemistry			
Chloride (As Cl)		**2,070,000 D**	NA
Sulfate (As SO4)		56,700 D	NA

	Location	LMW-1
	Sample Name	LMW-1_112818
	Sample Date	11/26/2018
1,2,4,5-Tetramethylbenzene		<0.2 U
1,2,4-Trimethylbenzene		0.21 J
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		<0.2 U
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		<0.2 U
M,P-Xylene		<0.5 U
n-Butylbenzene		<0.2 U
n-Propylbenzene		<0.2 U
o-Xylene (1,2-Dimethylbenzene)		<0.2 U
Sec-Butylbenzene		<0.2 U
Toluene		<0.2 U
Total Xylenes		<0.6 U
Benzo(a)anthracene		<0.0588 U
Benzo(a)pyrene		<0.0588 U
Benzo(b)fluoranthene		<0.0588 U
Benzo(k)fluoranthene		<0.0588 U
Chrysene		<0.0588 U
Indeno(1,2,3-cd)pyrene		<0.0588 U
Chlordane (alpha and gamma)		<0.0216 U
Antimony		1.84
Arsenic		2.95
Iron		<278 U
Lead		<5.56 U
Magnesium		**285,000**
Manganese		79.3
Selenium		**11.7 D**
Sodium		**2,860,000 D**
Antimony		1.91
Arsenic		3.13
Iron		<278 U
Lead		6.42
Magnesium		**280,000**
Manganese		84.5
Selenium		**12.8 D**
Sodium		**4,110,000 D**

	Location	LMW-2
	Sample Name	LMW-2_112618
	Sample Date	11/26/2018
1,2,4,5-Tetramethylbenzene		<0.2 U
1,2,4-Trimethylbenzene		<0.2 U
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		<0.2 U
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		<0.2 U
M,P-Xylene		<0.5 U
n-Butylbenzene		<0.2 U
n-Propylbenzene		<0.2 U
o-Xylene (1,2-Dimethylbenzene)		<0.2 U
Sec-Butylbenzene		<0.2 U
Toluene		<0.2 U
Total Xylenes		<0.6 U
Benzo(a)anthracene		**0.0774**
Benzo(a)pyrene		**0.0645**
Benzo(b)fluoranthene		<0.0645 U
Benzo(k)fluoranthene		<0.0645 U
Chrysene		**0.103**
Indeno(1,2,3-cd)pyrene		<0.0645 U
Chlordane (alpha and gamma)		<0.0205 U
Antimony		2.93
Arsenic		3.72
Iron		**339**
Lead		<5.56 U
Magnesium		**645,000**
Manganese		40.6
Selenium		<11.1 U
Sodium		**7,390,000 D**
Antimony		2.93
Arsenic		5.56
Iron		**625**
Lead		<5.56 U
Magnesium		**629,000**
Manganese		40.8
Selenium		<11.1 U
Sodium		**8,530,000 D**

	Location	LMW-23
	Sample Name	204 LMW-23
	Sample Date	07/30/2020
VOCs		
1,2,4-Trimethylbenzene		0.65
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		<0.2 U
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		<0.2 U
M,P-Xylene		<0.5 U
n-Butylbenzene		<0.2 U
n-Propylbenzene		<0.2 U
o-Xylene (1,2-Dimethylbenzene)		<0.2 U
Sec-Butylbenzene		<0.2 U
Toluene		<0.2 U
Total Xylenes		0.65 J
SVOCs		
1,4-Dioxane (P-Dioxane)		<0.4 U
Benzo(a)anthracene		**0.711**
Benzo(a)pyrene		**0.764**
Benzo(b)fluoranthene		**0.456**
Benzo(k)fluoranthene		**0.3**
Chrysene		**0.878**
Indeno(1,2,3-cd)pyrene		**0.267**
Pesticides		
Chlordane (alpha and gamma)		<0.0222 U
Metals - Dissolved		
Antimony		<1.11 U
Arsenic		3.31
Iron		**1,960**
Lead		<5.56 U
Magnesium		**708,000**
Manganese		108
Selenium		**198**
Sodium		**5,820,000 D**
Metals - Total		
Antimony		1.4
Arsenic		19.3
Iron		**8,640**
Lead		**94.7**
Magnesium		**703,000**
Manganese		393
Selenium		**202**
Sodium		**5,740,000 D**
PFAS		
Perfluorooctanesulfonic Acid (PFOS)		**0.0048**
Perfluorooctanoic Acid (PFOA)		**0.0207**

	Location	LMW-6
	Sample Name	LMW-6_112618
	Sample Date	11/26/2018
VOCs		
1,2,4,5-Tetramethylbenzene		<0.2 U
1,2,4-Trimethylbenzene		<0.2 U
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		<0.2 U
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		<0.2 U
M,P-Xylene		<0.5 U
n-Butylbenzene		<0.2 U
n-Propylbenzene		<0.2 U
o-Xylene (1,2-Dimethylbenzene)		<0.2 U
Sec-Butylbenzene		<0.2 U
Toluene		<0.2 U
Total Xylenes		<0.6 U
SVOCs		
Benzo(a)anthracene		<0.0571 U
Benzo(a)pyrene		**0.0571**
Benzo(b)fluoranthene		<0.0571 U
Benzo(k)fluoranthene		<0.0571 U
Chrysene		**0.0571**
Indeno(1,2,3-cd)pyrene		<0.0571 U
Pesticides		
Chlordane (alpha and gamma)		<0.0216 U
Metals - Dissolved		
Antimony		2.23
Arsenic		4
Iron		<278 U
Lead		<5.56 U
Magnesium		**203,000**
Manganese		49.6
Selenium		**13.5 D**
Sodium		**2,370,000 D**
Metals - Total		
Antimony		1.7
Arsenic		4.45
Iron		<278 U
Lead		<5.56 U
Magnesium		**210,000**
Manganese		295
Selenium		<11.1 U
Sodium		**2,900,000 D**

	Location	LMW-9
	Sample Name	LMW-9_112618
	Sample Date	11/26/2018
VOCs		
1,2,4,5-Tetramethylbenzene		<0.2 U
1,2,4-Trimethylbenzene		0.61
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		<0.2 U
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		<0.2 U
M,P-Xylene		0.66 J
n-Butylbenzene		<0.2 U
n-Propylbenzene		<0.2 U
o-Xylene (1,2-Dimethylbenzene)		0.2 J
Sec-Butylbenzene		<0.2 U
Toluene		<0.2 U
Total Xylenes		0.86 J
SVOCs		
Benzo(a)anthracene		<0.0541 U
Benzo(a)pyrene		<0.0541 U
Benzo(b)fluoranthene		<0.0541 U
Benzo(k)fluoranthene		<0.0541 U
Chrysene		<0.0541 U
Indeno(1,2,3-cd)pyrene		<0.0541 U
Pesticides		
Chlordane (alpha and gamma)		<0.02 U
Metals - Dissolved		
Antimony		2.15
Arsenic		2
Iron		<278 U
Lead		<5.56 U
Magnesium		**282,000**
Manganese		**678**
Selenium		<11.1 U
Sodium		**3,240,000 D**
Metals - Total		
Antimony		1.85
Arsenic		3.54
Iron		**1,240**
Lead		16.8
Magnesium		**279,000**
Manganese		**685**
Selenium		<11.1 U
Sodium		**3,780,000 D**

	Location	LMW-8
	Sample Name	LMW-8_112618
	Sample Date	11/26/2018
VOCs		
1,2,4,5-Tetramethylbenzene		**6.04 D**
1,2,4-Trimethylbenzene		1.48 D
1,4-Dioxane (P-Dioxane)		<80 U
Benzene		**1.64 D**
Ethylbenzene		0.88 JD
Isopropylbenzene (Cumene)		**0.24 D**
M,P-Xylene		2.4 D
n-Butylbenzene		1.04 D
n-Propylbenzene		**0.66 D**
o-Xylene (1,2-Dimethylbenzene)		0.76 JD
Sec-Butylbenzene		2.24 D
Toluene		3.08 D
Total Xylenes		3.16 D
SVOCs		
Benzo(a)anthracene		<0.0556 U
Benzo(a)pyrene		<0.0556 U
Benzo(b)fluoranthene		<0.0556 U
Benzo(k)fluoranthene		<0.0556 U
Chrysene		<0.0556 U
Indeno(1,2,3-cd)pyrene		<0.0556 U
Pesticides		
Chlordane (alpha and gamma)		<0.0205 U
Metals - Dissolved		
Antimony		1.28
Arsenic		3.6
Iron		<278 U
Lead		<5.56 U
Magnesium		**53,300**
Manganese		293
Selenium		<11.1 U
Sodium		**560,000**
Metals - Total		
Antimony		1.18
Arsenic		8.88
Iron		**4,160**
Lead		<5.56 U
Magnesium		**53,300**
Manganese		291
Selenium		<11.1 U
Sodium		**640,000**

	Location	LMW-7
	Sample Name	LMW-7_112618
	Sample Date	11/26/2018
VOCs		
1,2,4,5-Tetramethylbenzene		0.99
1,2,4-Trimethylbenzene		<0.2 U
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		<0.2 U
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		1.17
M,P-Xylene		<0.5 U
n-Butylbenzene		<0.2 U
n-Propylbenzene		0.59
o-Xylene (1,2-Dimethylbenzene)		<0.2 U
Sec-Butylbenzene		2.31 J
Toluene		<0.2 U
Total Xylenes		<0.6 U
SVOCs		
Benzo(a)anthracene		**0.0588**
Benzo(a)pyrene		<0.0588 U
Benzo(b)fluoranthene		<0.0588 U
Benzo(k)fluoranthene		<0.0588 U
Chrysene		**0.0706**
Indeno(1,2,3-cd)pyrene		<0.0588 U
Pesticides		
Chlordane (alpha and gamma)		<0.0211 U
Metals - Dissolved		
Antimony		<1.11 U
Arsenic		<1.11 U
Iron		<278 U
Lead		<5.56 U
Magnesium		**49,600**
Manganese		**616**
Selenium		<11.1 U
Sodium		**625,000**
Metals - Total		
Antimony		<1.11 U
Arsenic		1.68
Iron		**13,700**
Lead		**50,700**
Manganese		**649**
Selenium		<11.1 U
Sodium		**729,000**

	Location	LMW-19
	Sample Name	196 LMW-19
	Sample Date	07/28/2020
VOCs		
1,2,4,5-Tetramethylbenzene		0.61
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		**1.8**
Ethylbenzene		0.49 J
Isopropylbenzene (Cumene)		**8.2**
M,P-Xylene		1.6
n-Butylbenzene		3.4
n-Propylbenzene		**9.3**
o-Xylene (1,2-Dimethylbenzene)		1.5
Sec-Butylbenzene		3.6
Toluene		1
Total Xylenes		3.1
SVOCs		
1,4-Dioxane (P-Dioxane)		**0.62**
Benzo(a)anthracene		<0.0571 U
Benzo(a)pyrene		<0.0571 U
Benzo(b)fluoranthene		<0.0571 U
Benzo(k)fluoranthene		<0.0571 U
Chrysene		<0.0571 U
Indeno(1,2,3-cd)pyrene		<0.0571 U
Pesticides		
Chlordane (alpha and gamma)		<0.0219 U
Metals - Dissolved		
Antimony		<1.11 U
Arsenic		<1.11 U
Iron		**2,780**
Lead		<5.56 U
Magnesium		13,900
Manganese		**900**
Selenium		<1.11 U
Sodium		**134,000**
Metals - Total		
Antimony		<1.11 U
Arsenic		2.5
Iron		**31,900**
Lead		<5.56 U
Magnesium		11,900
Manganese		**801**
Selenium		4.29
Sodium		**112,000**
PFAS		
Perfluorooctanesulfonic Acid (PFOS)		**0.0148 J**
Perfluorooctanoic Acid (PFOA)		**0.0255**

	Location	LMW-17
	Sample Name	195 LMW-17
	Sample Date	07/28/2020
VOCs		
1,2,4,5-Tetramethylbenzene		<0.2 U
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		0.23 J
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		<0.2 U
M,P-Xylene		<0.5 U
n-Butylbenzene		<0.2 U
n-Propylbenzene		<0.2 U
o-Xylene (1,2-Dimethylbenzene)		<0.2 U
Sec-Butylbenzene		<0.2 U
Toluene		<0.2 U
Total Xylenes		<0.6 U
SVOCs		
1,4-Dioxane (P-Dioxane)		<0.4 U
Benzo(a)anthracene		**0.103**
Benzo(a)pyrene		<0.0571 U
Benzo(b)fluoranthene		<0.0571 U
Benzo(k)fluoranthene		<0.0571 U
Chrysene		**0.08**
Indeno(1,2,3-cd)pyrene		<0.0571 U
Pesticides		
Chlordane (alpha and gamma)		<0.0219 U
Metals - Dissolved		
Antimony		<1.11 U
Arsenic		<1.11 U
Iron		<278 U
Lead		<5.56 U
Magnesium		6,470 J
Manganese		**487 J**
Selenium		2.39
Sodium		**67500**
Metals - Total		
Antimony		<1.11 U
Arsenic		6.57 J
Iron		**13,400**
Lead		16.6
Magnesium		6,350
Manganese		**497 J**
Selenium		2.96
Sodium		**84,600**
PFAS		
Perfluorooctanesulfonic Acid (PFOS)		**0.0313 J**
Perfluorooctanoic Acid (PFOA)		**0.0143**

	Location	LMW-16
	Sample Name	192 LMW-16
	Sample Date	07/27/2020
VOCs		
1,2,4-Trimethylbenzene		0.6
1,4-Dioxane (P-Dioxane)		<20 U
Benzene		**3.3**
Ethylbenzene		0.58
Isopropylbenzene (Cumene)		**1.2**
M,P-Xylene		2.2
n-Butylbenzene		3
n-Propylbenzene		**11**
o-Xylene (1,2-Dimethylbenzene)		0.65
Sec-Butylbenzene		2.6
Toluene		1
Total Xylenes		2.8
SVOCs		
1,4-Dioxane (P-Dioxane)		<0.4 U
Benzo(a)anthracene		**0.0541**
Benzo(a)pyrene		**0.0541**
Benzo(b)fluoranthene		**0.0541**
Benzo(k)fluoranthene		<0.0541 U
Chrysene		**0.0541**
Indeno(1,2,3-cd)pyrene		<0.0541 U
Pesticides		
Chlordane (alpha and gamma)		<0.0218 U
Metals - Dissolved		
Antimony		**4.3 J**
Arsenic		<1.11 U
Iron		**563**
Lead		<5.56 U
Magnesium		8,750
Manganese		**1,120**
Selenium		<1.11 U
Sodium		**90,700**
Metals - Total		
Antimony		<1.11 U
Arsenic		1.47
Iron		**13,500**
Lead		<5.56 U
Magnesium		9,030
Manganese		**1,270**
Selenium		<11.1 U
Sodium		**93,900**
Metals - Total		
Antimony		1.23
Arsenic		2.43
Iron		**16,700**
Lead		30.8
Magnesium		**107,000**
Manganese		**785**
Selenium		<11.1 U
Sodium		**1,130,000**

	Location	LMW-13
	Sample Name	LMW-13_112718
	Sample Date	11/27/2018
VOCs		
1,2,4,5-Tetramethylbenzene		0.33 J
1,2,4-Trimethylbenzene		0.41 J
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		0.2 J
Ethylbenzene		<0.2 U
Isopropylbenzene (Cumene)		<0.2 U
M,P-Xylene		0.76 J
n-Butylbenzene		<0.2 U
n-Propylbenzene		<0.2 U
o-Xylene (1,2-Dimethylbenzene)		0.27 J
Sec-Butylbenzene		<0.2 U
Toluene		0.76
Total Xylenes		1.01 J
SVOCs		
Benzo(a)anthracene		<0.0556 U
Benzo(a)pyrene		<0.0556 U
Benzo(b)fluoranthene		<0.0556 U
Benzo(k)fluoranthene		<0.0556 U
Chrysene		<0.0556 U
Indeno(1,2,3-cd)pyrene		<0.0556 U
Pesticides		
Chlordane (alpha and gamma)		**0.11**
Metals - Dissolved		
Antimony		1.47
Arsenic		1.9
Iron		<278 U
Lead		<5.56 U
Magnesium		9,030
Manganese		**1,270**
Selenium		<11.1 U
Sodium		16,600
Metals - Total		
Antimony		1.23
Arsenic		2.43
Iron		**16,700**
Lead		30.8
Magnesium		**107,000**
Manganese		**785**
Selenium		<11.1 U
Sodium		**1,130,000**

	Location	LMW-15	LMW-15
	Sample Name	190 LMW-15	191 DUP-1
	Sample Date	07/27/2020	07/27/2020
VOCs			
1,2,4-Trimethylbenzene		0.72	0.81
1,4-Dioxane (P-Dioxane)		<40 U	<40 U
Benzene		0.27 J	0.31 J
Ethylbenzene		<0.2 U	<0.2 U
Isopropylbenzene (Cumene)		1.2	1.4
M,P-Xylene		<0.5 U	<0.5 U
n-Butylbenzene		1.1	1.2
n-Propylbenzene		0.87	0.95
o-Xylene (1,2-Dimethylbenzene)		<0.2 U	<0.2 U
Sec-Butylbenzene		2.3	2.6
Toluene		<0.2 U	<0.2 U
Total Xylenes		<0.6 U	<0.6 U
SVOCs			
1,4-Dioxane (P-Dioxane)		<0.4 U	<0.4 U
Benzo(a)anthracene		**0.111**	**0.103**
Benzo(a)pyrene		**0.111**	**0.0914**
Benzo(b)fluoranthene		**0.0778**	**0.08**
Benzo(k)fluoranthene		**0.0667**	**0.0688**
Chrysene		**0.122**	**0.114**
Indeno(1,2,3-cd)pyrene		**0.0778**	**0.0571**
Pesticides			
Chlordane (alpha and gamma)		<0.0216 U	<0.0216 U
Metals - Dissolved			
Antimony		<1.11 U	<1.11 U
Arsenic		1.6	1.48
Iron		**8,210 J**	**1,500 J**
Lead		<5.56 U	<5.56 U
Magnesium		20,900	20,100
Manganese		**1,300**	**1,260**
Selenium		6.53 J	6.88 J
Sodium		**316,000**	**322,000**
Metals - Total			
Antimony		<1.11 U	2.03
Arsenic		8.56 J	12.1 J
Iron		**45,900**	**52,300**
Lead		**107 J**	**207 J**
Magnesium		20,500	21,600
Manganese		**1,280**	**1,390**
Selenium		7.69	9.12
Sodium		**298,000**	**304,000**
PFAS			
Perfluorooctanesulfonic Acid (PFOS)		**0.00327 J**	**0.00291 J**
Perfluorooctanoic Acid (PFOA)		**0.0165**	**0.0165**

	Location	LMW-12
	Sample Name	LMW-12_112718
	Sample Date	11/27/2018
VOCs		
1,2,4,5-Tetramethylbenzene		**174**
1,2,4-Trimethylbenzene		0.97
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		0.62
Ethylbenzene		0.34 J
Isopropylbenzene (Cumene)		3.38
M,P-Xylene		1.37
n-Butylbenzene		4.33
n-Propylbenzene		**5.89**
o-Xylene (1,2-Dimethylbenzene)		0.81
Sec-Butylbenzene		1.86
Toluene		1.35
Total Xylenes		1.98
SVOCs		
Benzo(a)anthracene		<0.0556 U
Benzo(a)pyrene		<0.0556 U
Benzo(b)fluoranthene		<0.0556 U
Benzo(k)fluoranthene		<0.0556 U
Chrysene		<0.0556 U
Indeno(1,2,3-cd)pyrene		<0.0556 U
Pesticides		
Chlordane (alpha and gamma)		<0.0216 U
Metals - Dissolved		
Antimony		1.52
Arsenic		1.76
Iron		<278 U
Lead		<5.56 U
Magnesium		9,870
Manganese		197
Selenium		<11.1 U
Sodium		**22,800**
Metals - Total		
Antimony		1.33
Arsenic		2.79
Iron		<2,780 U
Lead		<55.6 U
Magnesium		3,550 D
Manganese		216 D
Selenium		<111 U
Sodium		**26,600 D**

	Location	LMW-29
	Sample Name	208 LMW-29
	Sample Date	08/03/2020
General Chemistry		
Chloride (As Cl)		**11,100,000 D**
Sulfate (As SO4)		**840,000 D**

	Location	LMW-22	LMW-22
	Sample Name	211 LMW-22	200 LMW-22
	Sample Date	08/03/2020	07/28/2020
VOCs			
1,2,4-Trimethylbenzene	NA		<0.2 U
1,4-Dioxane (P-Dioxane)	NA		<40 U
Benzene	NA		0.25 J
Ethylbenzene	NA		<0.2 U
Isopropylbenzene (Cumene)	NA		<0.2 U
M,P-Xylene	NA		<0.5 U
n-Butylbenzene	NA		<0.2 U
n-Propylbenzene	NA		<0.2 U
o-Xylene (1,2-Dimethylbenzene)	NA		<0.2 U
Sec-Butylbenzene	NA		<0.2 U
Toluene	NA		<0.2 U
Total Xylenes	NA		<0.6 U
SVOCs			
1,4-Dioxane (P-Dioxane)	NA		<0.4 U
Benzo(a)anthracene	NA		**0.235**
Benzo(a)pyrene	NA		**0.2**
Benzo(b)fluoranthene	NA		**0.153**
Benzo(k)fluoranthene	NA		**0.129**
Chrysene	NA		**0.254**
Indeno(1,2,3-cd)pyrene	NA		**0.0924**
Pesticides			
Chlordane (alpha and gamma)	NA		<0.0211 U
Metals - Dissolved			
Antimony	NA		<1.11 U
Arsenic	NA		3.23
Iron	NA		<278 U
Lead	NA		<5.56 U
Magnesium	NA		**180,000**
Manganese	NA		**3,550**
Selenium	NA		**30.2**
Sodium	NA		**1,510,000 D**
Metals - Total			
Antimony	NA		<1.11 U
Arsenic	NA		6.72
Iron	NA		**7,640**
Lead	NA		20.8
Magnesium	NA		**166,000**
Manganese	NA		**3,210**
Selenium	NA		**61.5**
Sodium	NA		**1,750,000 D**
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	NA		**0.0266 J**
Perfluorooctanoic Acid (PFOA)	NA		**0.0618**
General Chemistry			
Chloride (As Cl)		**4,200,000 D**	NA
Sulfate (As SO4)		**331,000 D**	NA

	Location	LMW-5
	Sample Name	LMW-5_112718
	Sample Date	11/27/2018
VOCs		
1,2,4-Trimethylbenzene		0.81
1,4-Dioxane (P-Dioxane)		<40 U
Benzene		**1.95**
Ethylbenzene		**5.18**
Isopropylbenzene (Cumene)		1.49
M,P-Xylene		**37.4**
n-Butylbenzene		0.24 J
n-Propylbenzene		1.78
o-Xylene (1,2-Dimethylbenzene)		**12.3**
Sec-Butylbenzene		0.48 J
Toluene		**13.6**
Total Xylenes		**49.8**
SVOCs		
Benzo(a)anthracene		<0.0571 U
Benzo(a)pyrene		<0.0571 U
Benzo(b)fluoranthene		<0.0571 U
Benzo(k)fluoranthene		<0.0571 U
Chrysene		<0.0571 U
Indeno(1,2,3-cd)pyrene		<0.0571 U
Pesticides		
Chlordane (alpha and gamma)		<0.0219 U
Metals - Dissolved		
Antimony		<1.11 U
Arsenic		<1.11 U
Iron		<278 U
Lead		<5.56 U
Magnesium		11,800
Manganese		**489**
Selenium		<11.1 U
Sodium		**71,100**
Metals - Total		
Antimony		<1.11 U
Arsenic		1.83
Iron		**6,880**
Lead		**106**
Magnesium		**158,000**
Manganese		**2,120**
Selenium		<11.1 U
Sodium		**1,830,000**

	Location	LMW-4	LMW-4
	Sample Name	LMW-4_112618	210 LMW-4
	Sample Date	11/26/2018	08/03/2020
VOCs

Location	LSV-2
Sample Name	LSV-2_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	6.15 D
1,2,4-Trichlorobenzene	<1.1 U
1,2,4-Trimethylbenzene	19.6 D
1,2-Dichloroethane	<0.6 U
1,3,5-Trimethylbenzene (Mesitylene)	5.32 D
2-Hexanone (MBK)	10.3 D
4-Ethyltoluene	18.4 D
Acetone	53.0 D
Benzene	13.2 D
Carbon Disulfide	7.62 D
Carbon Tetrachloride	0.373 D
Chloroform	<0.724 U
Chloromethane	<0.306 U
Cyclohexane	2.40 D
Dichlorodifluoromethane	3.45 D
Ethyl Acetate	<1.07 U
Ethylbenzene	12.9 D
Isopropanol	<0.729 U
M,P-Xylene	45.4 D
Methyl Ethyl Ketone (2-Butanone)	41.6 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	26.5 D
Methyl Methacrylate	<0.607 U
Methylene Chloride	<1.03 U
n-Heptane	13.4 D
n-Hexane	33.6 D
o-Xylene (1,2-Dimethylbenzene)	14.4 D
Propylene	4.44 D
Styrene	0.758 D
Tetrachloroethene (PCE)	99.5 D
Tetrahydrofuran	17.8 D
Toluene	58.6 D
Trichloroethene (TCE)	0.473 D
Trichlorofluoromethane	39.4 D
Vinyl Acetate	<0.522 U
Vinyl Chloride	<0.379 U

Location	LSV-3
Sample Name	LSV-3_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	4.52 D
1,2,4-Trichlorobenzene	<1.12 U
1,2,4-Trimethylbenzene	14.7 D
1,2-Dichloroethane	<0.609 U
1,3,5-Trimethylbenzene (Mesitylene)	3.92 D
2-Hexanone (MBK)	26.4 D
4-Ethyltoluene	14.9 D
Acetone	193 D
Benzene	14.0 D
Carbon Disulfide	7.93 D
Carbon Tetrachloride	<0.237 U
Chloroform	<0.735 U
Chloromethane	<0.311 U
Cyclohexane	1.14 D
Dichlorodifluoromethane	2.38 D
Ethyl Acetate	<1.09 U
Ethylbenzene	12.7 D
Isopropanol	<0.74 U
M,P-Xylene	49.4 D
Methyl Ethyl Ketone (2-Butanone)	107 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.617 U
Methyl Methacrylate	<0.617 U
Methylene Chloride	<1.09 U
n-Heptane	7.22 D
n-Hexane	18.5 D
o-Xylene (1,2-Dimethylbenzene)	14.5 D
Propylene	4.35 D
Styrene	<0.642 U
Tetrachloroethene (PCE)	78.0 D
Tetrahydrofuran	<0.888 U
Toluene	119 D
Trichloroethene (TCE)	<0.202 U
Trichlorofluoromethane	4.99 D
Vinyl Acetate	<0.53 U
Vinyl Chloride	<0.385 U

Location	LSV-5
Sample Name	LSV-5_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<0.86 U
1,2,4-Trichlorobenzene	<1.17 U
1,2,4-Trimethylbenzene	9.45 D
1,2-Dichloroethane	<0.638 U
1,3,5-Trimethylbenzene (Mesitylene)	2.56 D
2-Hexanone (MBK)	<1.29 U
4-Ethyltoluene	8.45 D
Acetone	29.5 D
Benzene	7.75 D
Carbon Disulfide	1.91 D
Carbon Tetrachloride	<0.248 U
Chloroform	<0.77 U
Chloromethane	<0.325 U
Cyclohexane	8.79 D
Dichlorodifluoromethane	2.42 D
Ethyl Acetate	<1.14 U
Ethylbenzene	4.86 D
Isopropanol	<0.775 U
M,P-Xylene	22.1 D
Methyl Ethyl Ketone (2-Butanone)	11.0 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.646 U
Methyl Methacrylate	<0.645 U
Methylene Chloride	<1.09 U
n-Heptane	5.56 D
n-Hexane	12.1 D
o-Xylene (1,2-Dimethylbenzene)	6.36 D
Propylene	2.20 D
Styrene	1.01 D
Tetrachloroethene (PCE)	92.6 D
Tetrahydrofuran	<0.93 U
Toluene	31.7 D
Trichloroethene (TCE)	<0.212 U
Trichlorofluoromethane	2.83 D
Vinyl Acetate	<0.555 U
Vinyl Chloride	<0.403 U

Location	LSV-7
Sample Name	LSV-7_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<0.84 U
1,2,4-Trichlorobenzene	<1.14 U
1,2,4-Trimethylbenzene	16.4 D
1,2-Dichloroethane	<0.623 U
1,3,5-Trimethylbenzene (Mesitylene)	4.62 D
2-Hexanone (MBK)	19.7 D
4-Ethyltoluene	17.7 D
Acetone	86.5 D
Benzene	24.7 D
Carbon Disulfide	4.75 D
Carbon Tetrachloride	<0.242 U
Chloroform	<0.752 U
Chloromethane	<0.318 U
Cyclohexane	3.55 D
Dichlorodifluoromethane	2.82 D
Ethyl Acetate	<1.11 U
Ethylbenzene	14.5 D
Isopropanol	<0.757 U
M,P-Xylene	54.0 D
Methyl Ethyl Ketone (2-Butanone)	70.4 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.631 U
Methyl Methacrylate	<0.63 U
Methylene Chloride	<1.07 U
n-Heptane	10.5 D
n-Hexane	34.0 D
o-Xylene (1,2-Dimethylbenzene)	14.3 D
Propylene	3.63 D
Styrene	0.856 D
Tetrachloroethene (PCE)	48.5 D
Tetrahydrofuran	<0.908 U
Toluene	87.7 D
Trichloroethene (TCE)	<0.207 U
Trichlorofluoromethane	10.2 D
Vinyl Acetate	<0.542 U
Vinyl Chloride	<0.394 U

Location	LSV-8	LSV-8
Sample Name	LSV-8_112718	DUP-8_112718
Sample Date	11/27/2018	11/27/2018
Sample Type	SV	SV
VOCs		
1,1,1-Trichloroethane	<0.778 U	<0.824 U
1,2,4-Trichlorobenzene	<1.06 U	2.16 D
1,2,4-Trimethylbenzene	6.24 D	10.9 D
1,2-Dichloroethane	<0.577 U	<0.619 U
1,3,5-Trimethylbenzene (Mesitylene)	1.96 D	3.61 D
2-Hexanone (MBK)	<1.17 U	<1.25 U
4-Ethyltoluene	5.82 D	10.4 D
Acetone	62.3 D	99.0 D
Benzene	8.84 D	10.6 D
Carbon Disulfide	2.49 D	3.14 D
Carbon Tetrachloride	<0.224 U	<0.24 U
Chloroform	<0.696 U	<0.747 U
Chloromethane	<0.294 U	<0.316 U
Cyclohexane	38.1 D	<0.526 U
Dichlorodifluoromethane	1.62 D	1.89 D
Ethyl Acetate	<1.03 U	<1.1 U
Ethylbenzene	5.26 D	8.50 D
Isopropanol	1.75 D	<0.752 U
M,P-Xylene	19.3 D	31.9 D
Methyl Ethyl Ketone (2-Butanone)	28.5 D	46.5 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.584 U	<0.626 U
Methyl Methacrylate	<0.584 U	<0.626 U
Methylene Chloride	<0.991 U	<1.06 U
n-Heptane	<0.584 U	<0.627 U
n-Hexane	29.7 D	42.6 D
o-Xylene (1,2-Dimethylbenzene)	5.39 D	9.10 D
Propylene	2.53 D	4.45 D
Styrene	0.668 D	1.11 D
Tetrachloroethene (PCE)	4.64 D	4.04 D
Tetrahydrofuran	<0.841 U	<0.902 U
Toluene	34.9 D	51.5 D
Trichloroethene (TCE)	<0.192 U	<0.205 U
Trichlorofluoromethane	4.97 D	6.53 D
Vinyl Acetate	10.6 D	<0.538 U
Vinyl Chloride	<0.365 U	<0.391 U

Location	LSV-6
Sample Name	LSV-6_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<0.837 U
1,2,4-Trichlorobenzene	<1.14 U
1,2,4-Trimethylbenzene	178 D
1,2-Dichloroethane	<0.621 U
1,3,5-Trimethylbenzene (Mesitylene)	4.90 D
2-Hexanone (MBK)	32.7 D
4-Ethyltoluene	19.3 D
Acetone	206 D
Benzene	23.9 D
Carbon Disulfide	8.03 D
Carbon Tetrachloride	<0.241 U
Chloroform	<0.749 U
Chloromethane	<0.317 U
Cyclohexane	2.43 D
Dichlorodifluoromethane	2.88 D
Ethyl Acetate	<1.11 U
Ethylbenzene	16.1 D
Isopropanol	<0.754 U
M,P-Xylene	58.1 D
Methyl Ethyl Ketone (2-Butanone)	131 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.628 U
Methyl Methacrylate	<0.628 U
Methylene Chloride	<1.07 U
n-Heptane	12.7 D
n-Hexane	38.7 D
o-Xylene (1,2-Dimethylbenzene)	15.9 D
Propylene	7.60 D
Styrene	<0.653 U
Tetrachloroethene (PCE)	33.4 D
Tetrahydrofuran	<0.905 U
Toluene	104 D
Trichloroethene (TCE)	<0.206 U
Trichlorofluoromethane	9.22 D
Vinyl Acetate	<0.54 U
Vinyl Chloride	<0.392 U

Location	LSV-9
Sample Name	LSV-9_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<0.864 U
1,2,4-Trichlorobenzene	<1.17 U
1,2,4-Trimethylbenzene	12.4 D
1,2-Dichloroethane	<0.641 U
1,3,5-Trimethylbenzene (Mesitylene)	4.44 D
2-Hexanone (MBK)	26.8 D
4-Ethyltoluene	11.8 D
Acetone	160 D
Benzene	25.9 D
Carbon Disulfide	7.00 D
Carbon Tetrachloride	<0.249 U
Chloroform	<0.773 U
Chloromethane	<0.327 U
Cyclohexane	23.6 D
Dichlorodifluoromethane	2.11 D
Ethyl Acetate	<1.14 U
Ethylbenzene	9.76 D
Isopropanol	<0.778 U
M,P-Xylene	33.0 D
Methyl Ethyl Ketone (2-Butanone)	92.3 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.648 U
Methyl Methacrylate	<0.648 U
Methylene Chloride	<1.1 U
n-Heptane	<0.649 U
n-Hexane	33.8 D
o-Xylene (1,2-Dimethylbenzene)	9.97 D
Propylene	4.06 D
Styrene	0.809 D
Tetrachloroethene (PCE)	13.7 D
Tetrahydrofuran	16.2 D
Toluene	58.7 D
Trichloroethene (TCE)	<0.213 U
Trichlorofluoromethane	7.20 D
Vinyl Acetate	4.90 D
Vinyl Chloride	<0.405 U

Location	Ambient-1
Sample Name	178 AMBIENT-1
Sample Date	07/16/2020
Sample Type	AA
VOCs	
1,1,1-Trichloroethane	<0.41 U
1,2,4-Trichlorobenzene	<0.56 U
1,2,4-Trimethylbenzene	0.59 D
1,2-Dichloroethane	<0.3 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.37 U
2-Hexanone (MBK)	<0.62 U
4-Ethyltoluene	0.48 D
Acetone	4.1 D
Benzene	0.29 D
Carbon Disulfide	<0.23 U
Carbon Tetrachloride	0.47 D
Chloroform	<0.37 U
Chloromethane	1.3 D
Cyclohexane	<0.26 U
Dichlorodifluoromethane	1.5 D
Ethyl Acetate	<0.54 U
Ethylbenzene	<0.33 U
Isopropanol	0.94 D
M,P-Xylene	0.95 D
Methyl Ethyl Ketone (2-Butanone)	0.53 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.31 U
Methyl Methacrylate	<0.31 U
Methylene Chloride	0.60 D
n-Heptane	0.34 D
n-Hexane	0.37 D
o-Xylene (1,2-Dimethylbenzene)	0.33 D
Propylene	0.48 D
Styrene	<0.32 U
Tetrachloroethene (PCE)	<0.51 U
Tetrahydrofuran	<0.44 U
Toluene	1.1 D
Trichloroethene (TCE)	<0.1 U
Trichlorofluoromethane	1.3 D
Vinyl Acetate	<0.26 UJ
Vinyl Chloride	<0.096 U

Location	LSV-4
Sample Name	LSV-4_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<0.853 U
1,2,4-Trichlorobenzene	<1.16 U
1,2,4-Trimethylbenzene	8.38 D
1,2-Dichloroethane	<0.633 U
1,3,5-Trimethylbenzene (Mesitylene)	2.92 D
2-Hexanone (MBK)	<1.28 U
4-Ethyltoluene	8.38 D
Acetone	9.59 D
Benzene	3.60 D
Carbon Disulfide	3.60 D
Carbon Tetrachloride	<0.246 U
Chloroform	<0.764 U
Chloromethane	<0.323 U
Cyclohexane	375 D
Dichlorodifluoromethane	2.40 D
Ethyl Acetate	<1.13 U
Ethylbenzene	3.33 D
Isopropanol	<0.769 U
M,P-Xylene	170 D
Methyl Ethyl Ketone (2-Butanone)	10.6 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.641 U
Methyl Methacrylate	<0.64 U
Methylene Chloride	<1.09 U
n-Heptane	19.9 D
n-Hexane	573 D
o-Xylene (1,2-Dimethylbenzene)	6.11 D
Propylene	1.67 D
Styrene	0.933 D
Tetrachloroethene (PCE)	18.7 D
Tetrahydrofuran	26.6 D
Toluene	9.78 D
Trichloroethene (TCE)	<0.21 U
Trichlorofluoromethane	6.68 D
Vinyl Acetate	<0.551 U
Vinyl Chloride	<0.4 U

Location	LSV-15	LSV-15
Sample Name	176 LSV-15	177 DUP-1
Sample Date	07/16/2020	07/16/2020
Sample Type	SV	SV
VOCs		
1,1,1-Trichloroethane	<1.7 U	<1.9 U
1,2,4-Trichlorobenzene	<2.3 U	<2.6 U
1,2,4-Trimethylbenzene	1.8 D	2.0 D
1,2-Dichloroethane	<1.3 U	<1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	<1.5 U	<1.7 U
2-Hexanone (MBK)	6.8 D	7.4 D
4-Ethyltoluene	1.8 D	1.9 D
Acetone	93 D	94 D
Benzene	2.7 D	2.6 D
Carbon Disulfide	2.2 D	2.5 D
Carbon Tetrachloride	<0.49 U	<0.55 U
Chloroform	<1.5 U	<1.7 U
Chloromethane	0.77 D	<0.72 U
Cyclohexane	<1.1 U	<1.2 U
Dichlorodifluoromethane	1.8 D	2.1 D
Ethyl Acetate	<2.2 U	<2.5 U
Ethylbenzene	2.6 D	2.9 D
Isopropanol	<1.5 U	<1.7 U
M,P-Xylene	8.2 D	8.7 D
Methyl Ethyl Ketone (2-Butanone)	17 D	18 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<1.3 U	<1.4 U
Methyl Methacrylate	<1.3 U	<1.4 U
Methylene Chloride	<2.2 U	<2.4 U
n-Heptane	1.8 D	2.3 D
n-Hexane	2.3 D	2.6 D
o-Xylene (1,2-Dimethylbenzene)	1.6 D	1.8 D
Propylene	1.9 D	1.7 D
Styrene	<1.3 U	<1.5 U
Tetrachloroethene (PCE)	790 D	850 D
Tetrahydrofuran	<1.8 U	<2 U
Toluene	6.6 D	7.2 D
Trichloroethene (TCE)	<0.42 U	<0.47 U
Trichlorofluoromethane	5.4 D	5.9 D
Vinyl Acetate	<1.1 UJ	<1.2 UJ
Vinyl Chloride	<0.4 U	<0.44 U

Location	LSV-10
Sample Name	LSV-10_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<8.24 U
1,2,4-Trichlorobenzene	<11.2 U
1,2,4-Trimethylbenzene	1350 D
1,2-Dichloroethane	715 D
1,3,5-Trimethylbenzene (Mesitylene)	<7.43 U
2-Hexanone (MBK)	<12.4 U
4-Ethyltoluene	1960 D
Acetone	1210 D
Benzene	<4.83 U
Carbon Disulfide	<4.71 U
Carbon Tetrachloride	<2.38 U
Chloroform	<7.38 U
Chloromethane	<3.12 U
Dichlorodifluoromethane	<7.47 U
Ethyl Acetate	<10.9 U
Ethylbenzene	2280 D
Isopropanol	<7.43 U
M,P-Xylene	5660 D
Methyl Ethyl Ketone (2-Butanone)	<4.46 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<6.19 U
Methyl Methacrylate	<6.19 U
Methylene Chloride	<10.5 U
n-Heptane	<6.19 U
n-Hexane	10600 D
o-Xylene (1,2-Dimethylbenzene)	2400 D
Propylene	1130 D
Styrene	<6.44 U
Tetrachloroethene (PCE)	<2.56 U
Tetrahydrofuran	<8.91 U
Toluene	1630 D
Trichloroethene (TCE)	<2.03 U
Trichlorofluoromethane	<8.49 U
Vinyl Acetate	<5.32 U
Vinyl Chloride	41.3 D

Location	LSV-14
Sample Name	178 LSV-14
Sample Date	07/16/2020
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<0.84 U
1,2,4-Trichlorobenzene	<1.1 U
1,2,4-Trimethylbenzene	2.0 D
1,2-Dichloroethane	<0.62 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.76 U
2-Hexanone (MBK)	7.4 D
4-Ethyltoluene	1.6 D
Acetone	110 D
Benzene	2.2 D
Carbon Disulfide	1.8 D
Carbon Tetrachloride	6.9 D
Chloroform	<0.75 U
Chloromethane	1.3 D
Cyclohexane	0.69 D
Dichlorodifluoromethane	1.7 D
Ethyl Acetate	6.6 D
Ethylbenzene	4.6 D
Isopropanol	170 D
M,P-Xylene	17 D
Methyl Ethyl Ketone (2-Butanone)	24 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	3.8 D
Methyl Methacrylate	1.1 D
Methylene Chloride	2.6 D
n-Heptane	5.7 D
n-Hexane	5.7 D
o-Xylene (1,2-Dimethylbenzene)	4.1 D
Propylene	<0.26 U
Styrene	1.1 D
Tetrachloroethene (PCE)	54 D
Tetrahydrofuran	<0.91 U
Toluene	25 D
Trichloroethene (TCE)	<0.21 U
Trichlorofluoromethane	2.8 D
Vinyl Acetate	<0.54 UJ
Vinyl Chloride	<0.2 U

Location	LSV-11
Sample Name	LSV-11_112718
Sample Date	11/27/2018
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<786 U
1,2,4-Trichlorobenzene	<10.7 U
1,2,4-Trimethylbenzene	<708 U
1,2-Dichloroethane	<5.83 U
1,3,5-Trimethylbenzene (Mesitylene)	<708 U
2-Hexanone (MBK)	<118 U
4-Ethyltoluene	<708 U
Acetone	602 D
Benzene	<44.6 U
Carbon Disulfide	<4.49 U
Carbon Tetrachloride	<2.27 U
Chloroform	<704 U
Chloromethane	<2.98 U
Cyclohexane	<4.96 U
Dichlorodifluoromethane	<713 U
Ethyl Acetate	<10.4 U
Ethylbenzene	163 D
Isopropanol	<708 U
M,P-Xylene	414 D
Methyl Ethyl Ketone (2-Butanone)	<4.25 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<5.9 U
Methyl Methacrylate	<5.9 U
Methylene Chloride	<10 U
n-Heptane	<5.91 U
n-Hexane	5650 D
o-Xylene (1,2-Dimethylbenzene)	98.2 D
Propylene	91.3 D
Styrene	<6.14 U
Tetrachloroethene (PCE)	<2.44 U
Tetrahydrofuran	<8.5 U
Toluene	353 D
Trichloroethene (TCE)	<1.94 U
Trichlorofluoromethane	<8.1 U
Vinyl Acetate	<5.07 U
Vinyl Chloride	<3.68 U

Location	LSV-13
Sample Name	174 LSV-13
Sample Date	07/16/2020
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<0.86 U
1,2,4-Trichlorobenzene	<1.2 U
1,2,4-Trimethylbenzene	4.7 D
1,2-Dichloroethane	<0.64 U
1,3,5-Trimethylbenzene (Mesitylene)	3.7 D
2-Hexanone (MBK)	32 D
4-Ethyltoluene	6.0 D
Acetone	170 D
Benzene	50 D
Carbon Disulfide	7.5 D
Carbon Tetrachloride	<0.25 U
Chloroform	11 D
Chloromethane	0.36 D
Cyclohexane	3.5 D
Dichlorodifluoromethane	1.4 D
Ethyl Acetate	<1.1 U
Ethylbenzene	5.8 D
Isopropanol	20 D
M,P-Xylene	17 D
Methyl Ethyl Ketone (2-Butanone)	60 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.65 U
Methyl Methacrylate	<0.65 U
Methylene Chloride	<1.1 U
n-Heptane	16 D
n-Hexane	37 D
o-Xylene (1,2-Dimethylbenzene)	2.5 D
Propylene	4.7 D
Styrene	<0.67 U
Tetrachloroethene (PCE)	16 D
Tetrahydrofuran	<0.93 U
Toluene	7.8 D
Trichloroethene (TCE)	<0.21 U
Trichlorofluoromethane	2.0 D
Vinyl Acetate	<0.56 UJ
Vinyl Chloride	<0.2 U

LMW-32
LSB-41
LMW-33
LSB-8/LMW-6/LSV-5
LSB-3/LMW-2/LSV-1
LSB-42
LSB-11/LMW-9
LMW-35
LSB-68
LMW-36
LSB-67
LSB-46/LMW-25
LSB-40/LMW-23
LSB-7/LSV-3
LSB-29/LMW-17
VEE-01
LSB-43/ LMW-28
LSB-12/LSV-8
LSB-70/LMW-27
LSB-45/LMW-26
VEE-02
LSB-44/LMW-24
LSB-69
LSB-4/LMW-3/LSV-2
LSB-71
LSB-58/LMW-29
LSB-25
LSB-39
LSB-32/LMW-19
AOC-3
LSB-65
STORM DRAIN ENTRANCE
W-4
LSB-19/LMW-13
LSB-26/LMW-15/LSV-13
LSB-2/LMW-1
LMW-31
VEE-03
VEE-03
LSB-59
LSB-64
LSB-16/LSV-11
LSB-28
LSB-27/LMW-16
AOC-5
AOC-3
LSB-9/LMW-7/LSV-6
LSB-18/LMW-12/LSV-12
W-3
LSB-14/LSV-9
LSB-66
LSB-56
LSB-5/LMW-4/LSV-4
LSB-21
AOC-1
W-1
W-5
LSB-23
LSB-60
LSB-10/LMW-8/LSV-7
LSB-20/LMW-14
LSB-38
LSB-67
LSB-61
LSB-37/LMW-22
LSB-22
W-6
LSB-62
LSB-33
LSB-15/LMW-11/LSV-10
LSB-6/LMW-5
LSB-36
AOC-2
W-2
LSB-30/LMW-18/LSV-14
AOC-4
LSB-63
LSB-72/LMW-30
LSB-35/LMW-21
LSB-17
STORM DRAIN
LSB-24
LSB-34/LMW-20/LSV-15
LSB-13/LMW-10

Legend

- Site Boundary
- Area of Concern (AOC)
- Former 275,000-gallon AST
- Existing Building Footprint
- NAPL Extents
- Historical Monitoring Well Location (Tyree 1990)

2020 Vacuum Enhanced Extraction Pilot Test

- Monitoring Well Location
- Vacuum Enhanced Extraction Well Location

2020 Supplemental Remedial Investigation

- Soil Boring
- Soil Boring/Monitoring Well Location
- Soil Boring/Monitoring Well/ Soil Vapor Sampling Location

2018 Remedial Investigation

- Soil Boring
- Soil Boring/Monitoring Well/ Soil Vapor Sampling Location
- Soil Boring/Soil Vapor Sampling Location
- Soil Boring/Monitoring Well Location

0 60 120
SCALE IN FEET

Notes:
1. Basemap from "Topographic, Boundary and Utility Survey" by Langan, signed 3/8/2019.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
3. Areas of Concern (AOCs) digitized from figures provided in historical reports and 1936 Sanborn Fire Insurance Map.
4. All sample locations are based on field measurements.

LANGAN
300 Kimball Drive, Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NEW JERSEY NEW YORK VIRGINIA CALIFORNIA PENNSYLVANIA CONNECTICUT FLORIDA
ABU DHABI ATHENS DOHA DUBAI ISTANBUL
Langan Engineering & Environmental Services, LLC
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

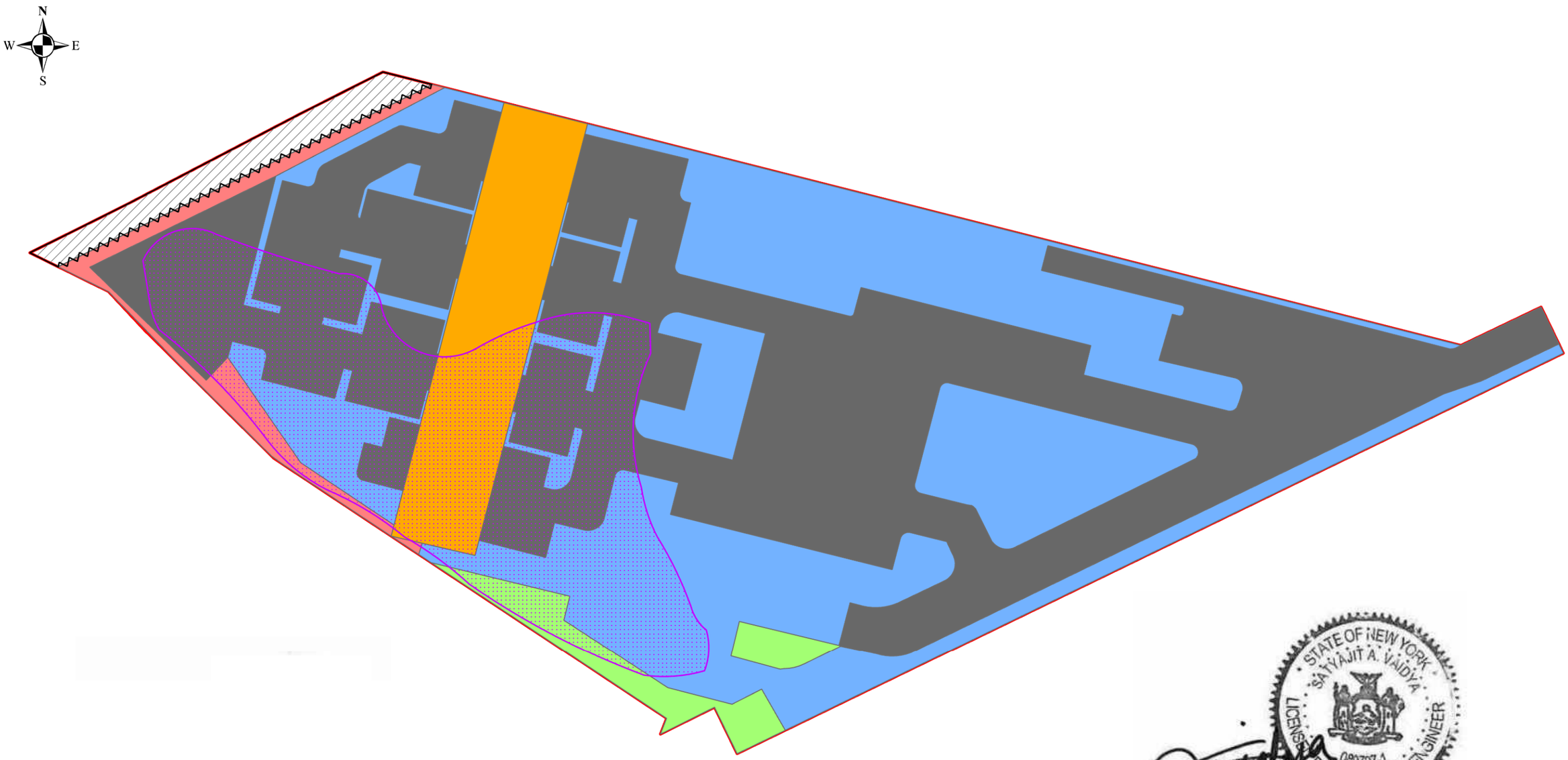
Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
2020 RI SOIL VAPOR ANALYTICAL RESULTS

Project No.	100652601
Date	9/23/2025
Scale	1" = 45'
Drawn By	IHB
Last Revised	6/16/2025
Figure	7

©2013 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\APRX\28-90 Review Avenue Collector\28-90 Review Avenue Collector.aprx Date: 9/23/2025 User: ibaker Time: 4:41 PM



Legend

- Site Boundary
- Sheet Pile Wall
- Undisturbed Area within Tidal Wetlands
- Extents of ISS Monolith
- Asphalt (7 inches thick)
- Concrete (12-14 inches thick)
- River Stone (minimum 14 inches thick)
- Landscaped Areas (minimum 12 inches thick)
- Stone (minimum 12 inches thick)

60 0 60
SCALE IN FEET

Notes:
1. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.

STATE OF NEW YORK
SATYAJIT A. VAIDYA
089797-1
LICENSED PROFESSIONAL ENGINEER

Satyajit Vaidya , P.E.
NYS P.E. # 089797

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com

Langan Engineering & Environmental Services, LLC
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

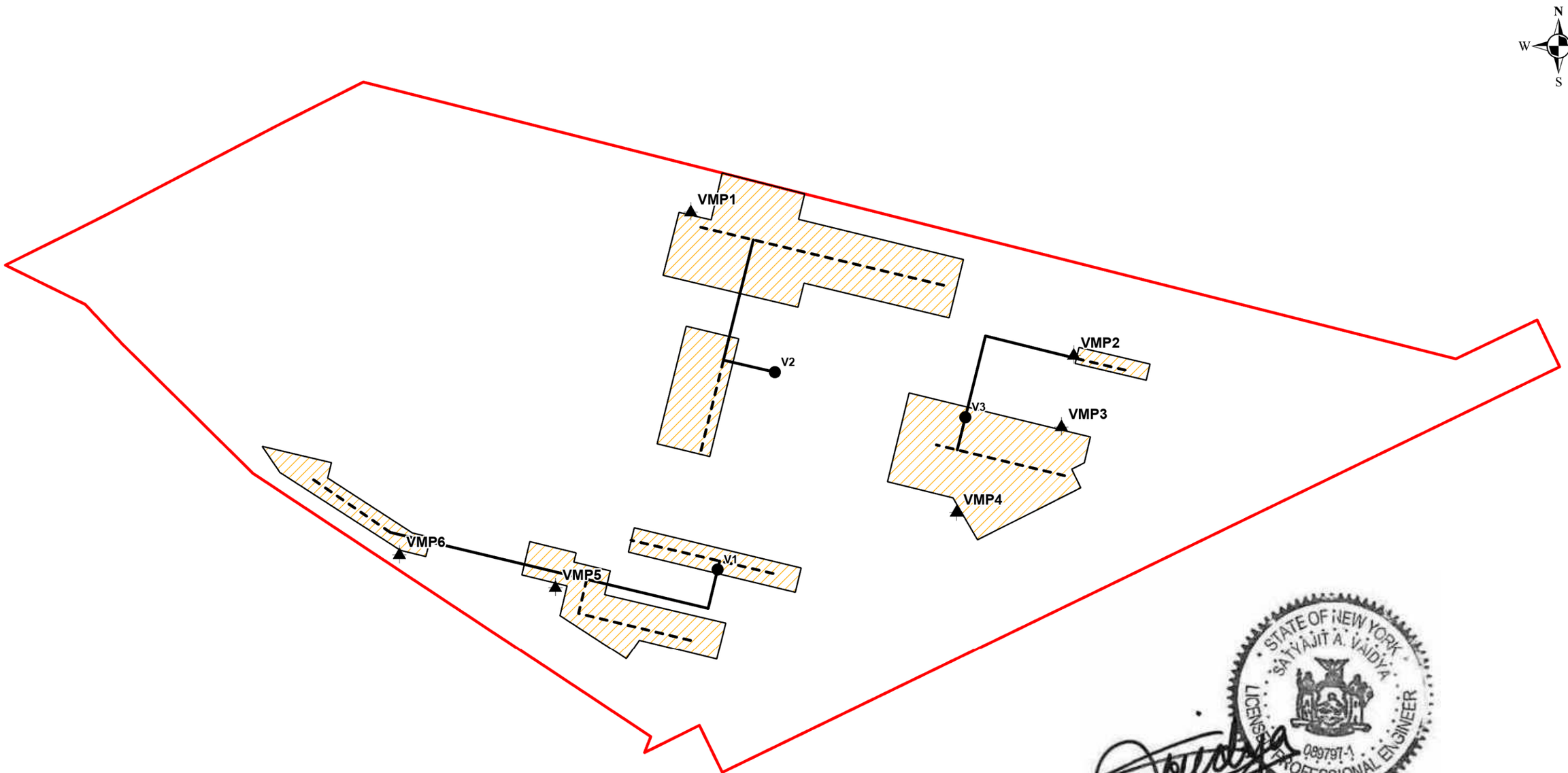
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
COMPOSITE COVER SYSTEM LAYOUT

Project No.	100652601
Date	6/16/2025
Scale	1"=60'
Drawn By	IHB
Last Revised	9/24/2025
Figure	8

© 2012 Langan



STATE OF NEW YORK
SATYAJIT A. VAIDYA
089797-1
LICENSED PROFESSIONAL ENGINEER

Satyajit Vaidya , P.E.
NYS P.E. # 089797

Legend

- Site Boundary
- Horizontal Extents of SSDS
- Vertical Vent Riser to Roof Mounted Fan
- Vacuum Monitoring Point
- SSDS Header Pipe
- SSDS Screen
- Wipeout
- Site Boundary

60 0 60
SCALE IN FEET

Notes:
1. Langan environmental boring locations are approximate and based on geolocation with a Trimble Geo 7x Handheld GNSS System.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

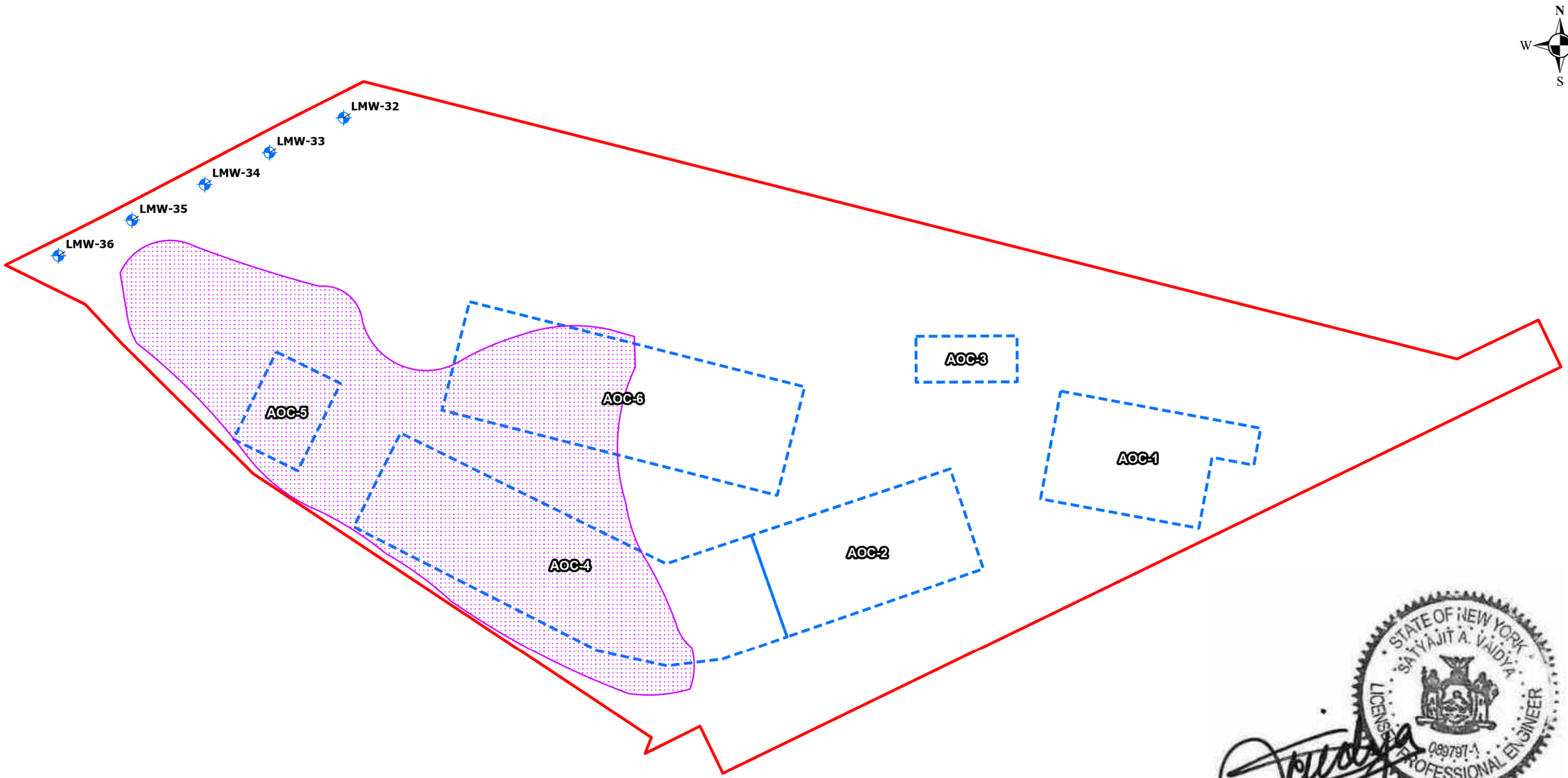
Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
SUB-SLAB DEPRESSURIZATION SYSTEM LAYOUT

Project No.	100652601
Date	6/20/2025
Scale	1"=60'
Drawn By	IHB
Last Revised	9/23/2025
Figure	9

© 2012 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\APRX\28-90 Review Avenue Collector\28-90 Review Avenue Collector.aprx Date: 9/23/2025 User: ibaker Time: 4:47 PM



STATE OF NEW YORK
SATYAJIT A. VAIDYA
089797-1
LICENSED PROFESSIONAL ENGINEER

Satyajit Vaidya , P.E.
NYS P.E. # 089797

60 0 60
SCALE IN FEET

Legend

- Site Boundary
- Area of Concern (AOC)
- Extents of ISS Monolith
- Proposed Monitoring Wells for long-term groundwater monitoring
- Wipeout
- Area of Concern (AOC)
- Site Boundary

Nat_Contamination

Notes:
1. Langan environmental boring locations are approximate and based on geolocation with a Trimble Geo 7x Handheld GNSS System.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com

Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
PROPOSED MONITORING WELL LOCATION PLAN

Project No.	100652601
Date	6/20/2025
Scale	1"=60'
Drawn By	JF
Last Revised	9/23/2025
Figure	10

© 2012 Langan

APPENDIX C

ENVIRONMENTAL EASEMENT

PARCEL I

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND SITUATE, LYING AND BEING IN THE BOROUGH AND COUNTY OF QUEENS, CITY AND STATE OF NEW YORK BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE SOUTHERLY BULKHEAD LINE OF THE DUTCH KILLS CANAL AS ADOPTED BY THE TOPOGRAPHICAL BUREAU OF THE CITY OF NEW YORK ADJOINING THE LANDS FORMERLY CONVEYED TO THE SIMONDS MANUFACTURING COMPANY BY DEED RECORDED IN THE OFFICE OF THE CLERK OF THE COUNTY OF QUEENS IN REEL 766 OF CONVEYANCES, PAGE 281, WHICH POINT IS ALSO INTERSECTED BY A LINE DRAWN PARALLEL TO BORDEN AVENUE AND DISTANT 145 FEET 4 1/2 INCHES SOUTHERLY THEREFROM, MEASURED ON A LINE DRAWN AT RIGHT ANGLES THERETO

1. RUNNING THENCE ALONG SAID PARALLEL LINE AND LAND FORMERLY OF THE SIMONDS MANUFACTURING COMPANY ON A COURSE BEARING SOUTH 67° 30' 00"EAST, 648.37 FEET TO THE NORTHERLY SIDE OF MARSH STREET (NOT OPEN), AS SHOWN ON THE COMMISSIONERS MAP OF LONG ISLAND CITY;
2. THENCE WESTERLY ALONG THE NORTHERLY SIDE OF MARSH STREET AS ON (NOT OPEN) SAID COMMISSIONERS MAP ON A COURSE BEARING SOUT 72° 15' 30" WEST, 524.90 FEET TO LAND FORMERLY CONVEYED TO THE CENTRAL FELT AND PAPER COMPANY BY DEED RECORDED IN THE OFFICE OF THE CLERK OF THE COUNTY OF QUEENS IN LIBER 1327 OF CONVEYANCES AT PAGE 47;
3. THENCE ALONG SAID LAND ON A COURSE BEARING NORTH 34° 02' 50' EAST, 76.03 FEET TO AN IRON MONUMENT;
4. THENCE STILL RUNNING ALONG SAID LAND AT RIGHT ANGLES TO THE PREVIOUS COURSE ON A COURSE BEARING NORTH 55° 57'10' WEST, 19.00 FEET TO ANOTHER IRON MONUMENT;
5. THENCE STILL RUNNING ALONG SAID LAND AT RIGHT ANGLES TO THE PREVIOUS COURSE BEARING NORTH 34° 02' 50' EAST, 19.00 FEET;
6. THENCE STILL RUNNING ALONG SAID LAND AT RIGHT ANGLES TO THE PREVOUS COURSE ON A COURSE BEARING NORTH 55° 57'10' WEST, 439.56 FEET TO THE BULKHEAD LINE ADOPTED BY THE TOPOGRAPHICAL BUREAU OF THE CITY OF NEW YORK;
7. THENCE ALONG SAID BULKHEAD LINE ON A COURSE BEARING NORTH 72° 18 54' EAST, 238.96 FEET TO THE POINT OR PLACE OF BEGINNING, ENCOMPASING 138,546.9 SQ FT OR 3.18060 ACRES.

PARCEL II

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE BOROUGH AND COUNTY OF QUEENS, CITY AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT AN IRON MONUMENT SET IN THE DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE TEXAS COMPANY, FORMERLY OF THE LONG ISLAND OYSTER FARMS, INC., AT A DISTANCE OF 11.03 FEET NORTHWARDLY, AS MEASURED ON A COURSE NORTH 33° 50' 30' EAST (RECORD) (NORTH 34° 02'50' EAST ACTUAL) FROM THE NORTHWESTERLY SIDE OF MARSH STREET (NOT OPEN) AS LAID DOWN ON A MAP OF THE CITY OF NEW YORK TO THE POINT OF BEGINNING, AND

1. RUNNING THENCE ALONG THE SAID DIVIDING LINE ON A COURSE NORTH 33° 50' 30' EAST (RECORD), (NORTH 34° 02' 50' EAST ACTUAL) A DISTANCE OF 65.00 FEET TO A POINT
2. THENCE STILL ALONG THE SAID DIVIDING LINE ON A COURSE NORTH 56° 09' 30" WEST (RECORD), (NORTH 55° 57' 10' WEST ACTUAL) A DISTANCE OF 19.00 FEET TO A POINT;
3. THENCE STILL ALONG THE SAID DIVIDING LINE ON A COURSE NORTH 33° 50' 30' EAST (RECORD), (NORTH 34° 02' 50' EAST ACTUAL) A DISTANCE OF 19.00 FEET TO A POINT;
4. THENCE STILL ALONG THE SAID DIVIDING LINE ON A COURSE NORTH 56° 09' 30" WEST (RECORD), (NORTH 55° 57' 10' WEST ACTUAL) A DISTANCE OF 388 FEET TO AN IRON MONUMENT;
5. THENCE ALONG THE DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE SOUTH 35° 21' 06' EAST (RECORD), (SOUTH 35° 08' 46' EAST ACTUAL) A DISTANCE OF 53.49 FEET TO AN IRON MONUMENT;
6. THENCE STILL ALONG THE SAID DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE SOUTH 48° 20' 49" EAST (RECORD), (SOUTH 48° 08' 29" EAST ACTUAL) A DISTANCE OF 279.59 FEET TO THE POINT OR PLACE OF BEGINNING, ENCOMPASING 20,717.7 SQ. FT OR 0.47561 ACRES.

PARCEL III

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE BOROUGH AND COUNTY OF QUEENS, CITY AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE WESTERLY SIDE LINE OF THE PUBLIC HIGHWAY KNOWN AND DESIGNATED AS REVIEW AVENUE WITH THE NORTHERLY SIDE LINE OF MARSH STREET (NOT OPEN); AND

1. RUNNING THENCE ALONG THE WESTERLY LINE OF REVIEW AVENUE SOUTH 17° 44 30' EAST, A DISTANCE OF 30.00 FEET TO THE CENTERLINE OF MARSH STREET (NOT OPEN); AND
2. THENCE WESTERLY ALONG THE CENTERLINE OF MARSH STREET (NOT OPEN) SOUTH 72° 15 30' WEST, A DISTANCE OF 12.21 FEET MORE OR LESS, TO A POINT;
3. THENCE GENERALLY NORTHWEST TO THE INTERSECTION OF THE NORTHERLY SIDE OF MARSH STREET (NOT OPEN) WITH THE NORTHEASTERLY LINE OF PROPERTY FORMERLY OF THE LONG ISLAND OYSTER FARMS, INC., N67° 30 06' W (RECORD) (NORTH 67° 30' 34' WEST ACTUAL) A DISTANCE OF 46.44 (RECORD), 46.45 (ACTUAL) FEET;
4. THENCE EASTERLY ALONG THE NORTHERLY SIDE LINE OF MARSH STREET (NOT OPEN) NORTH 72° 15 30' EAST, A DISTANCE OF 47.67 FEET TO THE POINT OR PLACE OF BEGINNING, ENCOMPASING 898.5 SQ. FT OR 0.02062 ACRES.

PARCEL IV

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND SITUATE, LYING AND BEING IN THE BOROUGH OF QUEENS, COUNTY OF QUEENS, CITY AND STATE OF NEW YORK BEING MORE PARTICULARLY BOUNDED AND DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT ON THE WESTERLY SIDE OF REVIEW AVENUE, DISTANT 180.38 FEET SOUTHERLY FROM THE CORNER FORMED BY THE INTERSECTION OF THE SOUTHERLY SIDE OF BORDEN AVENUE WITH THE WESTERLY SIDE OF REVIEW AVENUE. SAID POINT ALSO LYING ON THE CENTERLINE OF 29TH STREET (AKA MARSH STREET HEREAFTER REFERRED TO AS 29TH STREET) (60 FEET WIDE, NOT OPEN) AS SAID STREET IS SHOWN ON THE QUEENS FINAL SECTION, MAP #314;

1. RUNNING THENCE SOUTH 72° 15 30 'WEST,, A DISTANCE OF 12.21 FEET ALONG THE SAID CENTERLINE OF 29TH STREET (AND ALSO AT RIGHT ANGLES TO REVIEW AVENUE) TO THE TRUE POINT OR PLACE OF BEGINNING;
2. THENCE SOUTH 72° 15 30'WEST STILL ALONG THE SAID CENTERLINE OF 29TH STREET, A DISTANCE OF 524.94 FEET TO THE WESTERLY END OF 29TH STREET;
3. THENCE NORTH 17° 44 33' WEST, A DISTANCE OF 30 FEET TO THE COMER FORMED BY THE INTERSECTION OF THE WESTERLY END OF 29TH STREET WITH THE NORTHERLY SIDE OF 29TH STREET;
4. THENCE NORTH 72° 15 30'EAST ALONG THE SAID NORTHERLY SIDE OF 29TH STREET, A DISTANCE OF 489.48 FEET; THENCE SOUTH 67° 30 34'EAST, A DISTANCE OF 46.45 FEET TO THE POINT OR PLACE OF BEGINNING, ENCOMPASING 15,215.9 SQ. FT OR 0.34931 ACRES.

EASEMENT AREA DESCRIPTION

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE BOROUGH AND COUNTY OF QUEENS, CITY AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT (P.O.B. PARCEL I) ON THE SOUTHERLY LINE OF OLD BULKHEAD OF THE DUTCH KILLS CANAL AS ADOPTED BY THE TOPOGRAPHICAL BUREAU OF THE CITY OF NEW YORK ADJOINING THE LANDS FORMERLY CONVEYED TO THE SIMONDS MANUFACTURING COMPANY OF DEED RECORDED IN THE OFFICE OF THE CLERK OF THE COUNTY OF QUEENS IN REEL 766 OF CONVEYANCES, PAGE 281, WHICH POINT IS ALSO INTERSECTED BY A LINE DRAWN PARALLEL TO BORDEN AVENUE AND DISTANT 145 FEET 4-1/2 INCHES SOUTHERLY THEREFROM, MEASURED ON A LINE DRAWN AT RIGHT ANGLES HERETO;

1. RUNNING THENCE ALONG SAID PARALLEL LINE AND LAND FORMERLY OF THE SIMONDS MANUFACTURING COMPANY ON A COURSE BEARING SOUTH 67° 30' EAST, 20.87 FEET TO THE POINT OF BEGINNING OF EASEMENT PERIMETER (P.O.B. EASEMENT PERIMETER) ON THE SOUTHERLY LINE OF NEW BULKHEAD;
2. RUNNING THENCE ALONG SAME LINE AND LAND FORMERLY OF THE SIMONDS MANUFACTURING COMPANY ON A COURSE BEARING SOUTH 67° 30' EAST, 627.50 FEET TO THE NORTHERLY SIDE OF MARSH STREET, AS SHOWN ON THE COMMISSIONERS MAP OF LONG ISLAND CITY;
3. THENCE EASTERLY ALONG THE NORTHERLY SIDE OF MARSH STREET AS ON SAID COMMISSIONERS MAP ON A COURSE BEARING NORTH 72° 15' 30" EAST, 47.67 FEET TO A POINT IN REVIEW AVENUE;
4. THENCE ALONG THE WESTERLY LINE OF REVIEW AVENUE SOUTH 17° 44' 30" EAST, A DISTANCE OF 30 FEET TO THE CENTERLINE OF MARSH STREET (NOT OPEN);
5. THENCE SOUTH 72° 15 30' WEST STILL ALONG THE SAID CENTERLINE OF 29TH STREET, A DISTANCE OF 537.15 FEET TO THE WESTERLY END OF 29TH STREET;
6. THENCE NORTH 17° 44 33' WEST, A DISTANCE OF 30 FEET TO THE COMER FORMED BY THE INTERSECTION OF THE WESTERLY END OF 29TH STREET WITH THE NORTHERLY SIDE OF 29TH STREET;
7. THENCE WESTERLY ALONG THE NORTHERLY SIDE OF MARSH STREET AS ON SAID COMMISSIONERS MAP ON A COURSE BEARING SOUTH 72° 15' 30" WEST, 35.41 FEET TO LAND FORMERLY CONVEYED TO THE CENTRAL FELT AND PAPER COMPANY BY DEED RECORDED IN THE OFFICE OF THE CLERK OF THE COUNTY OF QUEENS IN LIBER 1327 OF CONVEYANCES, AT PAGE 47;
8. THENCE ALONG SAID LAND ON A COURSE BEARING NORTH 34° 02' 50" EAST, 11.03 FEET TO A POINT;
9. THENCE STILL ALONG THE SAID DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE NORTH 48° 20' 49" WEST (RECORD), (NORTH 48° 08 29" WEST ACTUAL) A DISTANCE OF 279.59 FEET TO AN IRON MONUMENT;
10. THENCE STILL ALONG THE SAID DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE NORTH 37'30' 32" WEST (RECORD), (NORTH 37° 18' 12" WEST ACTUAL) A DISTANCE OF 84.43 FEET TO AN IRON MONUMENT;
11. THENCE ALONG THE DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE NORTH 35° 21' 06" WEST (RECORD), (NORTH 35° 08' 46" EAST ACTUAL) A DISTANCE OF 53.49 FEET TO AN IRON MONUMENT;
12. THENCE STILL ALONG SAID LAND AT RIGHT ANGLES TO THE PREVOUS COURSE ON A COURSE BEARING 55° 57' 10' WEST, 33.93 FEET TO THE BULKHEAD LINE ADOPTED BY THE TOPOGRAPHIC BUREAU OF THE CITY OF NEW YORK;
13. THENCE ALONG SOUTHERLY LINE OF NEW BULKHEAD ON A COURSE BEARING NORTH 72° 13' 31" EAST, 238.98 FEET TO THE POINT OR PLACE OF BEGINNING OF EASEMENT PERIMETER (P.O.B. EASEMENT PERIMETER), CONCLUDING EASEMENT PERIMETER DESCRIPTION AND ENCOMPASING 172078.8 SQ FT OR 3.95039 ACRES.

FOR INFORMATION ONLY:
DESIGNATED AS BLOCK 294, LOT 106 QUEENS COUNTY AND ALSO KNOWN AS 28-90 REVIEW AVENUE, LONG ISLAND, NY. MARSH STREET (ALSO KNOWN 29th STREET) IS NOT OWNED BY NYC AS A PUBLIC STREET AND IS MERELY INCLUDED FOR REFERENCES NOTED IN THE LEGAL DESCRIPTION.

FLOOD NOTE:

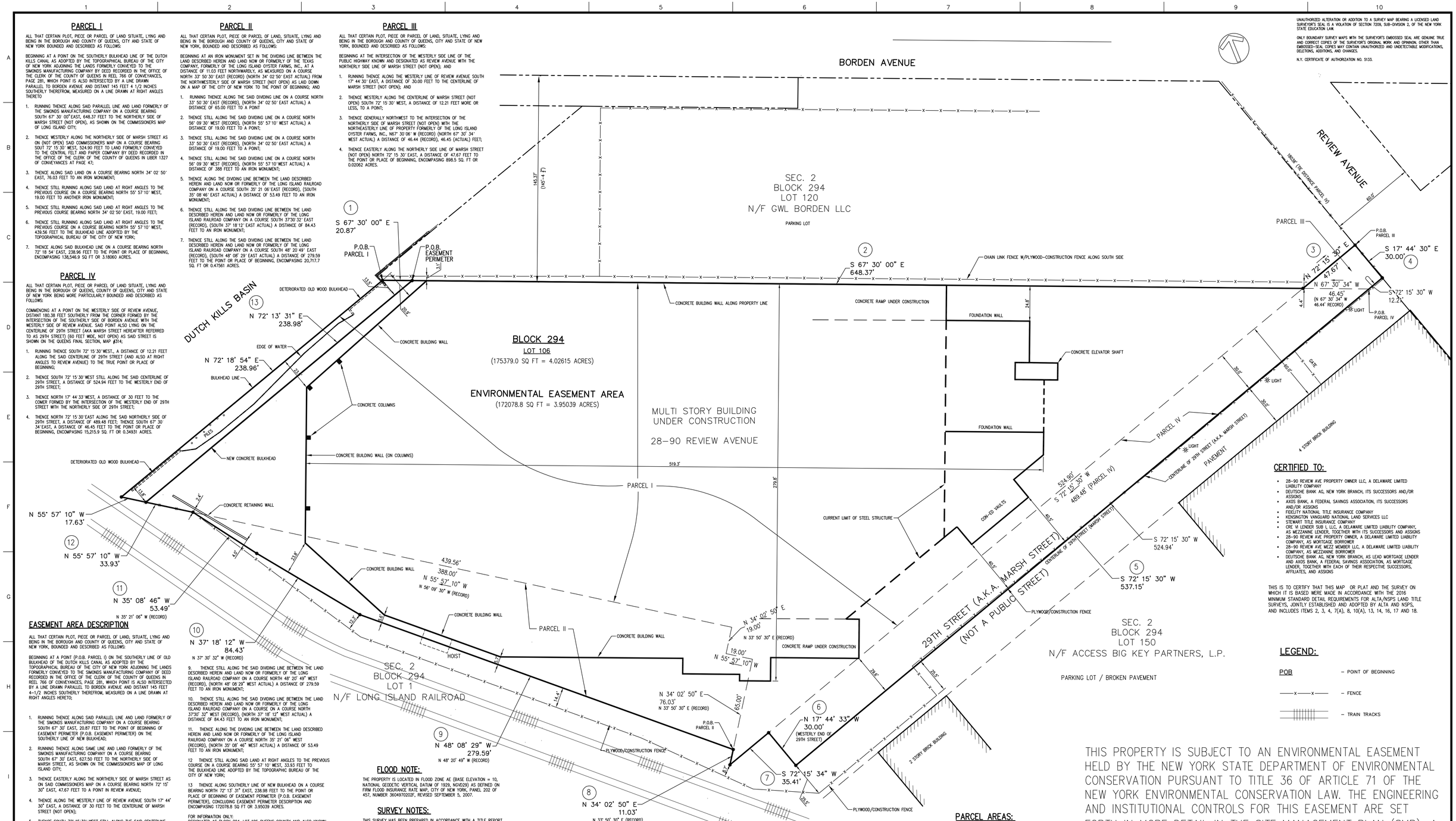
THE PROPERTY IS LOCATED IN FLOOD ZONE AE (BASE ELEVATION = 10, NATIONAL GEODETIC VERTICAL DATUM OF 1929, NGVD29) AS DEFINED ON FIRM FLOOD INSURANCE RATE MAP, CITY OF NEW YORK, PANEL 202 OF 457, NUMBER 36049702029F, REVISED SEPTEMBER 5, 2007.

SURVEY NOTES:

THIS SURVEY HAS BEEN PREPARED IN ACCORDANCE WITH A TITLE REPORT ISSUED BY FIDELITY NATIONAL TITLE INSURANCE COMPANY NO. 24-7406-63106-Q, EFFECTIVE OCTOBER 30, 2024.

REFERENCE MAPS:

"SURVEY OF PROPERTY, SITUATE, LONG ISLAND CITY, QUEENS COUNTY, CITY AND STATE OF NEW YORK, SEC. 2, BLOCK 294, LOT 106" DATED 12/10/2015, LAST REVISED 01/18/2022.



CERTIFIED TO:

- 28-90 REVIEW AVE PROPERTY OWNER LLC, A DELAWARE LIMITED LIABILITY COMPANY
- DEUTSCHE BANK AG, NEW YORK BRANCH, ITS SUCCESSORS AND/OR ASSIGNS
- AXOS BANK, A FEDERAL SAVINGS ASSOCIATION, ITS SUCCESSORS AND/OR ASSIGNS
- FIDELITY NATIONAL TITLE INSURANCE COMPANY
- KENSINGTON VANGUARD NATIONAL LAND SERVICES LLC
- STEWART TITLE INSURANCE COMPANY
- CRE 1V LENDER SUB I, LLC, A DELAWARE LIMITED LIABILITY COMPANY, AS MEZZANINE LENDER, TOGETHER WITH ITS SUCCESSORS AND ASSIGNS
- 28-90 REVIEW AVE PROPERTY OWNER, A DELAWARE LIMITED LIABILITY COMPANY, AS MORTGAGE BORROWER
- 28-90 REVIEW AVE MEZZ MEMBER LLC, A DELAWARE LIMITED LIABILITY COMPANY, AS MEZZANINE BORROWER
- DEUTSCHE BANK AG, NEW YORK BRANCH, AS LEAD MORTGAGE LENDER AND AXOS BANK, A FEDERAL SAVINGS ASSOCIATION, AS MORTGAGE LENDER, TOGETHER WITH EACH OF THEIR RESPECTIVE SUCCESSORS, AFFILIATES, AND ASSIGNS

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 3, 4, 7(A), 8, 10(A), 13, 14, 16, 17 AND 18.

LEGEND:

POB – POINT OF BEGINNING

—x—x— – FENCE

– TRAIN TRACKS

PARCEL AREAS:

PARCEL I	138,546.9 SQ. FT	3.18060 AC.
PARCEL II	20,717.7 SQ. FT	0.47561 AC.
PARCEL III	898.5 SQ. FT	0.02062 AC.
PARCEL IV	15,215.9 SQ. FT	0.34931 AC.
TOTAL	175,379.0 SQ. FT	4.02615 AC.

THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO TITLE 36 OF ARTICLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW. THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THIS EASEMENT ARE SET FORTH IN MORE DETAIL IN THE SITE MANAGEMENT PLAN (SMP). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP CAN BE OBTAINED FROM NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR AT DERWEB@DEC.NY.GOV.

UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISON 2, OF THE NEW YORK STATE EDUCATION LAW.

ONLY BOUNDARY SURVEY MAPS WITH THE SURVEYOR'S EMBOSSED SEAL ARE GENUINE TRUE AND CORRECT COPIES OF THE SURVEYOR'S ORIGINAL WORK AND OPINIONN. OTHER THAN EMBOSSED-SEAL COPIES MAY CONTAIN UNAUTHORIZED AND UNDETECTABLE MODIFICATIONS, DELETIONS, ADDITIONS, AND CHANGES.

N.Y. CERTIFICATE OF AUTHORIZATION NO. 5133.

REV.	DATE	BY	CHECKED	DESCRIPTION
0	12/27/24			

SCALE
1"=30'
30' 0 30' 60'
0m 2.5m 5m 7.5m 10m

EUGENE LEZAJA
LICENSED LAND SURVEYOR
050629
STATE OF NEW YORK
PROFESSIONAL LAND SURVEYOR
CERTIFICATION OF FIELD INSPECTION 05/29/2025

FIELD WORK BY:	AB/JB
DRAWN BY:	AB
DESIGNED BY:	N/A
CHECKED BY:	MB
APPROVED BY:	EL
CLASSIFICATION	SURVEYING

50 STATES ENGINEERING
ENGINEERING SURVEYING PLANNING
www.50StatesEngineering.com
43 MOONACHIE ROAD PH (201) 50-STATE
HACKENSACK, NJ 07601 FAX (201) 591-7907

PROJECT NAME
INNOVO PROPERTY GROUP
28-90 REVIEW AVENUE

DRAWING TITLE
ALTA/NSPS LAND TITLE SURVEY
SECTION 2 BLOCK 294 LOT 106
LONG ISLAND CITY, QUEENS COUNTY
CITY & STATE OF NEW YORK

PROJECT NUMBER
25-102

DRAWING NUMBER
25-102-101

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2025103100641001002E3B27

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 11**

Document ID: 2025103100641001 Document Date: 10-27-2025 Preparation Date: 11-03-2025
Document Type: EASEMENT
Document Page Count: 10

PRESENTER:
FIDELITY NATIONAL TITLE INS. COMPANY
485 LEXINGTON AVENUE, 18TH FLOOR
NEW YORK, NY 10017
212-481-5858
63106Q

RETURN TO:
NYSDEC
625 BROADWAY
ALBANY, NY 12233

PROPERTY DATA

Borough	Block	Lot	Unit	Address
QUEENS	294	106	Entire Lot	28-90 REVIEW AVENUE

Property Type: COMMERCIAL REAL ESTATE

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year_____ Reel____ Page_____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
28-90 REVIEW AVE PROPERTY OWNER LLC
1350 AVENUE OF THE AMERICAS
NEW YORK, NY 10019

GRANTEE/BUYER:
NEW YORK STATE DEPARTMENT OF
ENVIROMENTAL CONSERVA
625 BROADWAY
ALBANY, NY 12233

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	87.00
Affidavit Fee:	$	0.00

Filing Fee: $ 100.00

NYC Real Property Transfer Tax: $ 0.00

NYS Real Estate Transfer Tax: $ 0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 11-05-2025 09:12
City Register File No.(CRFN): **2025000299778**

City Register Official Signature

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 27th day of October, 2025 between Owner, 28-90 Review Ave Property Owner LLC, having an office at c/o Innovo Property Group, 1350 Avenue of the Americas, 17th Fl., County of New York, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 28-90 Review Avenue in the City of New York, County of Queens and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 294 Lot 106, being the same as that property conveyed to Grantor by deed dated March 16, 2022 and recorded in the City Register of the City of New York in City Register File No. 2022000126747. After excluding the lands underwater in the Dutch Kills Basin, the property subject to this Environmental Easement (the "Controlled Property") comprises approximately 3.95 +/- acres, and is hereinafter more fully described in the Land Title Survey dated December 27, 2024 prepared by Eugenij Lezaja, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is

extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C241236-09-19, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining

contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential or Restricted Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i) and (ii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation

Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against

the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C241236
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the

recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

28-90 Review Ave Property Owner LLC

By: _____

Print Name: ANDREW CHUNG

Title: AUTHORIZED SIGNATORY Date: 10/20/25

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF **New York**)

On the 20th day of October in the year 20 25, before me, the undersigned, personally appeared Andrew Chung, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Kevin D. Kim
Notary Public - State of New York

KEVIN D KIM
NOTARY PUBLIC, STATE OF NEW YORK
NO. 02KI0033131
QUALIFIED IN NEW YORK COUNTY
MY COMMISSION EXPIRES 01/23/2029

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Janet Brown, Assistant Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 27th day of October, in the year 2025 before me, the undersigned, personally appeared Janet Brown, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

SCHEDULE "A" PROPERTY DESCRIPTION

EASEMENT AREA:

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE BOROUGH AND COUNTY OF QUEENS, CITY AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT (P.O.B. PARCEL I) ON THE SOUTHERLY LINE OF OLD BULKHEAD OF THE DUTCH KILLS CANAL AS ADOPTED BY THE TOPOGRAPHICAL BUREAU OF THE CITY OF NEW YORK ADJOINING THE LANDS FORMERLY CONVEYED TO THE SIMONDS MANUFACTURING COMPANY OF DEED RECORDED IN THE OFFICE OF THE CLERK OF THE COUNTY OF QUEENS IN REEL 766 OF CONVEYANCES, PAGE 281, WHICH POINT IS ALSO INTERSECTED BY A LINE DRAWN PARALLEL TO BORDEN AVENUE AND DISTANT 145 FEET 4-1/2 INCHES SOUTHERLY THEREFROM, MEASURED ON A LINE DRAWN AT RIGHT ANGLES HERETO;

1. RUNNING THENCE ALONG SAID PARALLEL LINE AND LAND FORMERLY OF THE SIMONDS MANUFACTURING COMPANY ON A COURSE BEARING SOUTH 67° 30' EAST, 20.87 FEET TO THE POINT OF BEGINNING OF EASEMENT PERIMETER (P.O.B. EASEMENT PERIMETER) ON THE SOUTHERLY LINE OF NEW BULKHEAD;

2. RUNNING THENCE ALONG SAME LINE AND LAND FORMERLY OF THE SIMONDS MANUFACTURING COMPANY ON A COURSE BEARING SOUTH 67° 30' EAST, 627.50 FEET TO THE NORTHERLY SIDE OF MARSH STREET, AS SHOWN ON THE COMMISSIONERS MAP OF LONG ISLAND CITY;

3. THENCE EASTERLY ALONG THE NORTHERLY SIDE OF MARSH STREET AS ON SAID COMMISSIONERS MAP ON A COURSE BEARING NORTH 72° 15' 30" EAST, 47.67 FEET TO A POINT IN REVIEW AVENUE;

4. THENCE ALONG THE WESTERLY LINE OF REVIEW AVENUE SOUTH 17° 44' 30" EAST, A DISTANCE OF 30 FEET TO THE CENTERLINE OF MARSH STREET (NOT OPEN);

5. THENCE SOUTH 72° 15'30" WEST STILL ALONG THE SAID CENTERLINE OF 29TH STREET, A DISTANCE OF 537.15 FEET TO THE WESTERLY END OF 29TH STREET;

6. THENCE NORTH 17° 44' 33" WEST, A DISTANCE OF 30 FEET TO THE COMER FORMED BY THE INTERSECTION OF THE WESTERLY END OF 29TH STREET WITH THE NORTHERLY SIDE OF 29TH STREET;

7. THENCE WESTERLY ALONG THE NORTHERLY SIDE OF MARSH STREET AS ON SAID COMMISSIONERS MAP ON A COURSE BEARING SOUTH 72° 15' 30" WEST, 35.41 FEET TO LAND FORMERLY CONVEYED TO THE CENTRAL FELT AND PAPER COMPANY BY DEED RECORDED IN THE

OFFICE OF THE CLERK OF THE COUNTY OF QUEENS IN LIBER 1327 OF CONVEYANCES, AT PAGE 47;

8. THENCE ALONG SAID LAND ON A COURSE BEARING NORTH 34° 02' 50" EAST, 11.03 FEET TO A POINT;

9. THENCE STILL ALONG THE SAID DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE NORTH 48° 20' 49" WEST (RECORD), (NORTH 48° 08 29" WEST ACTUAL) A DISTANCE OF 279.59 FEET TO AN IRON MONUMENT;

10. THENCE STILL ALONG THE SAID DIVIDING LINE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE ON A COURSE NORTH 37°30' 32" WEST (RECORD), (NORTH 37° 18' 12" WEST ACTUAL) A DISTANCE OF 84.43 FEET TO AN IRON MONUMENT;

11. THENCE ALONG THE DIVIDING UNE BETWEEN THE LAND DESCRIBED HEREIN AND LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY ON A COURSE NORTH 35° 21' 06" WEST (RECORD), (NORTH 35° 08' 46" WEST ACTUAL) A DISTANCE OF 53.49 FEET TO AN IRON MONUMENT;

12. THENCE STILL ALONG SAID LAND AT RIGHT ANGLES TO THE PREVIOUS COURSE ON A COURSE BEARING 55° 57' 10" WEST, 33.93 FEET TO THE BULKHEAD LINE ADOPTED BY THE TOPOGRAPHIC BUREAU OF THE CITY OF NEW YORK;

13. THENCE ALONG SOUTHERLY LINE OF NEW BULKHEAD ON A COURSE BEARING NORTH 72° 13' 31" EAST, 238.98 FEET TO THE POINT OR PLACE OF BEGINNING OF EASEMENT PERIMETER (P.O.B. EASEMENT PERIMETER), CONCLUDING EASEMENT PERIMETER DESCRIPTION AND ENCOMPASING 172078.8 SQ FT OR 3.95039 ACRES.

APPENDIX D

LIST OF SITE CONTACTS

LIST OF SITE CONTACTS

Key contacts for this project are as follows:

Site Owner and Remedial Party:

28-90 Review Aven Property Owner LLC
Stephen Kim
Telephone: (212) 218-2150
E-mail: stephen.kim@innovopg.com

Remedial Party's Consultant:

Langan Engineering Project Manager
Christopher McMahon, CHMM
Telephone: (973) 560-4900
E-mail: cmcmahon@langan.com

Langan Engineering Remedial Engineer
Satyajit Vaidya, P.E.
Telephone: (973) 560-4900
E-mail: svaidya@langan.com

Langan Engineering Health & Safety Officer
Tony Moffa
Telephone: (215) 756-2523
E-mail: tmoffa@langan.com

Langan Engineering Field Safety Officer
Ashley Sandve
Telephone: (973) 560-4900
E-mail: asandve@langan.com

Qualified Environmental Professional:

Langan Engineering Project Manager
Christopher McMahon, CHMM
Telephone: (973) 560-4900
E-mail: cmcmahon@langancom

NYSDEC:	NYSDEC Project Managers Supervisor Mr. Douglas MacNeal Telephone: (518) 402-9684 E-mail: douglas.macneal@dec.ny.gov NYSDEC Project Manager Ms. Brittany Taranto Telephone: (518) 402-9791 E-mail: brittany.taranto@dec.ny.gov NYSDEC Site Control Ms. Kelly Lewandowski Telephone: (518) 402-0193 E-mail: kelly.lewandowski@dec.ny.gov
NYSDOH:	NYSDOH Project Manager Mr. Daniel Tucholski Telephone: (518) 402-7860 Email: beei@health.ny.gov
Remedial Party's Attorney:	Gibbons P.C. Matthew Sinkman Telephone: (212) 613-2000 E-mail: msinkman@gibbonslaw.com

APPENDIX E

SOIL BORING AND MONITORING WELL CONSTRUCTION LOGS

LANGAN

LANGAN

Log of Boring **LSB-26/LMW-15/LSV-13** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.36 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/13/20 — Date Finished: 7/13/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.4	Dark brown to black gravelly fine-coarse SAND, concrete fragments [FILL] (dry)	0					0.0	Started Drilling at 7/13/2020
			1					0.0	
								0.0	
								0.0	
			2	M-1	Macrocore	36		0.0	LSV-13 installed to 3 ft bgs
								0.0	
			3					0.1	Collect RI Sample 108/LSB-26A from 3-5 ft bgs (VOCs collected from 4.5-5 ft bgs)
								0.5	
			4					0.5	
								0.4	
	+2.4	▽	5					0.0	
		Dark brown to black fine-coarse SAND, some f-m gravel, wood fragments [FILL] (wet)						0.0	
			6					0.1	
								0.1	
			7	M-2	Macrocore	42		157.8	Odors observed from 7-15 ft bgs
								3.8	
			8					5.7	
								3.2	
			9					3.7	
								1.8	
	-2.6		10					0.0	
		Dark brown to black fine-coarse SAND, some f-m gravel, wood fragments [FILL] (wet)						0.6	
			11					1.6	Collect RI Sample 109/LSB-26B and 110/DUP-2 from 11-13 ft bgs (VOCs collected from 11-11.5 ft bgs)
								6.7	
			12					5.8	
				M-3	Macrocore	50		2.8	
	-5.6		13					1.1	
		Dark olive to black CLAY, some peat [NATIVE] (moist)						0.8	Monitoring well LMW-15 installed to 14 ft bgs with a screen from 4-14 ft bgs
			14					0.5	
								0.4	
	-7.6		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:45:50 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-27/LMW-16** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.58 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/13/20 / Date Finished: 7/13/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 / Undisturbed --- / Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 5 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.6	Dark brown to black gravelly SAND, some concrete, some fine sand, wood fragments [FILL] (dry)	0					0.0	Started Drilling at 7/13/2020
			1					0.1	
			1					0.1	
			1					0.1	
			2					0.1	
			2	M-1	Macrocore	44		0.1	
			3					0.1	Collect RI Sample 106/LSB-27A from 3-5 ft bgs (VOCs collected from 4.5-5 ft bgs)
			3					0.1	
			4					0.1	
			4					0.1	
	+2.6	▽	5					3.6	Odors observed from 5-10 ft bgs
		Dark brown to black gravelly SAND, some concrete, some fine sand, wood fragments [FILL] (dry)	5					9.2	
			6					15.7	
			6					138.8	
			7					67.9	
			7	M-2	Macrocore	15		50.4	
			8					20.8	
			8					20.9	
			9					3.9	
			9					5.9	
	-2.4	Dark brown to black gravelly SAND, some fine sand, some f-c gravel, wood fragments [FILL] (wet)	10					5.2	
			10					1.8	
			11					2.0	Collect RI Sample 107/LSB-27B from 11-13 ft bgs (VOCs collected from 11-11.5 ft bgs)
			11					0.6	
			12					0.5	
			12	M-3	Macrocore	50		0.5	
	-5.4	Dark olive to black CLAY, some peat [NATIVE] (moist)	13					0.5	
			13					0.5	Monitoring well LMW-16 installed to 14 ft bgs with a screen from 4-14 ft bgs
			14					0.5	
			14					0.5	
	-7.4		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:45:57 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-28** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7.4' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/13/20 / Date Finished: 7/13/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 5, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.4	Dark brown to black gravelly SAND, some fine sand, some f-m gravel [FILL] (dry)	0					0.2	Started Drilling at 7/13/2020
			1					0.3	
								1.2	Odors observed from 1-15 ft bgs
			2	M-1	Macrocore	30		2.6	
								2.4	
			3					3.8	
								5.6	Collect RI Sample 103/LSB-28A from 3-5 ft bgs (VOCs collected from 3-3.5 ft bgs)
			4					8.7	
								9.1	
	+2.4	▽						11.5	
		Dark brown to black fine-coarse SAND, trace f-c gravel [FILL] (wet)	5					4.6	
								27.8	
			6					35.1	
								50.5	
			7	M-2	Macrocore	42		159	
								54.4	
			8					12.8	
								10.9	
			9					11.2	
	-2.6							4.1	
		Dark brown to black fine-coarse SAND, trace f-c gravel [FILL] (wet)	10					18.4	
								64.7	
			11					52.8	
	-3.9							32.8	Collect RI Sample 104/LSB-28B and 105/DUP-1 from 11-13 ft bgs (VOCs collected from 11-11.5 ft bgs)
		Dark gray silty SAND, some clay, some peat, trace f-m sand, wood fragments [FILL] (moist)	12	M-3	Macrocore	56		4.6	
								29.4	
			13					10.2	
	-6.0							11.6	
		Dark olive to gray CLAY, trace f-m sand, trace peat [NATIVE] (moist)	14					6.9	
								4.2	
	-7.6		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:03 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-29/LMW-17** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.31 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/13/20 — Date Finished: 7/13/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 23 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 5 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 10 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.3	ASPHALT	0					0.0	Started Drilling at 7/13/2020
								1.2	
	+6.3	Dark brown to black fine-coarse SAND, some concrete (dry) [FILL]	1	M-1	Macrocore	38		2.8	Odors observed from 0.5-3 ft bgs
			2					3.4	
								6.8	
								10.2	
	+4.3	Concrete	3						Encountered concrete from 3-5 ft bgs, augered from 3-5 ft bgs
			4						
	+2.3	Dark brown to black fine-coarse SAND, trace concrete (dry) [FILL]	5					0.1	
								2.3	Odors observed from 5.5-9.5 ft bgs
	+1.1	Brown fine-coarse SAND, trace f-m gravel [FILL] (moist)	6					3.4	
	+0.4	Dark brown to black fine-coarse SAND, trace f-m gravel [FILL] (moist)	7	M-2	Macrocore	40		0.6	
								5.2	
			8					3.4	
								4.6	Collect RI Sample 101/LSB-29A from 8-10 ft bgs (VOCs collected from 9.5-10 ft bgs)
			9					9.5	
								11.2	
	-2.7	Dark brown to black fine-coarse SAND, some concrete, trace f-m gravel, wood fragment (wet) [FILL]	10 ▽					14.5	
								0.1	
			11					0.1	
								0.1	
								0.1	
			12	M-3	Macrocore	20		0.1	
								0.1	
			13					0.2	
								0.2	
			14					0.1	
								0.1	
	-7.7	Dark brown to black fine-coarse SAND, some clay, trace f-m gravel, wood fragments [FILL] (moist)	15					4.6	
								3.6	
			16					2.0	Collect RI Sample 102/LSB-29B from 16-18 ft bgs (VOCs collected from 16-16.5 ft bgs)
								1.8	
			17					0.9	
				M-4	Macrocore	38		0.8	
	-10.7	Dark gray CLAY, trace f-m sand [NATIVE] (moist)	18					0.7	
								0.6	
			19					0.3	
	-12.7		20					0.2	

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:06 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-29/LMW-17** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	7.31 NAVD88

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-12.7	Dark gray CLAY, trace f-m sand [NATIVE] (moist)	20	M-5	Macrocore	30		0.0	Monitoring well LMW-17 installed to 20 ft bgs with a screen from 5-20 ft bgs
			21					0.0	
			22					0.0	
			23					0.0	
	-15.7								Bottom of boring at 23 ft bgs
			24						
			25						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:07 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-30/LMW-18/LSV-14** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.67 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.7	CONCRETE	0					0.0	Started Drilling at 7/14/2020
	+6.7	Dark brown to black medium-coarse SAND, some fine gravel, trace fine sand [FILL] (dry)	1					0.0	
								0.0	
			2	M-1	Macrocore	36		0.1	
								0.0	
			3					0.0	
								0.0	
			4					0.0	LSV-14 installed to 3.5 ft bgs
								0.0	
	+2.7		5					0.0	
		Dark brown to black silty SAND, some fine gravel, trace fine sand [FILL] (moist)						0.1	
	+1.7		6					0.0	
		Dark brown to black silty SAND, trace clay, trace fine gravel [FILL] (moist)						0.2	Collect RI Sample 112/LSB-30A from 6-8 ft bgs (VOCs collected from 6.5-7 ft bgs)
			7					0.3	
				M-2	Macrocore	44		0.0	
			8 ▽					0.0	
								0.1	
			9					0.0	
								0.0	
	-2.3		10					0.0	
		Dark brown to black fine-medium GRAVEL, trace m-c sand [FILL] (moist)						0.0	Collect RI Sample 113/LSB-30B from 10.5-12.5 ft bgs (VOCs collected from 11-11.5 ft bgs)
			11					0.1	
	-3.8							0.0	
		Dark brown to black silty fine-medium SAND, trace clay, trace fine gravel [FILL] (moist)	12					0.0	
	-4.8							0.1	
		Dark olive to dark gray CLAY, trace organics [NATIVE] (moist)	13	M-3	Macrocore	54		0.0	
								0.0	Monitoring well LMW-18 installed to 15 ft bgs with a screen from 5-15 ft bgs
			14					0.0	
	-7.3							0.0	
			15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:11 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-31** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7.2' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 / Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 7, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.2	ASPHALT	0					0.0	Started Drilling at 7/14/2020
								0.0	
	+6.2	CONCRETE	1					0.1	
								0.2	
	+5.2	Dark brown to black fine-coarse SAND, some f-c gravel [FILL] (moist)	2	M-1	Macrocore	43		0.6	
			3					3.0	Odors observed from 2.5-13 ft bgs
			4						
	+2.2	Dark brown to black fine-coarse SAND, some f-c gravel, trace silt, wood fragments [FILL] (moist)	5					10.8	Collect RI Sample 133/LSB-31A and 134/DUP-4 from 5-7 ft bgs (VOCs collected from 5.5-6 ft bgs)
			6					168.8	
								538	
								886.5	
		▽	7	M-2	Macrocore	58		464.1	Collect Remedial Design Sample 135/LSB-31B from 7-7.5 ft bgs
								245.1	
			8					355.6	
								79	
			9					7.6	Collect Remedial Design Sample 135/LSB-31C from 9.5-10 ft bgs
	-2.8	Dark brown to black fine-coarse SAND, some f-c gravel, wood fragments [FILL] (moist)	10					3.3	
								22.4	
			11					35.9	Collect RI Sample 137/LSB-31D from 10-12 ft bgs (VOCs collected from 10-10.5 ft bgs)
								26.8	
	-4.8	Dark olive CLAY, trace silt, trace peat [NATIVE] (moist)	12					22.0	
								20.9	
			13	M-3	Macrocore	50		14.6	
								1.4	Collect Remedial Design Sample 138/LSB-31E from 13-13.5 ft bgs
			14					0.2	
								0.5	
								0.9	
	-7.8		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:13 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-32/LMW-19** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.49 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 2 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.5	CONCRETE	0						Started Drilling at 7/14/2020. Concrete encountered at 0.5 ft bgs, auger used from 0-5 ft bgs
	+2.5	Dark brown to black fine-coarse SAND, some f-c gravel [FILL] (moist)	5	M-1	Macrocore	58		1.0 8.8 5.3 6.5 4.1 5.1 5.6 7.9 7.6 3.3	Odors observed from 5-13 ft bgs Collect RI Sample 148/LSB-32A from 6-8 ft bgs (VOCs collected from 7.5-8 ft bgs)
	-2.5	Dark brown to black fine-coarse SAND, some f-c gravel, trace silt, wood fragments [FILL] (wet)	10	M-2	Macrocore	50		2.4 5.9 6.8 2.2 2.9 4.6 1.4	Collect RI Sample 149/LSB-32B from 11.5-13.5 ft bgs (VOCs collected from 12-12.5 ft bgs)
	-6.0	Dark olive CLAY, trace silt, trace peat [NATIVE] (moist)	14					0.2 0.5 0.9	Monitoring well LMW-19 installed to 15 ft bgs with a screen from 5-15 ft bgs
	-7.5		15						Bottom of boring at 15 ft bgs
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:16 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-33** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9.0' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.0		0					0.1	Started Drilling at 7/14/2020
	+8.5	ASPHALT						0.1	
		Concrete	1					0.1	
	+7.5							0.1	
		Dark gray cemented GRAVEL, some concrete (dry)[FILL]	2					0.1	
				M-1	Macrocore	42		0.1	
			3					0.1	
								0.1	
	+5.0		4					0.1	
		Dark brown to black fine-coarse SAND, some f-c gravel, trace wood (dry)[FILL]						0.1	
	+4.0		5					0.5	
		Dark brown to black fine-coarse SAND, some f-c gravel [FILL] (moist)						1.5	
			6					0.8	Collect RI Sample 122/LSB-33A and 123/DUP-3 from 6-8 ft bgs (VOCs collected from 6-6.5 ft bgs)
								1.4	
			7					4.9	
				M-2	Macrocore	54		115.8	
		▽	8					7.2	Odors observed from 7-13 ft bgs
								5.8	
			9					18.7	Staining observed from 7-13 ft bgs
								96.6	
	-1.0		10					10.7	
		Dark brown to black fine-coarse SAND, some f-c gravel [FILL] (moist)						9.8	
			11					6.2	Collect RI Sample 124/LSB-33B from 11-13 ft bgs (VOCs collected from 12.5-13 ft bgs)
								7.5	
			12					2.3	
				M-3	Macrocore	60		3.6	
	-4.0		13					1.1	
		Dark olive to black CLAY, some silt, trace peat [NATIVE] (moist)						0.9	
			14					0.8	
								0.9	
	-6.0		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:19 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-34/LMW-20/LSV-15** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 9.37 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.4	CONCRETE	0					0.0	Started Drilling at 7/14/2020
	+8.4	Dark brown to black medium-coarse SAND, some fine gravel, trace fine sand [FILL] (dry)	1					0.0	
								0.0	
			2	M-1	Macrocore	36		0.1	
								0.5	
			3					0.6	
								0.1	
			4					0.4	
								0.2	
	+4.4		5					0.5	
		Dark brown to black silty SAND, some fine gravel, trace fine sand [FILL] (moist)						0.4	LSV-15 installed to 5 ft bgs
	+3.4		6					0.6	
		Dark brown to black silty SAND, trace clay, trace fine gravel [FILL] (moist)						1.2	Odors observed from 6-15 ft bgs
			7	M-2	Macrocore	44		6.4	
								11.0	Collect RI Sample 116/LSB-34A from 6-8 ft bgs (VOCs collected from 7.5-8 ft bgs)
		▽	8					27.8	
								339.6	
								450.8	
			9					30.7	
								130.1	
	-0.6		10					73.8	
		Dark brown to black fine-medium GRAVEL, trace m-c sand [FILL] (moist)						8.9	
			11					449	
	-2.1							130.2	
		Dark brown to black silty fine-medium SAND, trace clay, trace fine gravel [FILL] (moist)	12	M-3	Macrocore	54		145.9	Collect RI Sample 117/LSB-34B from 12-14 ft bgs (VOCs collected from 12-12.5 ft bgs)
								90.7	
			13					23.6	
								39.5	Monitoring well LMW-20 installed to 15 ft bgs with a screen from 5-15 ft bgs
	-4.6		14					34.2	
		Dark olive to dark gray CLAY, trace organics [NATIVE] (moist)						6.4	
	-5.6		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:22 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-35/LMW-21** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 10.27 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 6 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+10.3	Dark brown to black fine-coarse SAND, some f-c gravel, concrete lenses [FILL] (dry)	0					0.0	Started Drilling at 7/14/2020
			1					0.0	
								0.0	
	+8.4	Brown fine-medium SAND, trace f-m gravel [FILL] (dry)	2	M-1	Macrocore	38		0.0	
								0.0	
			3					0.0	
								0.0	
			4					0.0	Collect RI Sample 114/LSB-35A from 4-6 ft bgs (VOCs collected from 5.5-6 ft bgs)
	+5.3	Brown fine-medium SAND, trace f-m gravel [FILL] (dry)	5					0.0	
								0.8	
		▽	6					0.0	
								0.1	
	+3.4	Dark brown to black fine-coarse SAND, some f-c gravel, brick fragments [FILL] (wet)	7	M-2	Macrocore	40		0.2	
								0.8	
			8					8.9	Odors observed from 8-15 ft bgs
								24.6	
			9					124.6	
								340.8	
	+0.3	Dark brown to black SAND, some silt, some f-c gravel [FILL] (wet)	10					29.4	
								79.5	
			11					24.3	Collect RI Sample 115/LSB-35B from 11.5-13.5 ft bgs (VOCs collected from 13-13.5 ft bgs)
								18.4	
			12	M-3	Macrocore	40		124.6	
								60.2	
			13					9.0	
	-3.2	Dark brown to black CLAY, trace f-m sand, trace peat [NATIVE] (moist)						3.6	Monitoring well LMW-21 installed to 15 ft bgs with a screen from 5-15 ft bgs
			14					2.8	
	-4.7		15					3.1	Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:25 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-36** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 10.0' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 17 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 9.5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+10.0		0					0.1	Started Drilling at 7/14/2020
	+9.5	Black fine-coarse GRAVEL, some f-c sand (dry)[ASPHALT]							
		Dark brown to black fine-coarse SAND, some f-c gravel, trace concrete, trace brick [FILL] (dry)	1					0.2	
								0.2	
			2					0.3	
				M-1	Macrocore	42		0.6	
			3					1.1	
								1.6	
			4					1.2	
								0.6	
								0.8	
	+5.0	Dark brown fine-medium SAND, trace c-f gravel, [FILL] (moist)	5					0.1	
								0.2	
			6					0.5	
								0.8	
			7	M-2	Macrocore	38		0.6	
								1.1	Collect RI Sample 119/LSB-36A from 7.5-9.5 ft bgs (VOCs collected from 8.5-9 ft bgs)
			8					0.7	
								0.9	
		▽	9					52.4	Odors observed from 9-14 ft bgs
								7.9	
	0.0	Dark brown to black fine-coarse SAND, some coarse gravel [FILL] (wet)	10					2.3	Product observed from 10-15 ft bgs
								29.9	
			11					3.9	Collect RI Sample 120/LSB-36B from 11-13 ft bgs (VOCs sampled from11-11.5 ft bgs)
								92.8	
			12					13.4	
				M-3	Macrocore	42		10.3	
			13					14.8	Collect RI Sample 121/LSB-36C sampled from 13-15 ft bgs (VOCs sampled from 13.5-14 ft bgs)
								20.67	
			14					4.5	
								2.8	
	-5.0	Dark olive to dark gray CLAY, trace peat (moist) [NATIVE]	15						
			16	M-4	Macrocore	24			
	-7.0		17						Bottom of boring at 17 ft bgs
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:27 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-37/LMW-22** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 8.48 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 / Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 2 / Undisturbed --- / Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 10 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+8.5	CONCRETE	0						Started Drilling at 7/14/2020. Concrete from 1-3 ft bgs, auger from 0-5 ft bgs
	+3.5	Light brown medium SAND, some fine gravel, trace fine sand (dry) [FILL]	5	M-1	Macrocore	36		0.1 0.7 0.8 0.9 1.9 1.7 3.1	
	+1.0	Light brown medium-fine SAND, trace fine gravel (moist) [FILL]	8					20.7 51.3 42.8	Collect RI Sample 128/LSB-37A from 8-10 ft bgs (VOCs sampled from 9.5-10 ft bgs)
	-1.5	Light brown silty medium-fine SAND, trace fine gravel (wet) [FILL]	10 ▽	M-2	Macrocore	36		18 20.7 78.5 29.7 71.3 107.9 32.1 19.7	Product observed from 10-15 ft bgs Collect RI Sample 129/LSB-37B from 12-14 ft bgs (VOCs sampled from 13-13.5 ft bgs)
	-5.5	Dark olive to dark gray CLAY, trace peat (moist) [NATIVE]	14					16.5 10.2	
	-6.5		15						Bottom of boring at 15 ft bgs
			17						Monitoring well LMW-22 installed to 17 ft bgs with a screen from 5-15 ft bgs and a sump from 15-17 ft bgs

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:30 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-38** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9.4' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/9/20 / Date Finished: 7/9/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 9, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.4	Light gray to brown fine-coarse SAND, some concrete, some f-c gravel, trace brick, wood fragments (dry)[FILL]	0	M-1	Macrocore	40		0.0	Started Drilling at 7/9/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
	+4.4	Dark brown to brown fine-medium SAND, trace f-m gravel, wood fragments (moist)[FILL]	5	M-2	Macrocore	30		0.0	
			6					0.0	
			7					0.0	Collect RI Sample 090/LSB-38A from 7-9 ft bgs (VOCs sampled from 7-7.5 ft bgs)
			8					0.1	
		▽	9					0.2	
	-0.6	Dark brown to brown fine-medium SAND, trace f-m gravel, Staining and product observed, strong odour (wet)[FILL]	10	M-3	Macrocore	50		0.5	Product observed from 7.5-13 ft bgs Staining observed from 7.5-13 ft bgs
			11					0.8	
			12					1.5	Collect RI Sample 091/LSB-38B from 10-12 ft bgs (VOCs sampled from 9-9.5 ft bgs)
	-3.6	Dark olive to brown CLAY, trace f-m sand, trace peat, Dense (moist)[NATIVE]	13					1.2	
			14					1.5	Collect RI Sample 092/LSB-38C from 13-15 ft bgs (VOCs sampled from 12.5-13 ft bgs)
	-5.6		15					1.6	Bottom of boring at 15 ft bgs
			16					1.9	
			17					2.8	
			18					3.6	
			19					0.5	
			20					0.2	
								0.1	
								0.1	

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:33 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-39** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 6.8' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/10/20 — Date Finished: 7/10/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 18 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 4 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 5.5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+6.8	Gray gravelly fine-coarse SAND, some concrete (dry)[FILL]	0					0.0	Started Drilling at 7/10/2020
			1					0.0	
								0.0	
								0.0	
			2					0.0	
	+4.5	Dark brown to black fine-medium SAND, some c-m gravel, trace wood [FILL] (moist)		M-1	Macrocore	42		0.0	
			3					0.0	
								0.0	
			4					0.0	Collect RI Sample 099/LSB-39A from 3.5-5.5 ft bgs (VOCs sampled from 3.5-4 ft bgs)
								0.0	
	+1.8	Dark brown to black fine-medium SAND, some c-m gravel, trace wood [FILL] (wet) ▽	5					1.4	
								1.5	
			6					1.8	
								2.6	
			7	M-2	Macrocore	42		1.9	
								1.4	
			8					1.6	
								2.0	
			9					1.6	
								1.4	
	-3.2	Dark brown to black fine-medium SAND, some c-m gravel, trace wood [FILL] (wet)	10					5.8	Odors observed from 10-20 ft bgs
								11.6	
			11					12.9	Product observed from 10-20 ft bgs
								15.6	
			12					13.5	
								12.3	
			13	M-3	Macrocore	42		14.5	Collect RI Sample 100/LSB-39B from 13-15 ft bgs (VOCs sampled from 13-13.5 ft bgs)
								12.8	
			14					14.6	
								15.1	
	-8.2	Dark brown sandy CLAY, some f gravel [NATIVE] (wet)	15					5.7	
								7.8	
			16					13.8	
								12.9	
			17	M-4	Macrocore	42		11.6	
								7.6	
	-11.2		18						Bottom of boring at 18 ft bgs
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:36 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-40/LMW-23** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.18 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/10/20 — Date Finished: 7/10/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 25 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 5 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 7.5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.2	ASPHALT	0					0.0	Started Drilling at 7/10/2020
			1					0.0	
								0.0	
	+5.4							0.0	
		Dark brown to black fine-medium SAND, some f-m gravel, wood fragments (dry) [FILL]	2	M-1	Macrocore	48		0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
	+2.2		5					0.1	
		Dark brown to black fine-medium SAND, some f-m gravel, wood fragments (moist)[FILL]						0.1	Collect RI Sample 096/LSB-40A from 5.5-7.5 ft bgs (VOCs sampled from 5.5-6 ft bgs)
			6					0.1	
								0.1	
			7 ▽	M-2	Macrocore	42		0.1	
								0.2	
			8					0.4	
								2.5	Staining observed from 8.5-22.5 ft bgs
			9					3.8	
								5.8	
	-2.8		10					5.6	
		Dark brown to black fine-medium SAND, some f-m gravel, wood fragments (wet)[FILL]						3.8	
			11					4.2	
								3.7	
			12	M-3	Macrocore	38		4.8	
								4.6	
			13					3.2	
								5.6	
			14					6.1	
								3.7	
	-7.8		15					11.2	
		Dark brown to black fine-medium SAND, some f-m gravel, wood fragments (wet)[FILL]						6.5	
			16					5.8	
								4.0	
			17					3.9	
				M-4	Macrocore	43		6.5	
			18					4.1	
								2.8	Collect RI Sample 097/LSB-40B from 18.5-20.5 ft bgs (VOCs sampled from 18.5-19 ft bgs)
			19					3.1	
	-12.8							0.4	
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:39 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-40/LMW-23** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	7.18 NAVD88

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-12.8		20					2.8	
	-13.3	Dark brown to black fine-medium SAND, some f-m gravel, wood fragments (wet)[FILL]	20					1.6	
		Dark brown to black CLAY, trace f-m sand (moist) [NATIVE]	21					3.4	
			21					3.8	Monitoring well LMW-23 installed to 21.5 ft bgs with a screen from 6.5-21.5 ft bgs
			22					1.9	
	-15.3	Dark brown CLAY, trace f-m sand, trace peat [NATIVE] (moist)	22	M-5	Macrocore	45		0.6	
			23					0.5	
	-16.5	Light gray sandy CLAY, some f-m sand [NATIVE] (moist)	23					0.4	
			24					0.6	
	-17.8		24					0.4	
			25						Bottom of boring at 25 ft bgs
			25						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:39 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-41** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/8/20 / Date Finished: 7/8/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 8, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius, Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6		0					0.0	Started Drilling at 7/8/2020
	+5.1	Gray GRAVEL, some concrete (dry)[FILL]						0.0	
		Dark brown to brown fine-medium SAND, trace brick, trace f-m gravel (moist) [FILL]	1					0.0	
								0.0	
			2					0.0	
				M-1	Macrocore	42		0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.6	
	+0.6		5					0.5	
		Dark brown to brown fine-medium SAND, trace brick, trace f-m gravel (moist) [FILL]						0.5	
			6					0.6	Collect RI Sample 076/LSB-41A from 6-8 ft bgs (VOCs sampled from 6-6.5 ft bgs)
								0.8	
			7					1.0	
				M-2	Macrocore	42		1.6	
	-2.4	▽	8					1.6	Collect RI Sample 077/LSB-41B from 8-10 ft bgs (VOCs sampled from 9-9.5 ft bgs)
		Dark brown to black CLAY, trace fine gravel (wet) [NATIVE]						1.0	
			9					10.5	
								10.8	
	-4.4		10					10.9	Staining observed from 10-13 ft bgs
		Dark brown to black CLAY [NATIVE] (wet)						13.4	
			11					20.8	
								18.7	
			12					13.4	
				M-3	Macrocore	60		21.9	
			13					18.5	
								17.6	
			14					15.4	
								16.3	
	-9.4		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:42 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-42** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 6.2' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 / Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 18 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 4, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 5, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+6.2	Dark brown to brown fine-medium SAND, some f-m gravel, trace brick (dry) [FILL]	0	M-1	Macrocore	42		0.0	Started Drilling at 7/7/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
								0.0	Collect RI Sample 072/LSB-42A from 3-5 ft bgs (VOCs sampled from 3.5-4 ft bgs)
								0.0	
								0.0	
	+1.2	▽	5					0.0	
		Dark brown to brown fine-medium SAND, some f-m gravel, trace brick (wet) [FILL]		M-2	Macrocore	48		0.0	
			6					0.0	
			7					0.0	
								0.0	
	-1.8	Dark brown fine-coarse SAND, some f-m gravel (wet) [FILL]	8					0.0	
								0.0	
			9					0.0	
	-3.8	Dark brown fine-coarse SAND, some f-m gravel [FILL](wet)	10	M-3	Macrocore	48		0.0	
			11					0.0	
								0.0	
			12					0.9	
								1.2	
			13					11.6	
								13.5	Collect RI Sample 073/LSB-42B from 13-15 ft bgs (VOCs sampled from 13-13.5 ft bgs)
			14					16.4	
								14.5	
								13.7	
	-8.8	Dark brown fine-coarse SAND, some f-m gravel [FILL] (wet)	15					13.8	Rock encountered at 15 ft bgs
								11.7	
			16	M-4	Macrocore	36		10.2	Refusal at 18 ft on rock
								13.2	
			17					8.9	
								7.5	
	-11.8		18						Bottom of boring at 18 ft bgs
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:45 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-43/LMW-28** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.42 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/15/20 — Date Finished: 7/15/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 25 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 4 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.4	CONCRETE	0					0.1	Started Drilling at 7/15/2020
			1					0.1	
								0.2	
								0.2	
	+5.4	Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (dry)	2					0.7	
					Macrocore	40		1.4	
			3					1.1	
								0.6	
			4					0.7	
	+2.4							0.4	
		Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (wet)	5					1.3	
								6.7	Collect RI Sample 157/LSB-43A from 6-8 ft bgs (VOCs sampled from 6-6.5 ft bgs)
			6					10.9	
								5.2	
			7	M-1				18.6	
								11.9	Odors observed from 7-20 ft bgs
		▽	8					30.5	Product observed from 7-20 ft bgs
					Macrocore	40		7.0	
			9					187	
								38.7	
	-2.6							8.9	
		Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (wet)	10					16.2	
								14.2	
			11					4.3	
								5.1	Collect RI Sample 158/LSB-43B from 11.5-13.5 ft bgs (VOCs sampled from 13-13.5 ft bgs)
			12					22	
				M-2				18.2	
			13					65.3	
					Macrocore	58		7.9	
			14					4.6	
	-7.6							6.7	
		Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (wet)	15					6.6	
								7.1	
			16					54.8	
								98.7	
			17					66.9	
				M-3				78.2	
			18					25.7	
					Macrocore	58		89.2	
			19					34.7	
	-12.6		20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:48 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-43/LMW-28** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	7.42 NAVD88

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-12.6	Dark brown to black fine-medium SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (wet)	20	M-4	Macrocore	60		14.7	
			21					41.3	
			22					33.1	
								18.3	
								27.7	
	-15.1							68.9	Monitoring well LMW-28 installed to 26 ft bgs with a screen from 4-24 ft bgs and a sump from 24-26 ft bgs
		Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (wet)	23					19.4	
	-16.1							15.8	
		Dark olive to black CLAY, trace silt, Dense [NATIVE] (moist)	24					3.2	
	-17.1							3.3	
	-17.6	Dark brown to black medium-fine SAND, trace f-m gravel [NATIVE] (wet)	25						Bottom of boring at 25 ft bgs
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:49 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-44/LMW-24** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 6.9 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/9/20 / Date Finished: 7/9/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 24 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 5 / Undisturbed --- / Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 6 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+6.9	Brown to dark brown fine-coarse SAND, trace concrete, trace f-m gravel, wood fragments (dry)[FILL]	0	M-1	Macrocore	42		0.0	Started Drilling at 7/9/2020
			1					0.0	
								0.2	
			2					0.6	
								0.1	
			3					0.4	
								0.2	
			4					0.8	
								0.4	
								0.4	Collect RI Sample 086/LSB-44A from 4-6 ft bgs (VOCs sampled from 4.5-5 ft bgs)
	+1.9	Brown to dark brown fine-coarse SAND, trace concrete, trace f-m gravel, wood fragments (moist)[FILL]	5	M-2	Macrocore	46		1.2	
								2.9	
		▽	6					5.0	
								22.8	
	+0.2	Dark brown to black SAND, trace clay, trace f-m gravel, wood fragments (wet) [FILL]	7					38.2	Product observed from 6.5-15 ft bgs
								49.1	Staining and strong odors observed from 6.5-15 ft bgs
			8					54.2	
								21.1	
			9					59.4	
								36.1	Collect RI Sample 087/LSB-44B from 9-11 ft bgs (VOCs sampled from 9-9.5 ft bgs)
	-3.1	Dark brown to black SAND, trace f-m gravel (wet)[FILL]	10	M-3	Macrocore	40		15.2	
								19.5	
			11					18.7	
								16.2	
			12					11.5	
								13.8	
			13					14.6	
								22.6	
			14					20.6	
								14.5	
	-8.1	Dark brown to black SAND, trace f-m gravel (wet)[FILL]	15	M-4	Macrocore	50		8.4	Collect RI Sample 088/LSB-44C from 15-17 ft bgs (VOCs sampled from 15-15.5 ft bgs)
								5.9	
			16					3.3	
								4.0	
	-10.1	Dark olive to brown CLAY, trace f-m sand, Dense (moist)[NATIVE]	17					3.5	
	-10.9	Dark olive to brown PEAT, some clay, trace f-m sand, Dense (moist)[NATIVE]						2.4	
			18					1.6	
								1.8	
	-12.1	Dark brown CLAY, trace f-m sand, Dense (moist)[NATIVE]	19					1.2	Monitoring well LMW-24 installed to 18.5 ft bgs with a screen from 5-16.5 ft bgs and a sump from 16.5-18.5 ft bgs
	-13.1		20					0.9	

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:52 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-44/LMW-24** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	6.9 NAVD88

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-13.1	Dark brown CLAY, trace f-m sand, Dense (moist)[NATIVE]	20	M-5	Macrocore	30			
	-17.1		24						Bottom of boring at 24 ft bgs

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:53 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-45/LMW-26** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.31 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/8/20 / Date Finished: 7/8/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 30 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 6 / Undisturbed --- / Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 6.5 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius, Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.3	Dark brown to brown fine-medium SAND, some f-m gravel, trace brick (dry)[FILL]	0	M-1	Macrocore	42		0.0	Started Drilling at 7/8/2020
			1					0.0	
								0.0	
			2					0.0	
								0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
	+2.3		5	M-2	Macrocore	42		0.0	Collect RI Sample 080/LSB-45A from 4.5-6.5 ft bgs (VOCs sampled from 4.5-5 ft bgs)
	+1.8	Dark brown to brown fine-medium SAND, some f-m gravel, trace brick (dry)[FILL]						0.0	
			6					0.0	
		Orangish brown fine-coarse SAND, trace fine gravel [FILL] (wet)						0.2	
			7					3.6	
	-0.2	Dark brown to black fine-medium SAND, trace fine gravel, clay lenses [FILL] (wet)						15.6	
			8					20.4	
								21.5	Staining and strong odors observed from 9-17 ft bgs
			9					20.8	
								19.6	
	-2.7	Dark brown to black fine-medium SAND, trace wood, trace fine gravel [FILL] (wet)	10	M-3	Macrocore	42		0.0	Collect RI Sample 081/LSB-45B from 9-11 ft bgs (VOCs sampled from 9-9.5 ft bgs)
								0.0	
			11					0.0	
								0.0	
			12					0.2	
								5.7	
			13					10.5	
								18.6	
			14					21.6	
								22.7	
	-7.7	Dark brown to black fine-medium SAND, trace wood, trace fine gravel [FILL] (wet)	15	M-4	Macrocore	48		15.6	Product observed at 15-17 ft bgs
								18.3	
			16					8.2	
								10.6	
	-9.7	Gray fine-medium SAND, trace wood, trace f-m gravel [FILL] (wet)	17					7.4	
								6.7	
			18					2.2	Collect RI Sample 082/LSB-45C from 18-20 ft bgs (VOCs sampled from x-x ft bgs)
								1.8	
			19					0.9	
								0.7	
	-12.7		20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:56 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-45/LMW-26** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	7.31 NAVD88

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-12.7	Gray fine-medium SAND [NATIVE] (wet)	20	M-5	Macrocore	60		0.0	
			21					0.0	
								0.0	
			22					0.0	
								0.0	Monitoring well LMW-26 installed to 22 ft bgs with a screen from 5-20 ft bgs and a sump from 20-22 ft bgs
			23					0.0	
								0.0	
			24					0.0	
								0.0	
	-17.7		25					0.0	
		Gray fine-medium SAND [NATIVE] (wet)		M-6	Macrocore	60		0.0	
			26					0.0	
								0.0	
			27					0.0	
								0.0	
			28					0.0	
								0.0	
			29					0.0	
								0.0	
	-22.7		30						Bottom of boring at 30 ft bgs
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:46:57 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-46/LMW-25** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 6.61 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/8/20 / Date Finished: 7/8/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 / Undisturbed --- / Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 9 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius, Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+6.6	Brown to reddish brown fine-medium SAND, trace f-m gravel, brick fragments, concrete fragments (dry) [FILL]	0					0.0	Started Drilling at 7/8/2020
			1					0.0	
								0.0	
			2					0.0	
				M-1	Macrocore	48		0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
	+1.6	Brown to reddish brown fine-medium SAND, trace f-m gravel, brick fragments, concrete fragments (moist) [FILL]	5					0.0	
								0.0	
			6					0.0	
								0.0	
			7					0.0	Collect RI Sample 078/LSB-46A from 7-9 ft bgs (VOCs sampled from 7.5-8 ft bgs)
				M-2	Macrocore	42		0.0	
			8					0.0	
								0.0	
	-2.4		9					0.3	Collect RI Sample 079/LSB-46B from 9-11 ft bgs (VOCs sampled from 9-9.5 ft bgs)
		Dark brown to black fine SAND, some clay, trace fine gravel, Slight odor and staining (wet) [FILL]						30.8	
	-3.4		10					12.1	Strong odors observed from 10-14 ft bgs
		Dark brown to black fine SAND, some clay, trace fine gravel, Slight odor and staining (wet) [FILL]						18.1	
	-4.4		11					45.8	Product observed from 10-14 ft bgs
		Dark brown to black CLAY, wood fragments (wet) [NATIVE]						49.5	
			12	M-3	Macrocore	42		36.3	Monitoring well LMW-25 installed to 14 ft bgs with a screen from 4-12 ft bgs and a sump from 12-14 ft bgs
								31.2	
			13					50.6	
								48.2	
	-7.4		14						Bottom of boring at 14 ft bgs
			15						
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:01 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-47** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 / Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 4, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Dark brown to brown fine-coarse SAND, some brick, some fine gravel (dry)[FILL]	0	M-1	Macrocore	36		0.0	Started Drilling at 7/7/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
	+1.6	Reddish brown fine-medium SAND, some brick, trace wood, trace f-m gravel (wet)[FILL]	5	M-2	Macrocore	48		0.0	
	+0.6	Reddish brown fine-medium SAND, some brick, trace wood, trace f-m gravel (wet)[FILL]	6					0.0	
	-0.9	Reddish brown fine-medium SAND, some brick, trace wood (wet)[FILL]	7					0.0	
			8					0.0	Collect PCB Delineation Sample 013/LSB-47E from 8-10 ft bgs
	-3.9	Grayish brown fine-coarse SAND, some fine gravel (wet)[FILL]	9					0.0	
	-4.4	Brown fine-coarse SAND, trace brick, trace fine gravel (wet)[FILL]	10	M-3	Macrocore	36		0.0	Collect PCB Delineation Sample 014/LSB-47F from 10-12 ft bgs
			11					0.0	
	-6.4	Dark brown to black CLAY [NATIVE] (wet)	12					0.0	Staining observed from 12-14 ft bgs
			13					0.0	
	-8.4		14						Bottom of boring at 14 ft bgs
			15						
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:03 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-48** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 — Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 4 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Dark brown fine-medium SAND, some f-c gravel, trace brick (dry) [FILL]	0	M-1	Macrocore	48		0.0	Started Drilling at 7/7/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
	+1.6	Reddish brown fine-medium SAND, trace brick (wet) [FILL] ▽						0.0	
	+0.6	Reddish brown fine-medium SAND, trace brick (wet) [FILL]	5					0.0	
			6					0.0	
			7	M-2	Macrocore	48		0.0	
	-1.9	Dark brown to brown SAND, trace f-m gravel (wet) [FILL]	8					0.0	
			9					0.0	
	-4.4	Dark brown to black fine-coarse SAND, some f-m gravel (wet) [FILL]	10					0.0	Collect PCB Delineation Sample 063/LSB-48F from 10-12 ft bgs
			11					0.0	
	-6.4	Dark brown to black CLAY [NATIVE] (wet)	12	M-3	Macrocore	48		0.0	Staining observed from 10-14 ft bgs
			13					0.3	
	-8.4		14					0.8	Bottom of boring at 14 ft bgs
			15						
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:06 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-49** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 — Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Brown to reddish brown fine-medium SAND, some brick, some f-m gravel (dry) [FILL]	0	M-1	Macrocore	42		0.0	Started Drilling at 7/7/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
	+1.6	Brown to reddish brown fine-medium SAND, some brick, some f-m gravel (moist) [FILL]	5					0.0	
	+0.6	Brown to reddish brown fine-medium SAND, some brick, some f-m gravel (wet) [FILL]	6	M-2	Macrocore	42		0.0	
			7					0.0	
			8					0.0	
			9					0.0	
	-4.4	Dark brown to brown fine-medium SAND, some f-m gravel (wet) [FILL]	10	M-3	Macrocore	48		0.7	Collect PCB Delineation Sample 035/LSB-49F from 10-12 ft bgs
			11					1.3	
			12					1.5	
	-6.9	Dark brown to brown CLAY, trace fine gravel [NATIVE] (wet)	13					9.2	
			14					20.7	Staining observed from 10-14 ft bgs
	-8.4		15					12.1	
			16					18.7	
			17					25.2	
			18						Bottom of boring at 14 ft bgs
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:08 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-50** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 — Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Dark brown to brown SAND, trace brick, trace f-c gravel, Moist at 3.5' bgs. (dry)[FILL]	0					0.0	Started Drilling at 7/7/2020
			1					0.0	
			2	M-1	Macrocore	42		0.0	
			3					0.0	
	+1.6	Reddish brown fine-coarse SAND, some brick (moist)[FILL]	4					0.0	
	+0.6	Brown fine-medium SAND, trace brick, trace f-m gravel (moist)[FILL]	5 ▽					0.0	
			6					0.0	
	-0.9	Gray to grayish brown fine-medium SAND, some fine gravel, trace concrete (dry)[FILL]	7	M-2	Macrocore	42		0.0	
	-1.4	Reddish brown to tannish red fine-medium SAND, some brick, trace f-m gravel (wet)[FILL]	8					0.0	
			9					0.0	
	-4.4	Dark brown to black fine-coarse SAND, some fine gravel (wet) [FILL]	10					0.0	Collect PCB Delineation Sample 021/LSB-50F from 10-12 ft bgs
			11					0.0	
	-6.4	Dark brown to black CLAY (wet) [NATIVE]	12	M-3	Macrocore	48		16.8	
			13					15.1	
	-8.4		14					14.9	Bottom of boring at 14 ft bgs
			15					15.8	
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:11 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-51** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 — Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Brown fine-medium SAND, some f-c gravel, trace brick [FILL] (moist)	0	M-1	Macrocore	42		0.0	Started Drilling at 7/7/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
	+0.6	Brown to reddish brown silty SAND, trace brick, trace wood, trace f-m gravel [FILL] (wet) ▽	5					0.0	
			6	M-2	Macrocore	60		0.0	
			7					0.0	
			8					0.0	Collect PCB Delineation Sample 048/LSB-51E from 8-10 ft bgs
			9					0.0	
	-4.4	Dark brown to black fine-coarse SAND, some gravel [FILL] (wet)	10					0.0	Staining observed from 10-14 ft bgs
			11					0.0	Odors observed from 10-14 ft bgs
	-6.4	Dark brown to black CLAY [NATIVE](wet)	12	M-3	Macrocore	48		0.0	Collect PCB Delineation Sample 049/LSB-51F from 10-12 ft bgs
			13					3.6	Collect PCB Delineation Sample 050/LSB-51G from 12-14 ft bgs
	-8.4		14					9.8	
			15					14.5	Bottom of boring at 14 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:13 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-52** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 — Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 4 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Dark brown to brown fine SAND, some fine gravel, trace brick (dry) [FILL]	0					0.0	Started Drilling at 7/7/2020
			1					0.0	
								0.0	
			2					0.0	
				M-1	Macrocore	60		0.0	
			3					0.0	
								0.0	
	+1.6	Reddish brown fine-coarse SAND, trace brick (wet) [FILL] ▽	4					0.0	
								0.0	
	+0.6	Reddish brown fine-coarse SAND, trace brick, trace f-m gravel (wet) [FILL]	5					0.0	
								0.0	
			6					0.0	
								0.0	
			7	M-2	Macrocore	48		0.0	
								0.0	
			8					0.0	
								0.0	
			9					0.0	
								0.0	
	-4.4	Dark brown to black fine-coarse SAND, some fine gravel (wet) [FILL]	10					0.0	Staining observed from 10-14 ft bgs
								0.0	
			11					0.0	
								0.0	
			12	M-3	Macrocore	48		0.9	
	-6.9	Dark brown to black CLAY (wet) [NATIVE]						1.1	
			13					3.4	
								4.7	
	-8.4		14						Bottom of boring 14 ft bgs
			15						
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:16 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-53** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 — Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Brown to tannish brown fine-medium SAND, trace f-m gravel (dry) [FILL]	0					0.0	Started Drilling at 7/7/2020
			1					0.0	
								0.0	
			2					0.0	
								0.0	
	+3.1	Reddish brown fine-medium SAND, some brick, trace m-f gravel (moist) [FILL]	3	M-1	Macrocore	42		0.0	
								0.0	
			4					0.0	
								0.0	
	+0.6	▽	5					0.0	
		Reddish brown fine-medium SAND, trace brick, trace m-f gravel (wet) [FILL]						0.0	
			6					0.0	
								0.0	
			7	M-2	Macrocore	60		0.0	
								0.0	
			8					0.0	
								0.0	
	-3.4	Tannish brown SAND, some f-m gravel (wet) [FILL]	9					1.3	
	-4.4	Dark brown to black fine-coarse SAND, trace wood (wet) [FILL]						2.2	
			10					2.4	
								2.7	
			11					3.1	
								3.5	
	-6.4	Dark brown to black CLAY (wet) [NATIVE]	12	M-3	Macrocore	36		5.9	
								5.4	
			13					5.7	
								4.4	
	-8.4		14						Bottom of boring at 14 ft bgs
			15						
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:18 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-54** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 — Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Tannish brown SAND, some f-c gravel, trace wood (dry) [FILL]	0	M-1	Macrocore	54		0.0	Started Drilling at 7/7/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
			5					0.0	
	+2.1	Reddish brown to grayish brown fine-medium SAND, trace brick, trace f-m gravel (moist)[FILL]						0.0	
								0.0	
	+0.6	Reddish brown to grayish brown fine-medium SAND, trace brick, trace f-m gravel, Wet at 8' bgs (moist)[FILL]	6	M-2	Macrocore	42		0.0	
			7					0.0	
			8 ▽					0.0	
			9					0.0	
			10					0.0	
	-4.4	Dark brown to black fine-coarse SAND, some fine gravel (wet) [FILL]						0.0	
			11					0.0	
	-6.4	Dark brown to black CLAY (wet) [NATIVE]	12	M-3	Macrocore	48		0.3	
			13					6.9	
								18.9	
								18.4	
	-8.4		14					12.6	Bottom of boring at 14 ft bgs
			15						
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:21 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-55** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 5.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/7/20 / Date Finished: 7/7/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 14 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 5, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Gutelius
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+5.6	Brown fine-medium SAND, some f-c gravel, trace brick [FILL] (dry)	0	M-1	Macrocore	42		0.0	Started Drilling at 7/7/2020
			1					0.0	
			2					0.0	
			3					0.0	
			4					0.0	
	+0.6	Brown to reddish brown silty SAND, trace brick, trace wood, trace f-m gravel (wet) [FILL] ▽	5					0.0	
			6	M-2	Macrocore	60		0.0	
			7					0.0	
			8					0.0	
	-3.4	Dark brown to black fine-coarse SAND, some fine gravel (wet) [FILL]	9					0.0	
	-4.4	Dark brown to black fine-coarse SAND, some gravel [FILL] (wet)	10					0.0	Collect PCB Delineation Sample 056/LSB-55F from 10-12 ft bgs
			11					0.0	
	-5.9	Dark brown to black CLAY [NATIVE] (wet)	12	M-3	Macrocore	48		0.0	Staining observed from 10-14 ft bgs
			13					3.6	
			14					9.8	
	-8.4		15					14.5	Bottom of boring at 14 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:23 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-56** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 8.0' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/16/20 — Date Finished: 7/16/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 5 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+8.0	Concrete	0					0.0	Started Drilling at 7/16/2020
			1					0.0	
								0.0	
								0.0	
	+6.0		2					0.0	
	+5.3	Brownish red to orange fine-coarse GRAVEL, some f-c sand (dry)[FILL]		M-1	Macrocore	40		0.0	
		Dark brown to black fine-coarse SAND, trace f-m gravel (dry)	3					0.0	
	+4.3							0.0	
	+3.8	Concrete	4					0.0	
		Dark olive brown to black fine-coarse SAND, trace f-m gravel (dry) ▽						0.0	
	+3.0		5					0.0	
		Dark brown to brown fine-medium SAND, trace f-m gravel, wood fragments (moist)[FILL]						0.0	Collect Remedial Design Sample 180/LSB-56A from 5.5-6 ft bgs
			6					0.0	
								0.0	
			7					0.0	
				M-2	Macrocore	30		0.1	Staining observed from 7.5-12.5 ft bgs
			8					0.2	Product observed from 7.5-12.5 ft bgs
								0.5	
			9					0.8	
								1.5	
	-2.0		10					1.2	
		Dark brown to brown fine-medium SAND, trace f-m gravel, Staining and product observed, strong odour (wet)[FILL]						1.5	
			11					1.6	
								1.9	
			12					2.8	Collect Remedial Design Sample 181/LSB-56B from 12-12.5 ft bgs
	-4.5			M-3	Macrocore	50		3.6	
		Dark olive gray to black CLAY, trace organics (moist)[NATIVE]	13					0.5	
	-5.5							0.2	
		Dark olive to brown CLAY, trace f-m sand, trace peat, Dense (moist)[NATIVE]	14					0.1	
								0.1	
	-7.0		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:26 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-57** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7.8' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/16/20 — Date Finished: 7/16/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 10 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.8	Concrete	0					0.1	Started Drilling at 7/16/2020
			1					0.1	
								0.1	
								0.1	
	+5.8	Dark brown to dark fine-coarse SAND, some f-m sand, some f-m gravel, brick fragments (dry)[FILL]	2	M-1	Macrocore	40		0.1	
								0.1	
			3					0.1	
								0.1	
			4					0.1	
								0.1	
	+2.8	Dark brown to dark fine-coarse SAND, some f-m sand, some f-m gravel, brick fragments (moist)[FILL]	5					0.8	
								0.7	
			6					0.6	
								0.9	
			7	M-2	Macrocore	42		0.5	
								0.8	
			8					0.6	Collect Remedial Design Sample 185/LSB-57A from 9-9.5 ft bgs
								0.5	
			9					3.6	
	-2.2	Dark brown to dark fine-coarse SAND, some f-m sand, some f-m gravel, brick fragments (wet)[FILL] ▽						5.8	Collect Remedial Design Sample 186/LSB-57B from 10-10.5 ft bgs
			10					38.6	
								49.8	Staining and strong odors observed from 10-14 ft bgs
			11					52.0	
								57.1	
			12					68.6	Collect Remedial Design Sample 187/LSB-57C from 12-12.5 ft bgs
	-4.7	Dark olive to black CLAY, trace peat, trace organics (moist)[NATIVE]		M-3	Macrocore	48		98.1	
			13					20.4	
								22.8	
			14					5.8	Collect Remedial Design Dample 188/LSB-57B from 14.5-15 ft bgs
								1.2	
	-7.2		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:29 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-58/LMW-29** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 8.42 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/10/20 — Date Finished: 7/10/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 23 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 5 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+8.4	ASPHALT	0					0.0	Started Drilling at 7/10/2020
								0.0	
	+7.4	Dark brown to black fine-medium SAND, trace f-m gravel, wood fragments (moist)[FILL]	1					0.0	
								0.0	
			2	M-1	Macrocore	40		0.0	
								0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
	+3.4	Dark brown to black fine-medium SAND, trace f-m gravel, wood fragments (moist)[FILL]	5					0.1	
								0.1	
			6					0.1	
								0.1	
			7					0.1	
				M-2	Macrocore	40		0.1	
		▽	8					0.1	
								0.1	
			9					0.1	
								0.1	
	-1.6	Dark brown to black fine-medium SAND, trace f-m gravel, wood fragments (wet)[FILL]	10					1.2	Odors observed from 10-18 ft bgs
								4.4	
			11					3.8	
								2.2	
			12					3.6	
				M-3	Macrocore	40		7.6	
			13					5.4	
								3.4	Product observed from 13.5-18 ft bgs
			14					6.9	
								8.9	Collect Remedial Design Sample 098/LSB-58A from 14-15 ft bgs
	-6.6	Dark brown to black fine-medium SAND, trace f-m gravel, wood fragments (wet)[FILL]	15					6.8	
								4.7	
			16					3.8	
								3.9	
			17					1.9	
				M-4	Macrocore	40		2.3	
								2.0	
			18					1.2	
								1.7	
			19					1.1	Collect Remedial Design Sample 179/LSB-58B from 19.5-20 ft bgs
								0.4	
	-11.6		20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:32 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-58/LMW-29** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	8.42 NAVD88

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-11.6	Dark olive to black CLAY, trace organics [NATIVE]	20	M-5	Macrocore	20		0.3	Monitoring well LMW-29 installed to a depth of 23 ft bgs with a screen from 6-21 ft bgs and a sump from 21-23 ft bgs
			21					0.6	
			22					0.5	
	-14.6		23					0.8	Bottom of boring at 23 ft bgs
			24					0.6	
			25					0.3	
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:33 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-59** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 8.9' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 / Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 2, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 8, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+8.9	Concrete	0						Started Drilling at 7/14/2020 Concrete from 1-3 ft bgs, auger from 0-5 ft bgs
	+3.9	Dark brown to black fine-coarse SAND, some gravel (wet)[FILL]	5	M-1	Macrocore	20		1.8 1.2 1.4 2.0 1.9 1.7 3.6 4.0 2.1 8.6	Collected Remedial Design Sample 139/LSB-59A from 8-8.5 ft bgs Collected Remedial Design Sample 140/LSB-59B from 8.5-9 ft bgs
	-1.1	Dark brown to black fine-coarse SAND, some gravel, wood fragments (wet)[FILL]	10	M-2	Macrocore	35		20.6 58.3 61.2 58.1 76.5 86.2 88.9 65.9 58.4 60.2	Product and strong odors observed from 10-15 ft bgs Collected Remedial Design Sample 141/LSB-59C from 11-12 ft bgs Collected Remedial Design Sample 142/LSB-59D from 13-14 ft bgs
	-6.1		15						Bottom of boring at 15 ft bgs
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:35 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-60** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9.0' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.0	Light gray cemented GRAVEL, some concrete [FILL]	0					0.0	Started Drilling at 7/14/2020
			1					0.0	
								0.1	
								0.1	
	+7.0		2					0.1	
	+6.5	Light orangish brown to dark brown fine-coarse SAND, trace f-c gravel (dry) [FILL]		M-1	Macrocore	41		0.3	
		Light brown fine-medium SAND, trace f-m gravel (dry) [FILL]	3					0.3	
								0.6	
			4					0.6	
								0.2	
	+4.0		5					1.1	Odors observed from 5-15 ft bgs
		Dark brown to black fine-coarse SAND, some f-m gravel [FILL] (moist)						2.8	
			6					3.6	
	+2.6	Light brown fine-medium SAND, trace f-m gravel [FILL] (wet)						15.3	
	+2.0	Dark brown to black fine-coarse SAND, some f-m gravel [FILL] (moist)	7					20.5	
				M-2	Macrocore	40		69.5	Collect Remedial Design Sample 118/LSB-60 from 7.5-8 ft bgs
		▽	8					88.2	
								1209	
			9					1490	
								2451	
	-1.0		10					8.9	
		Dark brown to black fine-medium SAND, trace silt, trace f-m gravel [FILL] (wet)						7.6	
			11					5.5	
								6.4	
			12					3.2	
				M-3	Macrocore	42		5.9	
			13					6.7	
								8.9	
			14					2.8	
								1.6	
	-6.0		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:38 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-61** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9.0' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 / Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 8, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.0	Light brown fine-medium SAND, trace fine sand (dry) [FILL]	0					0.1	Started Drilling at 7/22/2020
			1					0.1	
								0.1	
								0.1	
	+7.0	Light gray gravelly fine-coarse SAND, some concrete (dry) [FILL]	2	M-1	Macrocore	35		0.1	
			3					0.1	
	+5.5	Dark brown to black fine-coarse SAND, trace f-m sand, trace f-m gravel, wood fragments (moist) [FILL]	4					0.1	
								0.1	
	+4.0	Dark brown to black fine-coarse SAND, trace f-m sand, trace f-m gravel, concrete lenses, wood fragments (moist) [FILL]	5					0.1	
								0.1	
			6					0.1	
								0.1	
			7	M-2	Macrocore	42		0.1	Collect Remedial Design Sample 131/LSB-61A from 7-8 ft bgs
		▽	8					0.1	
								0.1	
			9					0.1	
	-1.0	Dark brown to black fine-coarse SAND, trace f-m sand, trace f-m gravel, wood fragments [FILL] (wet)	10					8.2	Odors observed from 10-15 ft bgs
								28.4	
			11					25.3	
								11.3	
			12	M-3	Macrocore	44		37.2	
								20.1	
			13					18.6	
								27.6	Collect Remedial Design Sample 132/LSB-61B from 14-15 ft bgs
			14					22.5	
								8.4	
	-6.0		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:41 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-62** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9.2' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 9 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.2	ASPHALT	0					0.1	Started Drilling at 7/14/2020
								0.1	
	+8.2	Dark brown to black fine-coarse SAND, trace f-c gravel (dry) [FILL]	1					0.1	
								0.1	
			2					0.1	
				M-1	Macrocore	38		0.1	
			3					0.1	
								0.1	
			4					0.1	
								0.1	
	+4.2	Light gray to dark brown gravelly fine-coarse SAND, some f-c gravel [FILL] (dry)	5					5.6	Odors observed from 5-15 ft bgs
								520.7	
			6					414.9	Collect Remedial Design Sample 125/LSB-62A from 6-7 ft bgs
								669	
	+2.2	Dark brown to black fine-coarse SAND, trace f-c gravel, Staining observed [FILL] (moist)	7					370	
				M-2	Macrocore	38		884	
			8					617	Staining observed from 8-13 ft bgs
								688	
		▽	9					417	Collect Remedial Design Sample 126/LSB-62B from 9-10 ft bgs
								38	
	-0.8	Dark brown to black fine-coarse SAND, trace f-c gravel [FILL] (moist)	10					38.6	
								40.2	
			11					63.8	
								50.9	
			12	M-3	Macrocore	40		20	
								18.6	
	-3.8	Dark gray to dark olive CLAY, some silt, trace f-m sand, trace peat [NATIVE] (moist)	13					15.1	Collect Remedial Design Sample 127/LSB-62C from 13-14 ft bgs
								12.4	
			14					10.8	
								7.9	
	-5.8		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:44 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-63** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9.4' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+9.4	ASPHALT	0					0.1	Started Drilling at 7/14/2020
	+8.4	CONCRETE	1					0.1	
			2					0.1	
	+6.4	Dark brown to black fine-coarse SAND, some f-c gravel (moist)[FILL]	3	M-1	Macrocore	44		0.1	
			4					0.1	
	+4.4	Dark brown to black fine-coarse SAND, some f-c gravel, wood fragments (moist)[FILL]	5					0.1	Collect Remedial Design Sample 143/LSB-63A from 4-5 ft bgs
			6					0.2	
			7	M-2	Macrocore	20		2.8	
		▽	8					3.6	
			9					3.9	
	-0.6	Dark brown to black fine-coarse SAND, some f-c gravel, wood fragments (moist)[FILL]	10					2.7	Odors observed from 9-15 ft bgs
			11					5.6	
			12					4.7	
	-3.6	Dark olive to black CLAY, some peat, trace f-m sand, trace organics (moist)[NATIVE]	13	M-3	Macrocore	55		3.2	Collect Remedial Design Sample 144/LSB-63B from 9-10 ft bgs
			14					2.9	
	-5.6		15					9.6	
			16					15.6	
			17					20.8	Collect Remedial Design Sample 145/LSB-63C from 10-10.5 ft bgs
			18					28.6	
			19					46.8	
			20					64.9	
								55.4	Collect Remedial Design Sample 146/LSB-63D from 13-13.5 ft bgs
								20.8	
								6.0	
								5.5	Collect Remedial Design Sample 147/LSB-63E from 14.5-15 ft bgs
								6.8	Bottom of boring at 15 ft bgs

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:46 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-64** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.6	ASPHALT	0					0.1	Started Drilling at 7/14/2020
	+6.6	CONCRETE	1					0.1	
			2					0.1	
			3	M-1	Macrocore	40		0.1	
	+4.1	Dark brown to black fine-coarse SAND, trace f-c gravel, some concrete [FILL] (dry)	4					0.1	
	+2.6	Dark brown to black fine-coarse SAND, trace f-c gravel, wood fragments (moist) [FILL]	5					0.1	
			6					102.9	Odors observed from 5-13.5 ft bgs
			7					139	
			8 ▽	M-2	Macrocore	48		4.6	
			9					169	
	-2.4	Dark brown to black fine-coarse SAND, trace f-c gravel, wood fragments (wet) [FILL]	10					686.6	Collect Remedial Design Sample 150/LSB-64A from 7-8 ft bgs
			11					52.1	
			12					58	
			13	M-3	Macrocore	50		61.9	Collect Remedial Design Sample 151/LSB-64B from 8-9 ft bgs
	-5.4	Dark olive to black CLAY, some peat, trace organics (moist)[NATIVE]	14					69.2	
	-7.4		15					50.1	
			16					12.1	
			17					11.8	
			18					15.1	
			19					108.1	
			20					58	Collect Remedial Design Sample 152/LSB-64C from 12-12.5 ft bgs
								62.8	
								49.7	
								54.1	Collect Remedial Design Sample 153/LSB-64D from 14.5-15 ft bgs
								0.9	
								0.6	
									Bottom of boring at 15 ft bgs

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:49 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-65** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7.2' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/14/20 — Date Finished: 7/14/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.2	Light gray gravelly fine-coarse SAND, some concrete [FILL]	0	M-1	Macrocore	35		0.1	Started Drilling at 7/14/2020
			1					0.3	
			1					0.2	
			2					0.1	
			2					0.1	
			3					0.1	
			3					0.1	
	+3.2		4					0.1	
		Dark brown fine-coarse SAND, some f-c gravel, brick fragments (dry) [FILL]	4					3.5	Odors observed from 4-10 ft bgs
	+2.2		5					3.9	
		Dark brown to black fine-coarse SAND, some f-c gravel, wood fragments (moist) [FILL]	5	M-2	Macrocore	40		10.0	
			6					29.6	
			6					11.8	Collect Remedial Design Sample 154/LSB-65A from 6-7 ft bgs
			7					139	
			7					156	
		▽	8					128	
			8					68.6	
			9					58.4	Collect Remedial Design Sample 155/LSB-65B from 8.5-9 ft bgs
			9					48.9	
	-2.8		10					26.8	
		Dark brown to black fine-coarse SAND, some f-c gravel, wood fragments (wet) [FILL]	10	M-3	Macrocore	42		2.1	
			11					0.8	
			11					1.6	
			12					2.6	
			12					1.9	
			13					2.0	
	-5.8		13					1.3	
		Dark olive to black CLAY, trace organics (moist)[NATIVE]	14					1.6	Collect Remedial Design Sample 156/LSB-65C from 14.5-15 ft bgs
			14					0.8	
	-7.8		15					0.9	Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:52 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-66** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 8.6' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/15/20 — Date Finished: 7/15/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+8.6	CONCRETE	0					0.1	Started Drilling at 7/15/2020
			1					0.1	
								0.1	
								0.1	
	+6.6	Dark brown to black fine-coarse SAND, some c-f gravel, trace wood (dry) [FILL]	2	M-1	Macrocore	35		0.1	
								0.3	
			3					0.4	
								0.2	
			4					0.2	
								0.1	
	+3.6	Dark brown to black fine-coarse SAND, some c-f gravel, trace wood (moist) [FILL]	5					0.1	
								0.1	
			6					0.2	
								0.1	
			7	M-2	Macrocore	30		1.2	
								0.2	
		▽	8					0.4	
								0.2	
			9					0.8	
								13.1	
	-1.4	Dark brown to black fine-coarse SAND, some c-f gravel, trace wood [FILL] (moist)	10					0.8	Product observed from 10-12.5 ft bgs
								17.7	
			11					12.9	
								27	
			12					12.5	
	-3.9	Dark olive to gray CLAY, trace silt, trace peat [NATIVE] (moist)		M-3	Macrocore	42		5.3	
			13					7	
								2.2	
			14					3.1	
								2.0	
	-6.4		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/24/2020 10:43:01 AM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-67** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 6.4' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/15/20 / Date Finished: 7/15/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 4, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 8, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+6.4	CONCRETE	0					0.1	Started Drilling at 7/15/2020
	+5.4	Dark brown to black fine-coarse SAND, some f-c gravel, wood fragments, brick fragments (dry) [FILL]	1					0.1	
	+4.4	Dark brown to black fine-coarse SAND, some f-c gravel, some concrete, wood fragments, brick fragments (dry) [FILL]	2	M-1	Macrocore	40		0.1	
	+3.9	Dark brown to black fine-coarse SAND, some f-c gravel, trace f-m sand (dry) [FILL]	3					0.2	
			4					0.1	
	+1.4	Dark brown to black fine-coarse SAND, some f-c gravel, trace f-m sand (wet) [FILL]	5					0.1	
			6					0.1	
			7	M-2	Macrocore	25		0.1	
		▽	8					0.2	
			9					0.2	
	-3.6	Dark brown to black fine-coarse SAND, some f-c gravel, some concrete, wood fragments, brick fragments (dry) [FILL]	10					0.1	
	-4.1	Dark brown to black fine-coarse SAND, some f-c gravel, trace f-m sand (dry) [FILL]	11					0.1	
	-5.1	Dark brown to black fine-coarse SAND, some f-c gravel, some concrete, wood fragments, brick fragments (dry) [FILL]	12	M-3	Macrocore	45		0.1	
	-5.6	Dark brown to black fine-coarse SAND, trace f-m sand, trace fine gravel (dry) [FILL]	13					0.2	
	-6.1	Dark brown to black fine-coarse SAND, some f-c gravel, some concrete, wood fragments, brick fragments (dry) [FILL]	14					0.1	
	-6.6	Dark brown to black fine-coarse SAND, some f-c gravel, trace f-m sand (dry) [FILL]	15					0.1	Bottom of boring at 15 ft bgs
	-8.6		16					0.1	
			17					0.1	
			18					0.1	
			19					0.1	
			20					0.1	

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:47:58 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-68** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 6.2' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/15/20 / Date Finished: 7/15/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 8, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+6.2	ASPHALT	0					0.1	Started Drilling at 7/15/2020
								0.1	
	+5.2	Dark brown fine-coarse SAND, trace f-m sand, trace f-m gravel, brick fragments (dry) [FILL]	1					0.1	
								0.1	
			2					0.1	
				M-1	Macrocore	35		0.1	
			3					0.1	
								0.1	
			4					0.1	
								0.1	
	+1.2	Dark brown to black fine-coarse SAND, trace f-m sand, trace f-m gravel, brick fragments (dry) [FILL]	5					0.1	
								0.1	
			6					0.1	
								0.1	
			7					0.1	
				M-2	Macrocore	35		0.1	
		▽	8					0.1	
								0.1	
			9					0.1	
								0.1	
	-3.8	Dark brown to black fine-coarse GRAVEL, trace f-c sand (wet) [FILL]	10					0.1	
								0.1	
			11					0.1	
								0.1	
			12					0.1	
				M-3	Macrocore	35		0.2	
			13					0.2	
	-7.3	Dark brown to black CLAY, some silt, wood fragments [NATIVE](wet)						1.7	Staining observed from 13.5-15 ft bgs
			14					6.3	
								4.0	
	-8.8		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:48:01 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-69** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7.0' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/15/20 / Date Finished: 7/15/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 20 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 4 / Undisturbed --- / Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 6 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.0		0					0.1	Started Drilling at 7/15/2020
	+6.5	Dark brown fine-coarse SAND, trace f-c gravel (dry)						0.1	
		Concrete	1					0.1	
	+5.5							0.1	
		Dark black to black fine-coarse SAND, trace f-m sand, trace f-c gravel, wood fragments [FILL] (dry)	2	M-1	Macrocore	40		0.1	
			3					0.2	
								0.3	
			4					0.2	
	+2.0							0.2	
		Dark black to black fine-coarse SAND, trace f-m sand, trace f-c gravel, wood fragments, [FILL] (wet) ▽	5					0.2	
								0.3	
			6					0.3	
								0.3	
			7	M-2	Macrocore	42		1.4	Staining and odors observed from 7-19 ft bgs
								9.4	
			8					10.2	
								23.2	
			9					39.6	
	-3.0							19.7	
		Dark black to black fine-coarse SAND, trace f-m sand, trace f-c gravel, wood fragments [FILL] (wet)	10					8.2	
								9.5	
			11					17.2	
								24.6	
			12					54.5	
				M-3	Macrocore	30		41.3	
			13					57.4	
								16.7	Collect Remedial Design Sample 165/LSB-69A from 14-15 ft bgs
			14					24.6	
								9.2	
	-8.0		15					13.3	Product observed from 15-19 ft bgs
		Dark black to black fine-coarse SAND, trace f-m sand, trace f-c gravel, wood fragments [FILL] (wet)						15.6	
			16					21.3	Collect Remedial Design Sample 166/LSB-69B sampled 16-17 ft bgs
								20.7	
	-10.0		17					35.9	
		Dark olive to dark gray CLAY, trace silt, trace peat [NATIVE] (moist)		M-4	Macrocore	60		5	Collect Remedial Design Sample 167/LSB-69C sampled 17.5-18 ft bgs
			18					26.9	
								19	
			19					6.6	
	-13.0							2.3	Bottom of boring at 20 ft bgs
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:48:04 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-70/LMW-27** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 7.61 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/15/20 — Date Finished: 7/15/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 25 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 4 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.6	No Recovery	0						Started Drilling at 7/15/2020 Concrete from 1-3 ft bgs, auger from 0-5 ft bgs
	+2.6	Dark brown to black fine-coarse SAND, some f-m sand, some f-c gravel [FILL] (dry)	5	M-1	Macrocore	50		0.2 3.6 30.8 22.7 19.6 11.4 9.8 6.5	
	-2.4	Dark brown to black fine-coarse SAND, some f-m sand, some f-c gravel [FILL] (wet)	10	M-2	Macrocore	58		4.8 3.9 4.5 3.6 3.9 5.8 6.1 4.3	Collect Remedial Design Sample 169/LSB-70A from 9.5-10 ft bgs Product observed from 10-18.5 ft bgs Collect Remedial Design Sample 170/LSB-70B from 10-10.5 ft bgs
	-9.4	Light gray to black fine-coarse SAND, some f-m gravel (moist)[NATIVE]	15	M-3	Macrocore	30		2.4 2.1 1.9 1.6 0.9 1.2 0.9 1.1 1.1 1.0 0.9	Collect Remedial Design Sample 171/LSB-70C from 17.5-18 ft bgs
	-11.4	Light gray to black CLAY, trace f-m sand (moist)[NATIVE]	20					2.1 1.8	
	-12.4							1.5	

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:48:07 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-70/LMW-27** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	7.61 NAVD88

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	-12.4	Light gray to black CLAY, trace f-m sand (moist)[NATIVE]	20	M-4	Macrocore	40		1.4	Collect Remedial Design Sample 172/LSB-70D from 20-20.5 ft bgs
								0.6	
	-13.4	Light brown fine-medium SAND, trace fine sand (moist)[NATIVE]	21					0.8	
								1.1	
			22					0.9	Monitoring well LMW-27 installed to a depth of 22 ft bgs with a screen from 5-20 ft bgs and a sump from 20-22 ft bgs
			23					1.4	
								1.9	
			24					2.0	
								1.8	
			25					0.5	
	-17.4								Bottom of boring at 25 ft bgs
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:48:07 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-71** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7.8' NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/15/20 / Date Finished: 7/15/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3, Undisturbed ---, Core ---
Casing Diameter (in): --- / Casing Depth (ft): ---	Water Level (ft.): First ▽ 8, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+7.8	Concrete	0					0.1	Started Drilling at 7/15/2020
			1					0.1	
								0.1	
								0.1	
	+5.8	Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (dry)	2	M-1	Macrocore	38		0.1	
								0.1	
			3					0.2	
								0.3	
			4					0.2	
	+2.8							0.2	
		Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (wet)	5					0.2	
								0.3	
			6					0.3	
								0.3	
			7	M-2	Macrocore	40		1.4	Product and odors observed from 7-15 ft bgs
								9.4	
		▽	8					10.2	
								23.2	
			9					39.6	
	-2.2							19.7	
		Dark brown to black fine-coarse SAND, some f-c gravel, trace fine sand, wood fragments [FILL] (wet)	10					8.2	
								9.5	
			11					17.2	
								24.6	
			12	M-3	Macrocore	42		54.5	Collect Remedial Design Sample 173/LSB 71A from 12-12.5 ft bgs
								41.3	
			13					57.4	
								16.7	
			14					24.6	
								9.2	
	-7.2		15						Bottom of boring at 15 ft bgs
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:48:11 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LSB-72/LMW-30** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: 10.36 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 7/16/20 — Date Finished: 7/16/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft — Rock Depth: NE
Size and Type of Bit: 2-inch Direct Push	Number of Samples: Disturbed 3 — Undisturbed --- — Core ---
Casing Diameter (in): --- — Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: --- — Weight (lbs): --- — Drop (in): ---	Drilling Foreman: Tom Harer
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: --- — Weight (lbs): --- — Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+10.4		0					0.0	Started Drilling at 7/15/2020
	+9.9	Asphalt						0.0	
		Dark brown to black fine-coarse SAND, trace f-m gravel, brick lenses [FILL] (dry)	1					0.0	
								0.0	
			2					0.0	
				M-1	Macrocore	48		0.0	
	+7.4	Concrete	3					0.0	
								0.0	
	+6.1		4					0.0	
		Dark brown to black fine-coarse SAND, trace f-m sand, trace f-c gravel [FILL] (dry)						0.0	
	+5.4		5					0.1	
		Dark brown to black fine-coarse SAND, trace f-m sand, trace f-c gravel [FILL] (wet)						0.1	
			6					0.1	Collect Remedial Design Sample 182/LSB-72A from 6-6.5 ft bgs
								0.1	
			7					0.2	
				M-2	Macrocore	50		0.1	
		▽	8					0.1	
								0.2	
			9					0.1	
								0.2	
	+0.4		10					40.8	Product observed from 10-13 ft bgs
		Dark brown to black fine-coarse SAND, trace clay, trace f-m sand, trace f-c gravel [FILL] (wet)						603	
			11					284	Collect Remedial Design Sample 183/LSB-72B sampled from 11-11.5 ft bgs
								143	
			12					180	
				M-3	Macrocore	58		176	Collect Remedial Design Sample 184/LSB-72C from 12-12.5 ft bgs
	-2.6		13					58.9	
		Dark olive to black CLAY, trace peat, trace organics, wood fragments [NATIVE] (moist)						31.5	
			14					40.6	
								22.7	
	-4.6		15						Bottom of boring at 15 ft bgs
			16						Monitoring well LMW-30 installed to a depth of 16.5 ft bgs with a screen from 4.5-14.5 ft bgs and a sump from 14.5-16.5 ft bgs
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 9/18/2020 2:48:14 PM ... Report: Log - LANGAN

LANGAN

Log of Boring **LMW-31** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9' NAVD88
Drilling Company: AWT Environmental Services, Inc.	Date Started: 11/6/20 / Date Finished: 11/6/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 20 ft / Rock Depth: NE
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 4 / Undisturbed --- / Core ---
Casing Diameter (in): 3in / Casing Depth (ft): ---	Water Level (ft.): First ▽ 9 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: John Dixon
Sampler: 1.75" x 4' Long Acetate Lined Macrocore	Field Engineer: Brandon Reiner
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Black GRAVEL [ASPHALT]	0					0.0	Started Drilling on 11/6/2020
		Dark brown to tan medium-coarse SAND and fine-coarse GRAVEL, trace concrete, trace asphalt [FILL]	1					0.0	
								0.0	
			2	M-1	Macrocore	24		0.0	
								0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
		Dark gray to gray medium-coarse SAND, some f-m gravel, trace concrete (dry) [FILL]	5					0.0	
								0.0	
			6					0.0	
								0.0	
			7	M-2	Macrocore	30		0.0	
								0.0	
			8					0.0	
								0.0	
		Dark gray to gray medium-coarse SAND, some f-m gravel, trace concrete (wet) [FILL]	9 ▽					2.0	Odors observed from 9-20 ft bgs
								2.0	
		Dark gray silty SAND, some f-m gravel, trace wood, trace coal (wet) [FILL]	10					94.8	Product observed in soil from 10-20 ft bgs
								143.0	
			11					82.1	
								149.1	
			12	M-3	Macrocore	30		73.5	
								69.7	
			13					67.5	
								49.6	
			14					48.2	
								45.6	
		Dark gray coarse SAND, trace wood, trace silt, trace f-m gravel (wet)[FILL]	15					42.4	
								44.8	
			16					43.9	
								43.8	
			17	M-4	Macrocore	30		48.6	
								47.5	
			18					50.1	
								14.2	
			19					14.8	Bottom of boring at 20 ft bgs
								14.0	
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:42:26 AM ... Report: Log - LANGAN

LANGAN

Log of Boring **VEE-01** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7' NAVD88
Drilling Company: AWT Environmental Services, Inc.	Date Started: 11/5/20 / Date Finished: 11/5/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 15 ft / Rock Depth: NE
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 3 / Undisturbed --- / Core ---
Casing Diameter (in): 3in / Casing Depth (ft): ---	Water Level (ft.): First ▽ 7 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: John Dixon
Sampler: 1.75" x 4' Long Acetate Lined Macrocore	Field Engineer: Brandon Reiner
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Black GRAVEL [ASPHALT]	0					0.0	Started Drilling on 11/5/2020
		Dark brown fine-coarse SAND, trace brick, trace f-c gravel, trace asphalt (dry) [FILL]	1					0.0	
								0.0	
			2					0.0	
								0.0	
			3	M-1	Macrocore	24		0.0	
								0	
			4					0.0	
								0.7	
								0.7	
		Dark brown fine-coarse SAND, trace brick, trace f-c gravel, trace asphalt (dry) [FILL]	5					0.4	
								0.4	
			6					0.4	
								0.4	
		▽	7					0.4	Odor observed from 7-10 ft bgs
		Dark brown silty SAND and medium-coarse GRAVEL, trace wood (wet) [NATIVE]		M-2	Macrocore	48		15.3	
			8					69.0	
								80.5	
			9					109.6	Staining observed from 9-10 ft bgs
								63.5	
		Dark brown silty SAND, some f-m gravel, trace wood (wet) [NATIVE]	10					20.1	Product and odor observed in soil and GW from 10-15 ft bgs
								20.1	
			11					22.8	
								22.8	
			12	M-3	Macrocore	12		21.5	
								21.5	
			13					7.6	
								7.6	
			14					41.3	Bottom of boring at 15 ft bgs
								41.3	
			15						
			16						
			17						
			18						
			19						
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:42:28 AM ... Report: Log - LANGAN

LANGAN

Log of Boring **VEE-02** Sheet 1 of 1

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 7' NAVD88
Drilling Company: AWT Environmental Services, Inc.	Date Started: 11/5/20 / Date Finished: 11/5/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 20 ft / Rock Depth: NE
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 4, Undisturbed ---, Core ---
Casing Diameter (in): 3in / Casing Depth (ft): ---	Water Level (ft.): First ▽ 7, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: John Dixon
Sampler: 1.75" x 4' Long Acetate Lined Macrocore	Field Engineer: Brandon Reiner
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Dark brown fine-coarse SAND, some concrete, some f-c gravel, trace brick (dry) [FILL]	0	M-1	Macrocore	40		2.9	Started Drilling on 11/5/2020
			1					46.8	
								0.2	
			2					0.2	
								0.2	
			3					0.2	
								0.2	
			4					0.2	
								0.2	
		Dark gray to gray fine-medium SAND, trace f-m gravel (dry) [FILL]	5	M-2	Macrocore	30		6.5	
		Gray medium dense CLAY (moist) [FILL]						6.0	
		Dark gray to gray fine-medium SAND, trace glass, trace clay, trace coal [FILL]	6					12.2	Odor observed from 6-15 ft bgs
								12.8	
		Dark gray to gray fine-medium SAND, trace glass, trace clay, trace coal (wet) [FILL] ▽	7					32.8	
								20.9	
			8					52.4	
								30.0	
			9					24.5	
								26.0	
		Dark brown silty SAND, some f-m gravel (wet) [FILL]	10	M-3	Macrocore	24		10.0	Product in groundwater observed from 10-15 ft bgs
								10.0	
			11					37.9	
								37.9	
			12					33.2	
								33.2	
			13					41.6	
								41.6	
			14					35.8	
								35.8	
		Dark gray to gray medium dense CLAY, trace shells (moist) [NATIVE]	15	M-4	Macrocore	36		2.0	
								2.0	
			16					2.0	
								2.2	
			17					2.2	
								2.2	
			18					2.1	
		Dark brown medium dense CLAY (moist) [NATIVE]						2.1	
			19					2.1	Bottom of boring at 20 ft
								2.1	
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:42:31 AM ... Report: Log - LANGAN

LANGAN

Log of Boring **VEE-03** Sheet 1 of 2

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation and Datum: Approx. 9' NAVD88
Drilling Company: AWT Environmental Services, Inc.	Date Started: 11/6/20 / Date Finished: 11/6/20
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 25 ft / Rock Depth: NE
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 5 / Undisturbed --- / Core ---
Casing Diameter (in): 3in / Casing Depth (ft): ---	Water Level (ft.): First ▽ 8 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: --- / Weight (lbs): --- / Drop (in): ---	Drilling Foreman: John Dixon
Sampler: 1.75" x 4' Long Acetate Lined Macrocore	Field Engineer: Brandon Reiner
Sampler Hammer: --- / Weight (lbs): --- / Drop (in): ---	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Black GRAVEL [ASPHALT]	0					0.0	Started Drilling on 11/6/2020
		Dark brown fine-coarse SAND, trace concrete, trace brick, trace f-c gravel (dry) [FILL]	1					0.0	
								0.0	
			2	M-1	Macrocore	30		0.0	
								0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
		Dark brown medium-coarse SAND, some medium gravel, trace coal (dry) [FILL]	5					0.0	
								0.0	
			6					0.0	
								0.0	
			7	M-2	Macrocore	36		0.0	
								0.0	
		▽	8					0.0	
		Dark brown medium-coarse SAND, some medium gravel, trace coal (wet) [FILL]						0.0	
		Dark brown medium-coarse SAND, some medium gravel (wet) [FILL]	9					69.4	Product and odor observed in soil from 9-25 ft bgs.
								87.0	
		Dark brown silty SAND, some f-m gravel (wet) [NATIVE]	10					39.7	
								39.7	
			11					71.8	
								71.8	
			12	M-3	Macrocore	24		117.7	
								117.1	
			13					197.8	
								197.8	
			14					140.4	
								140.4	
		Dark brown fine-coarse SAND, some f-m gravel (wet) [NATIVE]	15					74.1	
								74.1	
			16					81.9	
								81.9	
			17					159.3	
				M-4	Macrocore	30		159.3	
		Dark gray silty SAND, trace wood, trace fine gravel (wet) [NATIVE]	18					88.9	
								88.9	
			19					73.1	
								73.1	
			20						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:42:34 AM ... Report: Log - LANGAN

LANGAN

Log of Boring **VEE-03** Sheet 2 of 2

Project	Project No.
28-90 Review Avenue	100652601
Location	**Elevation and Datum**
Queens, NY	Approx. 9' NAVD88

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Dark brown medium-coarse SAND, some f-m gravel (wet) [NATIVE]	20	M-5	Macrocore	24		103.8	
								103.8	
			21					52.5	
								52.5	
			22					58.6	
								58.6	
		Dark gray silty SAND, trace medium gravel (wet) [NATIVE]	23					16.6	
								16.6	
		Dark gray soft CLAY, trace medium gravel (wet) [NATIVE]	24					13.3	Bottom of boring at 25 ft bgs
								13.3	
			25						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:42:34 AM ... Report: Log - LANGAN

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-15

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.36 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/13/2020 / Date Finished: 7/13/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 15-feet bgs and backfilled with bentonite to 14-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 4- to 14-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 3-feet bgs. A bentonite seal was installed from 1- to 3-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

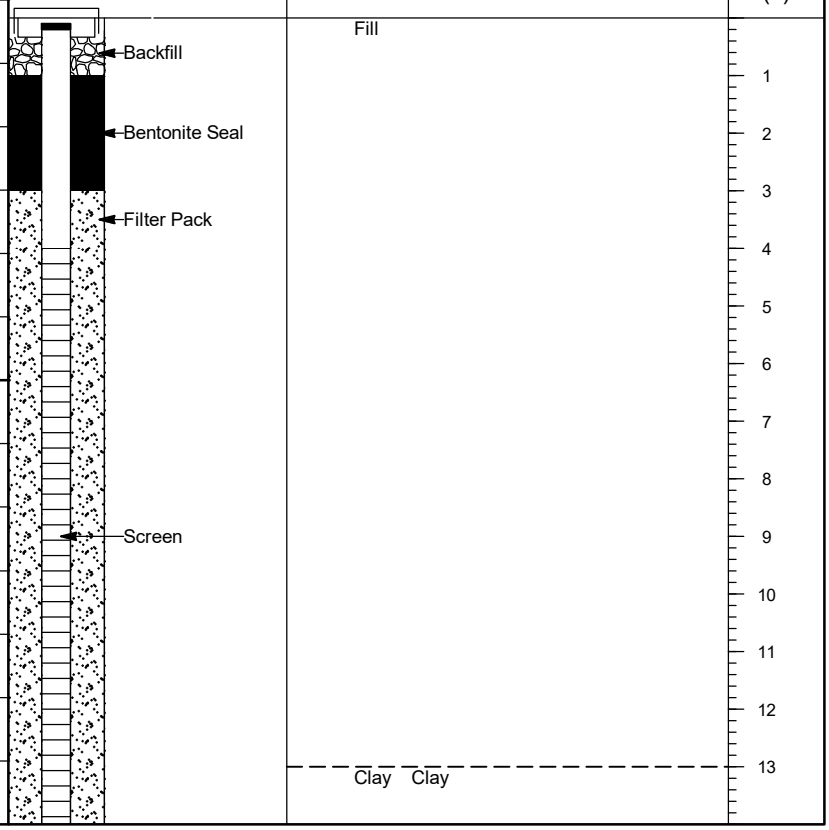
LMW-15 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	7.14'	0.22' bgs
Top of Seal	6.36'	1' bgs
Top of Filter	4.36'	3' bgs
Top of Screen	3.36'	4' bgs
Bottom of Filter	-6.64'	14' bgs
Bottom of Well	-6.64'	14' bgs
Screen Length: 10.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
2.28'	4.86'	7/27/2020
2.29'	4.85'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:23:57 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-16

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.58 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/13/2020 / Date Finished: 7/13/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 15-feet bgs and backfilled with bentonite to 14-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 4- to 14-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 3-feet bgs. A bentonite seal was installed from 1- to 3-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

LMW-16 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

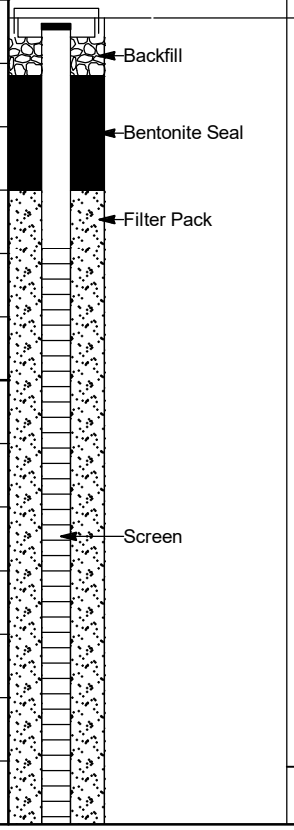
Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	Type of Filter Material: #00 Sand

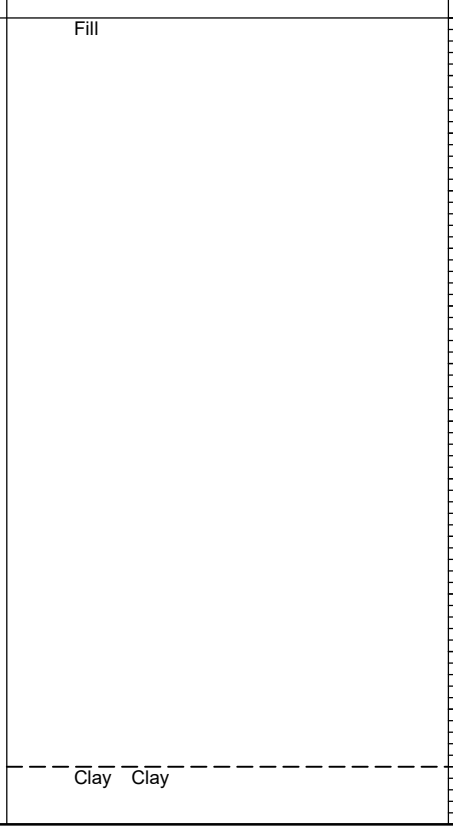
	Elevation	Depth
Top of Casing	7.26'	0.32' bgs
Top of Seal	6.58'	1' bgs
Top of Filter	4.58'	3' bgs
Top of Screen	3.58'	4' bgs
Bottom of Filter	-6.42'	14' bgs
Bottom of Well	-6.42'	14' bgs

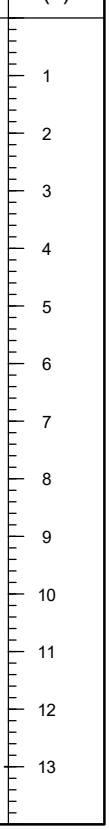
Screen Length	Slot Size
10.0'	0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
2.56'	4.7'	7/27/2020
2.37'	4.89'	7/30/2020







\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:00 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-17

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.31 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/13/2020 / Date Finished: 7/13/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 23-feet bgs and backfilled with bentonite to 20-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 5- to 20-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

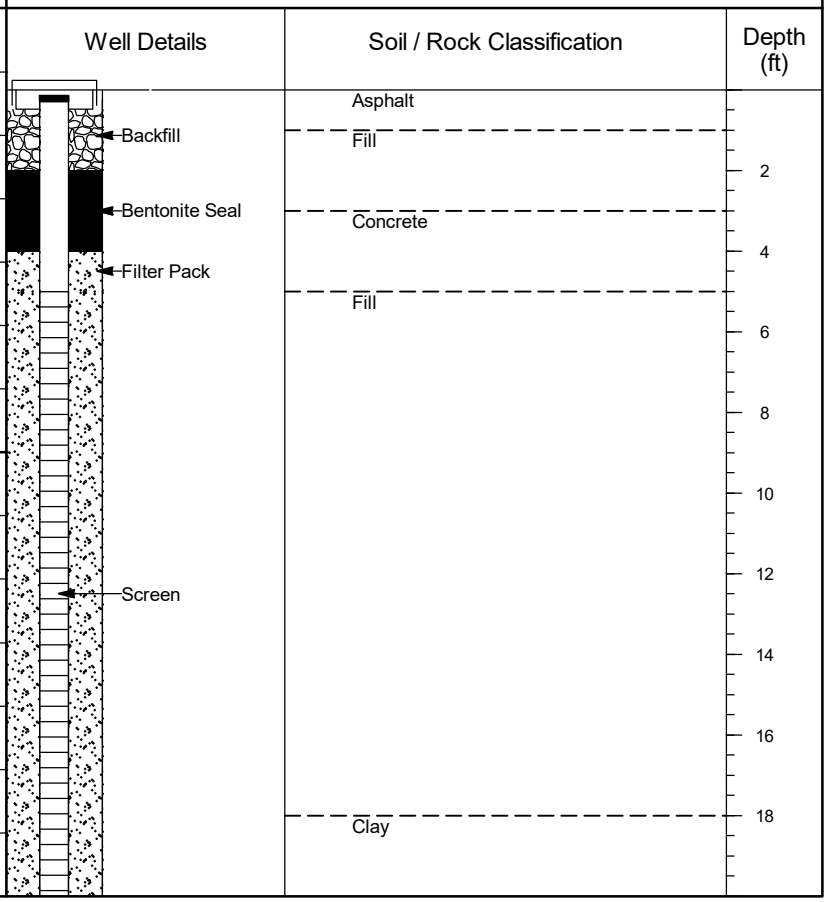
LMW-17 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	7.07'	0.24' bgs
Top of Seal	5.31'	2' bgs
Top of Filter	3.31'	4' bgs
Top of Screen	2.31'	5' bgs
Bottom of Filter	-12.69'	20' bgs
Bottom of Well	-12.69'	20' bgs
Screen Length: 15.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
2.52'	4.55'	7/27/2020
2.33'	4.74'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:03 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-18

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.67 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/14/2020 / Date Finished: 7/14/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 15-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 5- to 15-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

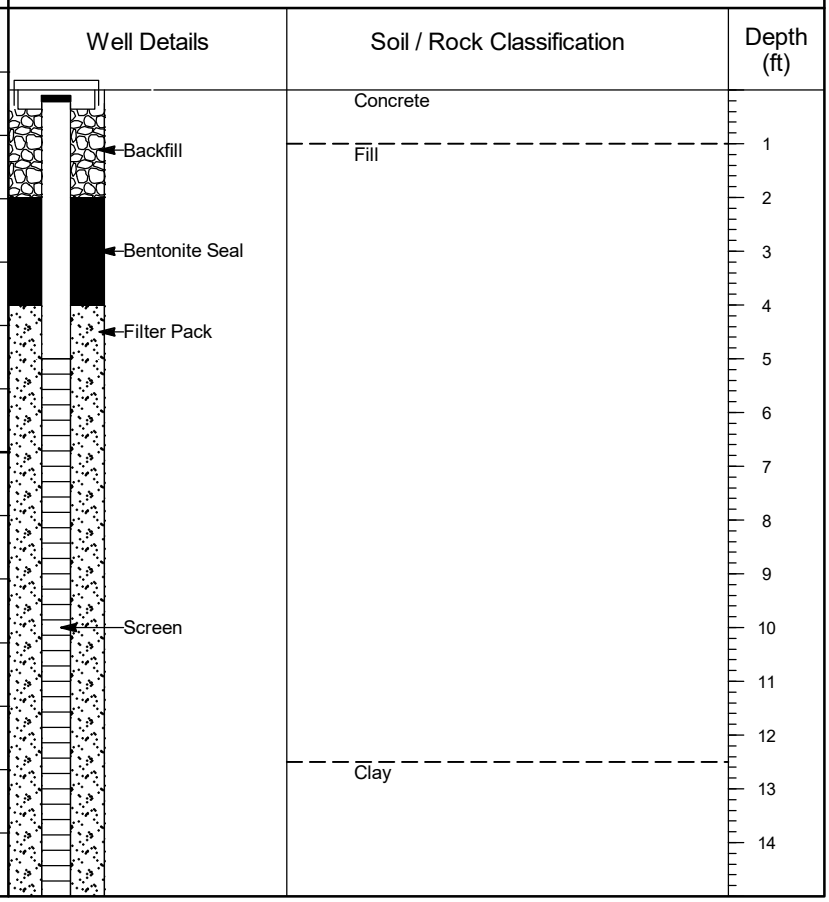
LMW-18 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	7.42'	0.25' bgs
Top of Seal	5.67'	2' bgs
Top of Filter	3.67'	4' bgs
Top of Screen	2.67'	5' bgs
Bottom of Filter	-7.33'	15' bgs
Bottom of Well	-7.33'	15' bgs
Screen Length: 10.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
2.08'	5.34'	7/27/2020
1.94'	5.48'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:04 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-19

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.49 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/14/2020 / Date Finished: 7/14/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 15-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 5- to 15-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

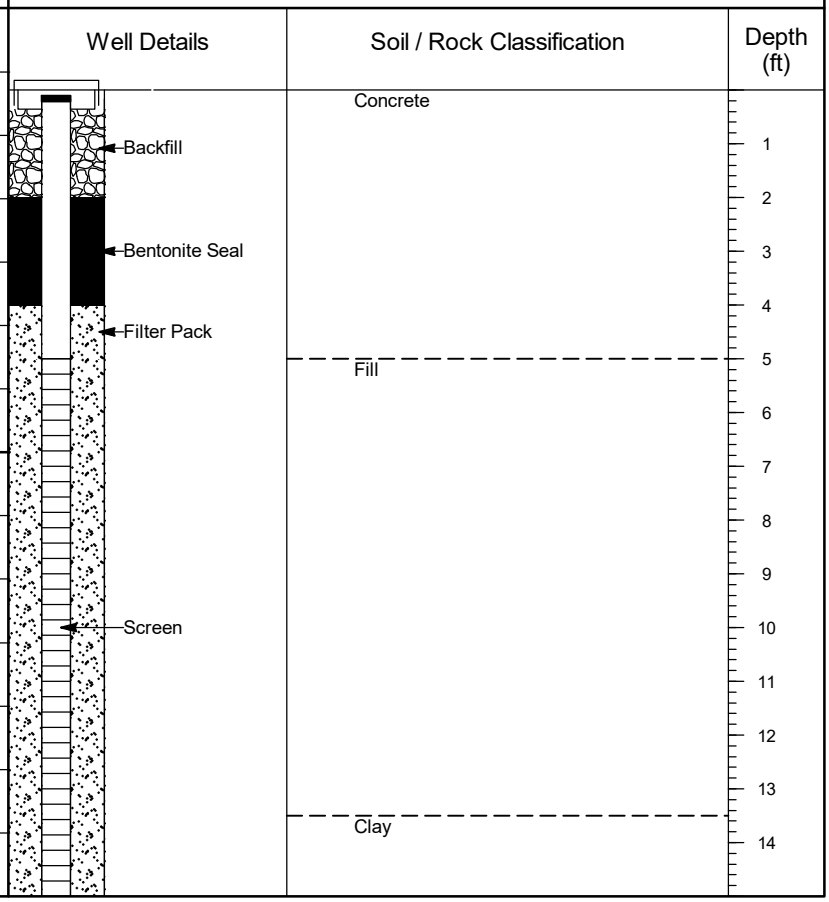
LMW-19 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	Type of Filter Material: #00 Sand

	Elevation	Depth
Top of Casing	7.32'	0.17' bgs
Top of Seal	5.49'	2' bgs
Top of Filter	3.49'	4' bgs
Top of Screen	2.49'	5' bgs
Bottom of Filter	-7.51'	15' bgs
Bottom of Well	-7.51'	15' bgs
Screen Length: 10.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
1.94'	5.38'	7/27/2020
1.90'	5.42'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:06 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-20

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 9.37 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/14/2020 / Date Finished: 7/14/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 15-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 5- to 15-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

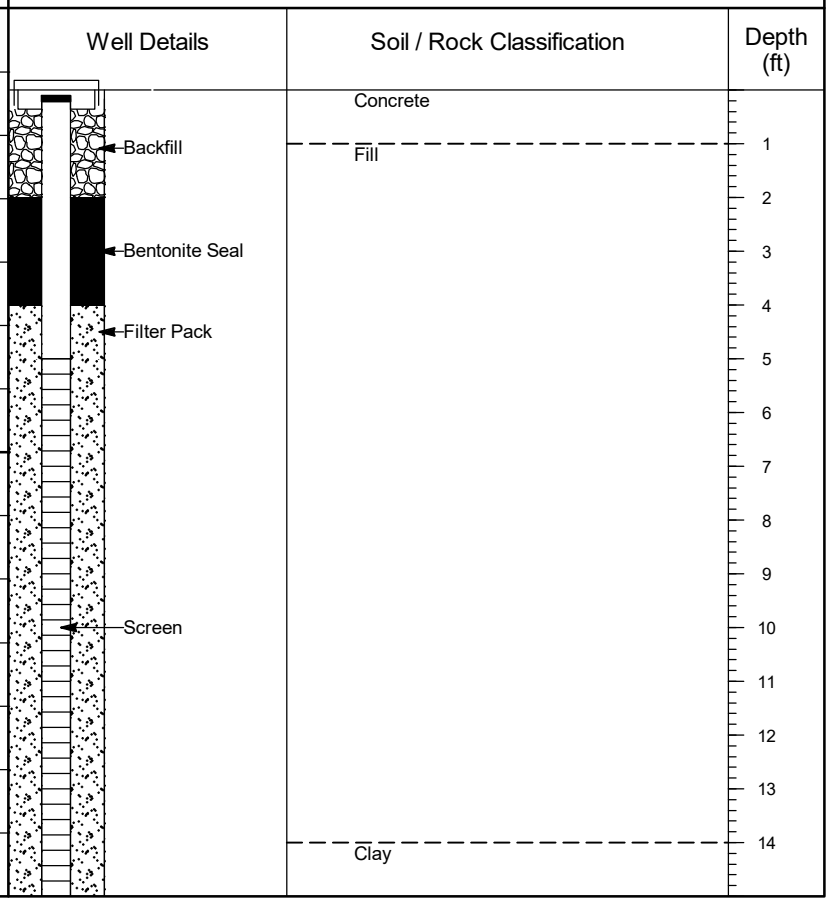
LMW-20 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	9.20'	0.17' bgs
Top of Seal	7.37'	2' bgs
Top of Filter	5.37'	4' bgs
Top of Screen	4.37'	5' bgs
Bottom of Filter	-5.63'	15' bgs
Bottom of Well	-5.63'	15' bgs
Screen Length: 10.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
1.76'	7.44'	7/27/2020
1.71'	7.49'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:07 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-21

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 10.27 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/14/2020 / Date Finished: 7/14/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 15-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 5- to 15-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

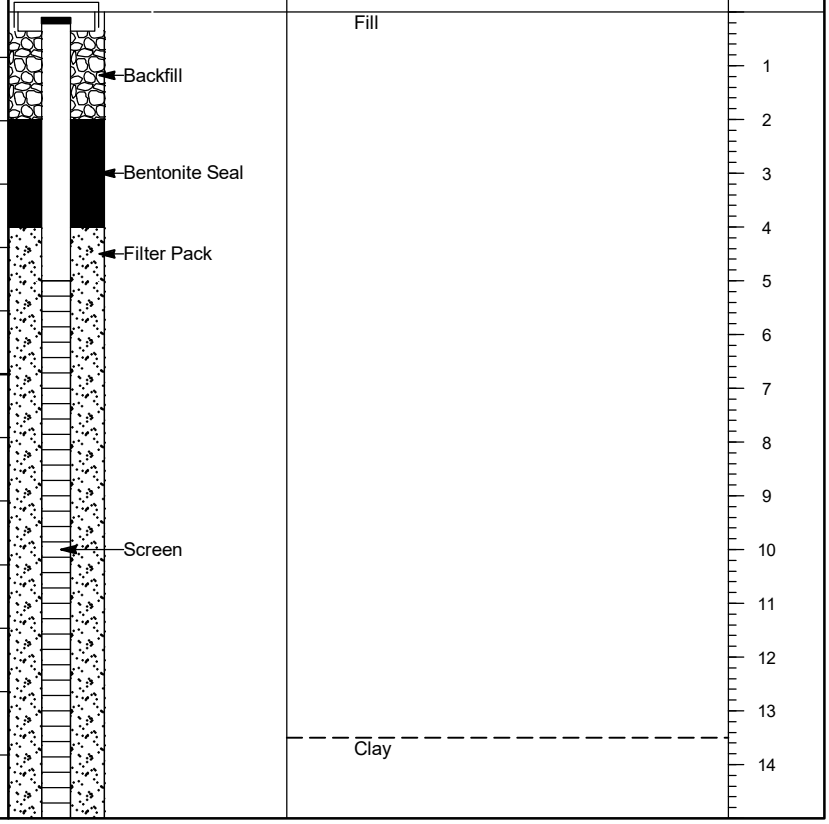
LMW-21 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	9.91'	0.36' bgs
Top of Seal	8.27'	2' bgs
Top of Filter	6.27'	4' bgs
Top of Screen	5.27'	5' bgs
Bottom of Filter	-4.73'	15' bgs
Bottom of Well	-4.73'	15' bgs
Screen Length: 10.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
1.47'	8.44'	7/27/2020
1.42'	8.49'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:08 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-22

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 8.48 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/14/2020 / Date Finished: 7/14/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 17-feet bgs and backfilled with bentonite to 15-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 15- to 17-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 5- to 15-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

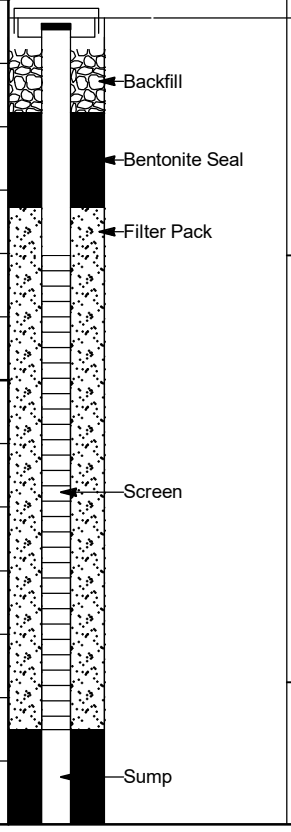
LMW-22 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	7.82'	0.66' bgs
Top of Seal	6.48'	2' bgs
Top of Filter	4.48'	4' bgs
Top of Screen	3.48'	5' bgs
Bottom of Filter	-6.52'	15' bgs
Bottom of Well	-8.52'	17' bgs
Screen Length: 10.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
1.32'	6.5'	7/27/2020
1.32'	6.5'	7/30/2020



Soil / Rock Classification: Concrete; Fill; Clay

Depth (ft): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:10 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-23

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.18 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/10/2020 / Date Finished: 7/10/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 25-feet bgs and backfilled with bentonite to 21.5-feet bgs. A 2-inch 0.010-slot Schedule 40 PVC screen was installed from 6.5- to 21.5-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

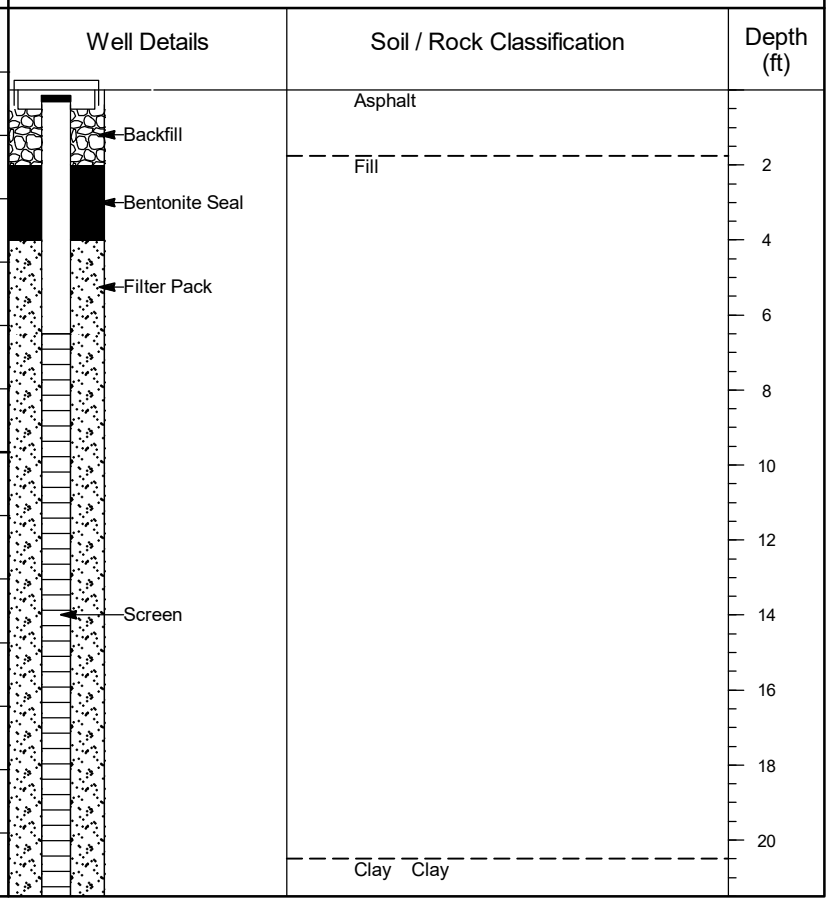
LMW-23 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	6.79'	0.39' bgs
Top of Seal	5.18'	2' bgs
Top of Filter	3.18'	4' bgs
Top of Screen	0.68'	6.5' bgs
Bottom of Filter	-14.32'	21.5' bgs
Bottom of Well	-14.32'	21.5' bgs
Screen Length: 15.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
0.36'	6.43'	7/27/2020
0.36'	6.43'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:13 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-28

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.42 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/16/2020 / Date Finished: 7/16/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 26-feet bgs and backfilled with bentonite to 24-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 24- to 26-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 4- to 24-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 3-feet bgs. A bentonite seal was installed from 1- to 3-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

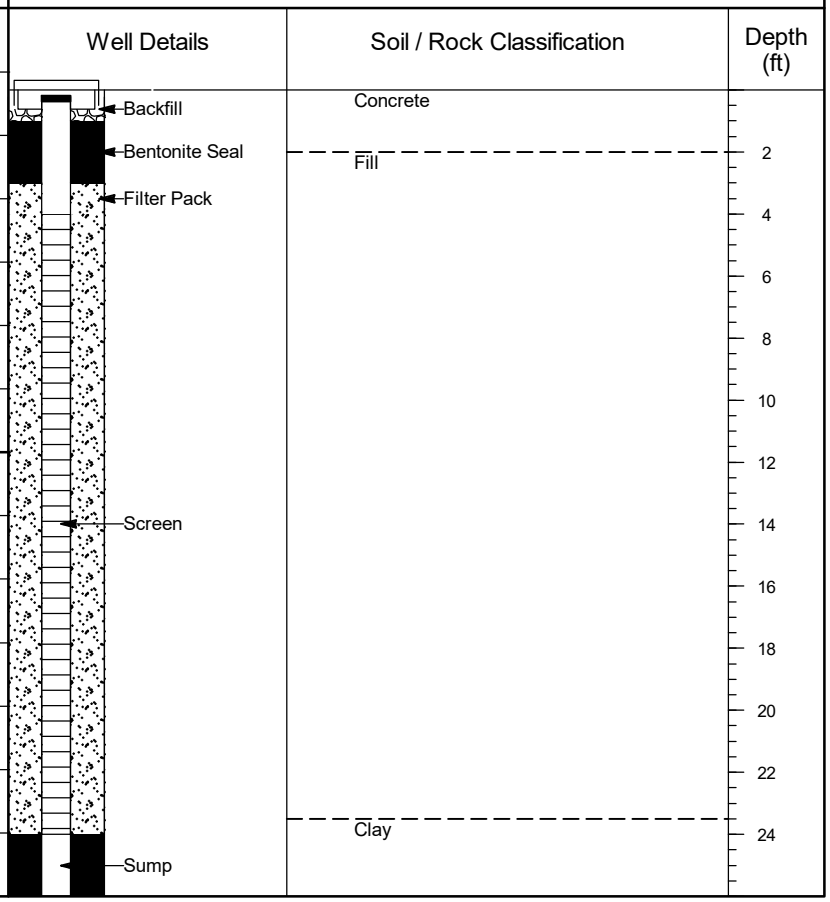
LMW-28 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	7.20'	0.22' bgs
Top of Seal	6.42'	1' bgs
Top of Filter	4.42'	3' bgs
Top of Screen	3.42'	4' bgs
Bottom of Filter	-16.58'	24' bgs
Bottom of Well	-18.58'	26' bgs
Screen Length: 20.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
-0.34'	7.54'	7/27/2020
-0.34'	7.54'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:15 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-24

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 6.90 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/9/2020 / Date Finished: 7/9/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 24-feet bgs and backfilled with bentonite to 18.5-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 16.5- to 18.5-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 5- to 16.5-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

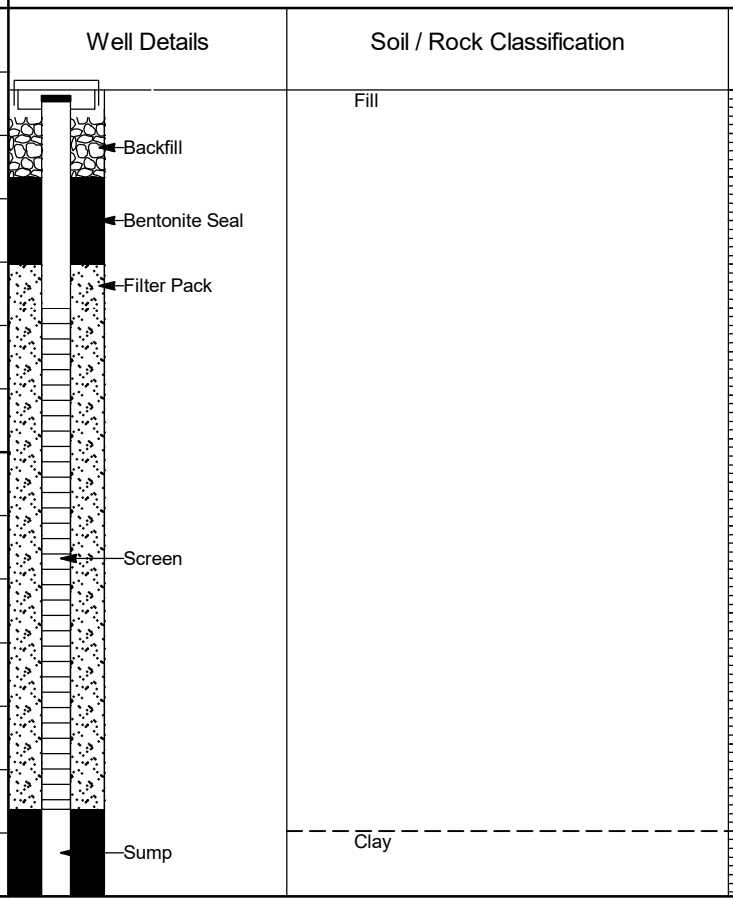
LMW-24 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	6.27'	0.63' bgs
Top of Seal	4.90'	2' bgs
Top of Filter	2.90'	4' bgs
Top of Screen	1.90'	5' bgs
Bottom of Filter	-9.60'	16.5' bgs
Bottom of Well	-11.60'	18.5' bgs
Screen Length: 11.5'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
0.45'	5.82'	7/27/2020
0.45'	5.82'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:16 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-26

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.31 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/9/2020 / Date Finished: 7/9/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 30-feet bgs and backfilled with bentonite to 20-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 20- to 22-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 5- to 20-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

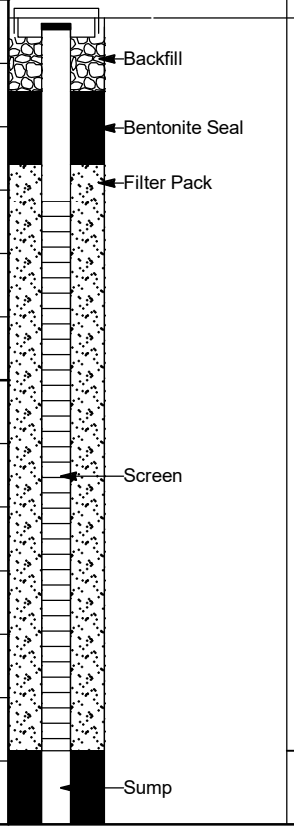
LMW-26 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

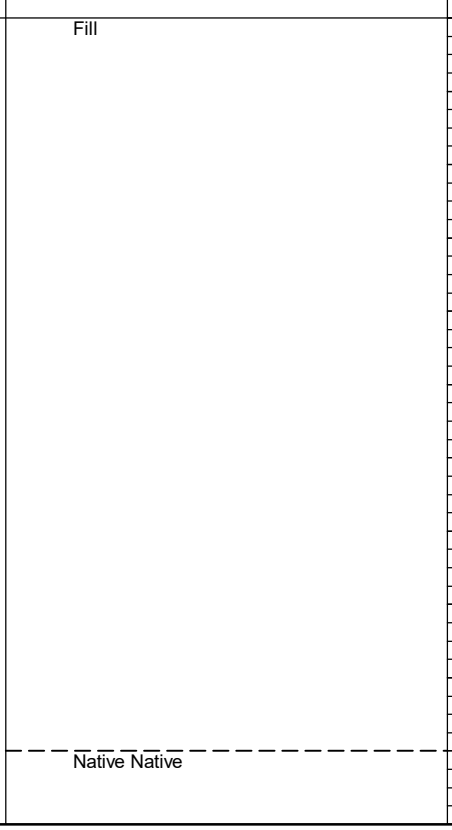
Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	Type of Filter Material: #00 Sand

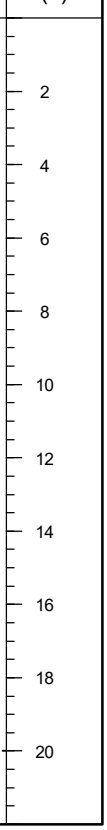
	Elevation	Depth
Top of Casing	7.06'	0.25' bgs
Top of Seal	5.31'	2' bgs
Top of Filter	3.31'	4' bgs
Top of Screen	2.31'	5' bgs
Bottom of Filter	-12.69'	20' bgs
Bottom of Well	-14.69'	22' bgs
Screen Length: 15.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
0.51'	6.55'	7/27/2020
0.52'	6.54'	7/30/2020







\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:18 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-25

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 6.61 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/16/2020 / Date Finished: 7/16/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 14-feet bgs and backfilled with bentonite to 12-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 12- to 14-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 4- to 12-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 3-feet bgs. A bentonite seal was installed from 1- to 3-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

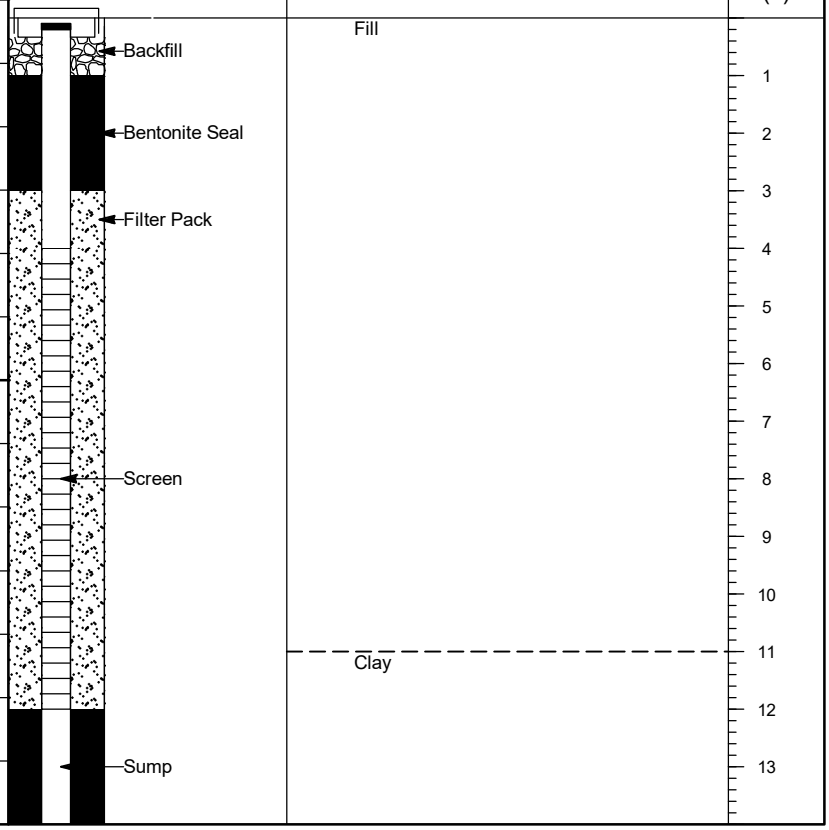
LMW-25 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Screen: Schedule 40	Diameter: 2 inch
Borehole Diameter: 6-inch	
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Seal Material: Bentonite	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	6.46'	0.15' bgs
Top of Seal	5.61'	1' bgs
Top of Filter	3.61'	3' bgs
Top of Screen	2.61'	4' bgs
Bottom of Filter	-5.39'	12' bgs
Bottom of Well	-7.39'	14' bgs
Screen Length: 8.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
-0.86'	7.32'	7/27/2020
-0.87'	7.33'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:20 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-29

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 8.42 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/16/2020 / Date Finished: 7/16/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 23-feet bgs and backfilled with bentonite to 21-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 21- to 23-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 6- to 21-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 5-feet bgs. A bentonite seal was installed from 3- to 5-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

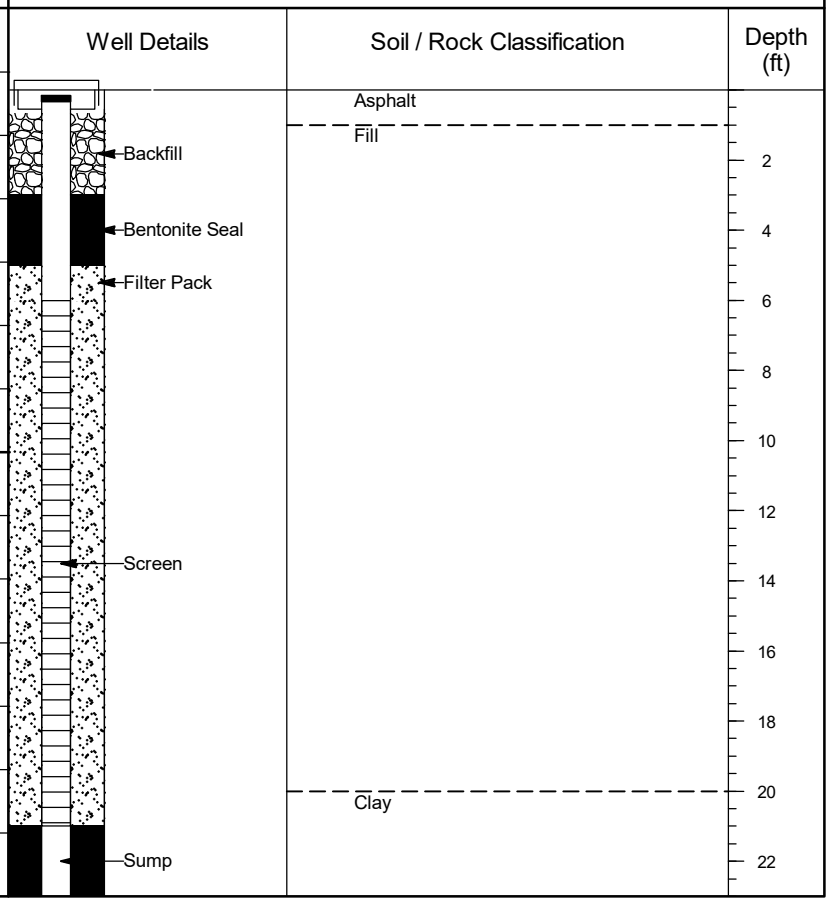
LMW-29 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40 PVC	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6 inch	Type of Filter Material: #00 Sand

	Elevation	Depth
Top of Casing	7.77'	0.65' bgs
Top of Seal	5.42'	3' bgs
Top of Filter	3.42'	5' bgs
Top of Screen	2.42'	6' bgs
Bottom of Filter	-12.58'	21' bgs
Bottom of Well	-14.58'	23' bgs
Screen Length: 15.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
0.12'	7.65'	7/27/2020
0.12'	7.65'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:22 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-27

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.61 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/15/2020 / Date Finished: 7/15/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 25-feet bgs and backfilled with bentonite to 20-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 20- to 22-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 5- to 20-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 4-feet bgs. A bentonite seal was installed from 2- to 4-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

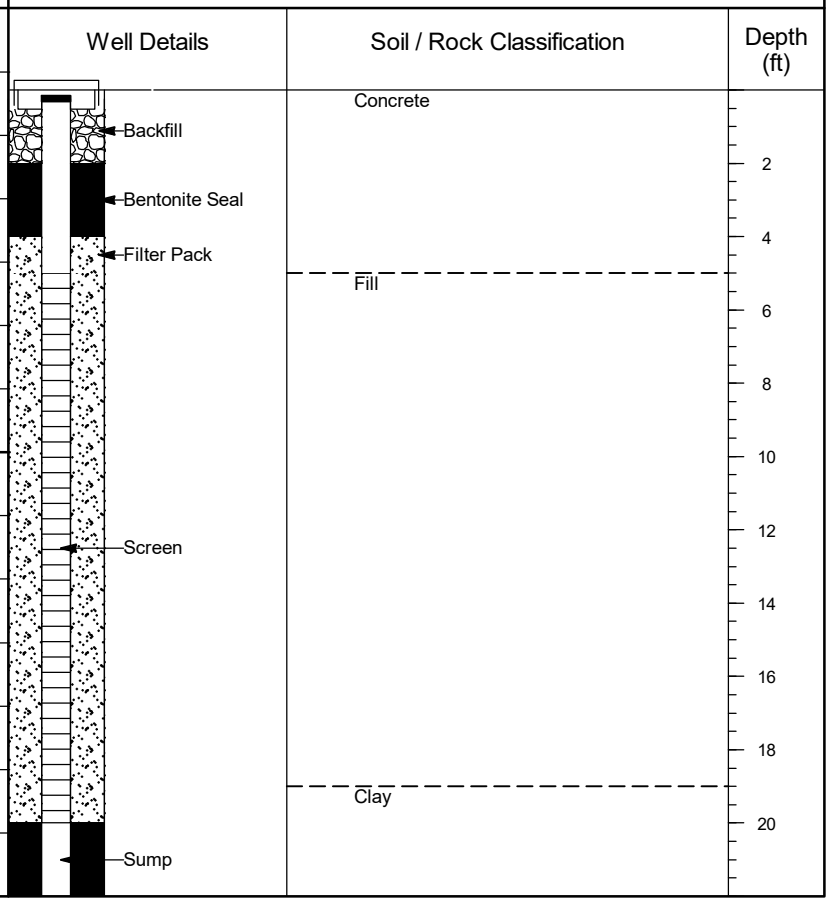
LMW-27 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	
Type of Filter Material: #00 Sand	

	Elevation	Depth
Top of Casing	7.36'	0.25' bgs
Top of Seal	5.61'	2' bgs
Top of Filter	3.61'	4' bgs
Top of Screen	2.61'	5' bgs
Bottom of Filter	-12.39'	20' bgs
Bottom of Well	-14.39'	22' bgs
Screen Length: 15.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
0.69'	6.67'	7/27/2020
1.23'	6.13'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:23 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-30

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 10.36 NAVD88
Drilling Agency: AARCO Environmental Services, Corp.	Date Started: 7/16/2020 / Date Finished: 7/16/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: Tom Harer
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Esther Arthur

Method of Installation

Drilled to 16.5-feet bgs and backfilled with bentonite to 14.5-feet bgs. A 2-inch Schedule 40 PVC sump was installed from 14.5- to 16.5-feet bgs followed by a 2-inch 0.010-slot Schedule 40 PVC screen from 4.5- to 14.5-feet bgs followed by a 2-inch Schedule 40 PVC riser to grade. No. 00 sand was backfilled to 3-feet bgs. A bentonite seal was installed from 1- to 3-feet bgs and the remainder of the borehole was backfilled with non-impacted soil cuttings, clean sand, and/or a bentonite/grout slurry. Manhole installed and secured with concrete.

Method of Well Development

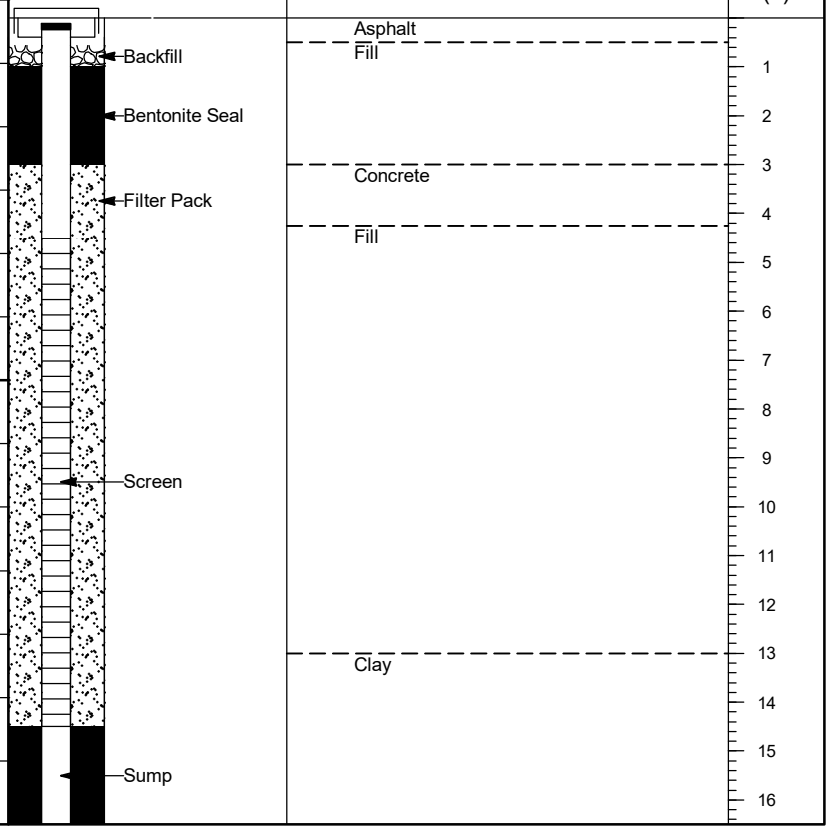
LMW-30 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear. Purged water was monitored using a water quality meter and was developed until the turbidity readings measured to stabilize within 10%; if turbidity did not fall below 50 nephelometric turbidity units (NTUs) before stabilizing, pH, conductivity, and temperature were also recorded until all three stabilized within 10%.

Type of Casing:	Diameter:
Type of Backfill Material: Non-impacted soil cuttings, sand, and bentonite/grout	
Type of Screen: Schedule 40	Diameter: 2 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	Type of Filter Material: #00 Sand

	Elevation	Depth
Top of Casing	9.80'	0.56' bgs
Top of Seal	9.36'	1' bgs
Top of Filter	7.36'	3' bgs
Top of Screen	5.86'	4.5' bgs
Bottom of Filter	-4.14'	14.5' bgs
Bottom of Well	-6.14'	16.5' bgs
Screen Length: 10.0'		Slot Size: 0.020

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
1.42'	8.38'	7/27/2020
1.42'	8.38'	7/30/2020



\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 10/6/2020 12:24:25 PM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. LMW-31

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 9.0 NAVD88
Drilling Agency: AWT Environmental Services, Inc.	Date Started: 11/6/2020 / Date Finished: 11/6/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: John Dixon
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Brandon Reiner

Method of Installation

AWT installed a 10-slot Schedule 40 PVC screen from 5 to 20 feet bgs and Schedule 40 PVC riser to the surface. The annulus of the borehole was backfilled to 4.5-feet bgs with No. 1 Sand, hydrated bentonite seal from 2.5 to 4.5 feet bgs, and bentonite grout from 0 to 2.5-feet bgs. A manhole was installed and encased in concrete at grade.

Method of Well Development

LMW-31 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear.

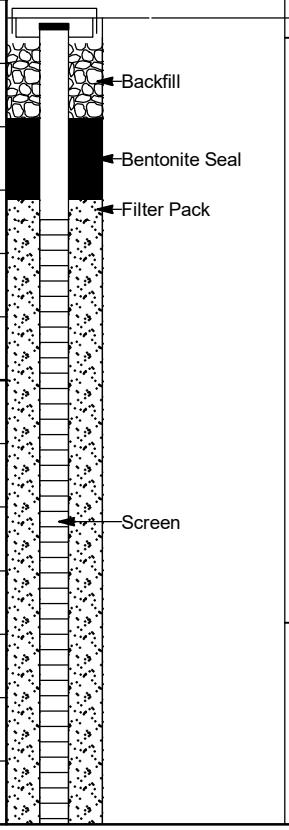
Type of Casing: — Diameter: —	Type of Backfill Material: Bentonite Grout
Type of Screen: Schedule 40 — Diameter: 2-inch	Type of Seal Material: Bentonite
Borehole Diameter: 6-inch	Type of Filter Material: No. 1 Sand

	Elevation	Depth
Top of Casing	8.37'	0.63' bgs
Top of Seal	6.50'	2.5' bgs
Top of Filter	4.50'	4.5' bgs
Top of Screen	4.00'	5' bgs
Bottom of Filter	-11.00'	20' bgs
Bottom of Well		20' bgs

Screen Length	Slot Size
15.0'	0.010

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date



Soil / Rock Classification	Depth (ft)
ASPHALT	0.63
FILL	2.5
	4.5
	5
SAND	20

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:21:13 AM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. VEE-01

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.0 NAVD88
Drilling Agency: AWT Environmental Services, Inc.	Date Started: 11/5/2020 / Date Finished: 11/5/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: John Dixon
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Brandon Reiner

Method of Installation

AWT installed a 30-slot Schedule 40 PVC screen from 4 to 14 feet bgs and Schedule 40 PVC riser to the surface. The annulus of the borehole was backfilled to 3.5-feet bgs with No. 3 Sand, hydrated bentonite seal from 2.5 to 3.5 feet bgs, and bentonite grout from 0 to 2.5-feet bgs. A manhole was installed and encased in concrete at grade.

Method of Well Development

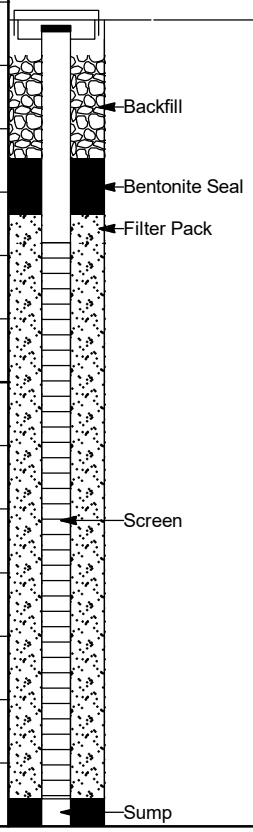
VEE-01 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear.

Type of Casing:	Diameter:
Type of Backfill Material: Bentonite Grout	
Type of Screen: Schedule 40	Diameter: 4 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	Type of Filter Material: No. 3 Sand

	Elevation	Depth
Top of Casing	6.37'	0.63' bgs
Top of Seal	4.50'	2.5' bgs
Top of Filter	3.50'	3.5' bgs
Top of Screen	3.00'	4' bgs
Bottom of Filter	-7.00'	14' bgs
Bottom of Well		14.5' bgs
Screen Length: 10.0'		Slot Size: 0.030

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date



Soil / Rock Classification	Depth (ft)
ASPHALT	0.63
FILL	0.63
	2.5
	3.5
	4
SILTY SAND	
	14
	14.5

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:21:15 AM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. VEE-02

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 7.0 NAVD88
Drilling Agency: AWT Environmental Services, Inc.	Date Started: 11/5/2020 / Date Finished: 11/5/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: John Dixon
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Brandon Reiner

Method of Installation

AWT installed a 30-slot Schedule 40 PVC screen from 4 to 14 feet bgs and Schedule 40 PVC riser to the surface. The annulus of the borehole was backfilled to 3.5-feet bgs with No. 3 Sand, hydrated bentonite seal from 2.5 to 3.5 feet bgs, and bentonite grout from 0 to 2.5-feet bgs. A manhole was installed and encased in concrete at grade.

Method of Well Development

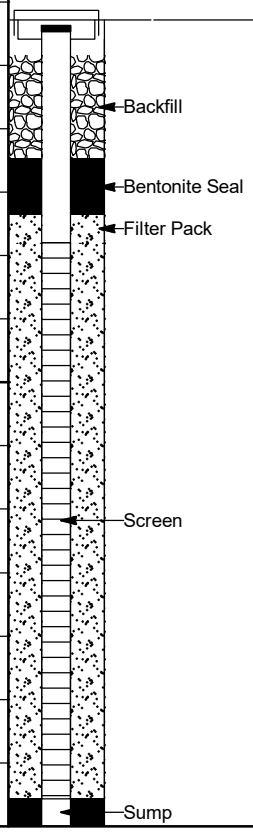
VEE-02 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear.

Type of Casing: — Diameter: —	Type of Backfill Material: Bentonite Grout
Type of Screen: Schedule 40 — Diameter: 4 inch	Type of Seal Material: Bentonite
Borehole Diameter: 6-inch	Type of Filter Material: No. 3 Sand

	Elevation	Depth
Top of Casing	6.37'	0.63' bgs
Top of Seal	4.50'	2.5' bgs
Top of Filter	3.50'	3.5' bgs
Top of Screen	3.00'	4' bgs
Bottom of Filter	-7.00'	14' bgs
Bottom of Well		14.5' bgs
Screen Length: 10.0'		Slot Size: 0.030

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date



Soil / Rock Classification	Depth (ft)
FILL	0.63 0.63
SILTY SAND	2.5 3.5 4
SILTY SAND	14 14.5

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:21:16 AM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

LANGAN

WELL CONSTRUCTION SUMMARY

Well No. VEE-03

Project: 28-90 Review Avenue	Project No.: 100652601
Location: Queens, NY	Elevation And Datum: 9.0 NAVD88
Drilling Agency: AWT Environmental Services, Inc.	Date Started: 11/6/2020 / Date Finished: 11/6/2020
Drilling Equipment: Geoprobe 7822 DT	Driller: John Dixon
Size And Type of Bit: 6-inch Hollow Stem Auger	Inspector: Brandon Reiner

Method of Installation

AWT installed a 30-slot Schedule 40 PVC screen from 6 to 21 feet bgs and Schedule 40 PVC riser to the surface. The annulus of the borehole was backfilled to 5.5-feet bgs with No. 3 Sand, hydrated bentonite seal from 2.5 to 5.5 feet bgs, and bentonite grout from 0 to 2.5-feet bgs. A manhole was installed and encased in concrete at grade.

Method of Well Development

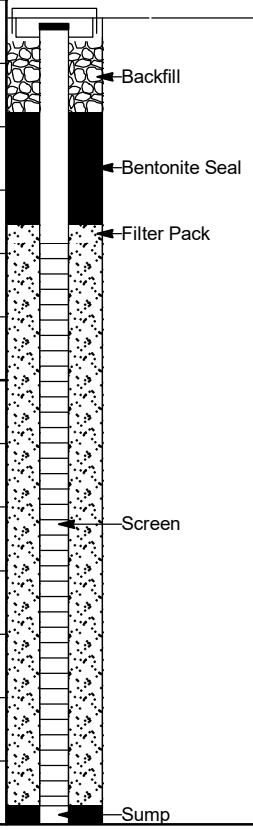
VEE-03 was developed with a whale pump using surge pumping techniques across the well screen in two- to three-foot increments. After surging, the well was purged via pumping until the water became clear.

Type of Casing:	Diameter:
Type of Backfill Material: Bentonite Grout	
Type of Screen: Schedule 40	Diameter: 4 inch
Type of Seal Material: Bentonite	
Borehole Diameter: 6-inch	Type of Filter Material: No. 3 Sand

	Elevation	Depth
Top of Casing	8.37'	0.63' bgs
Top of Seal	6.50'	2.5' bgs
Top of Filter	3.50'	5.5' bgs
Top of Screen	3.00'	6' bgs
Bottom of Filter	-12.00'	21' bgs
Bottom of Well		21.5' bgs
Screen Length: 15.0'		Slot Size: 0.030

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date

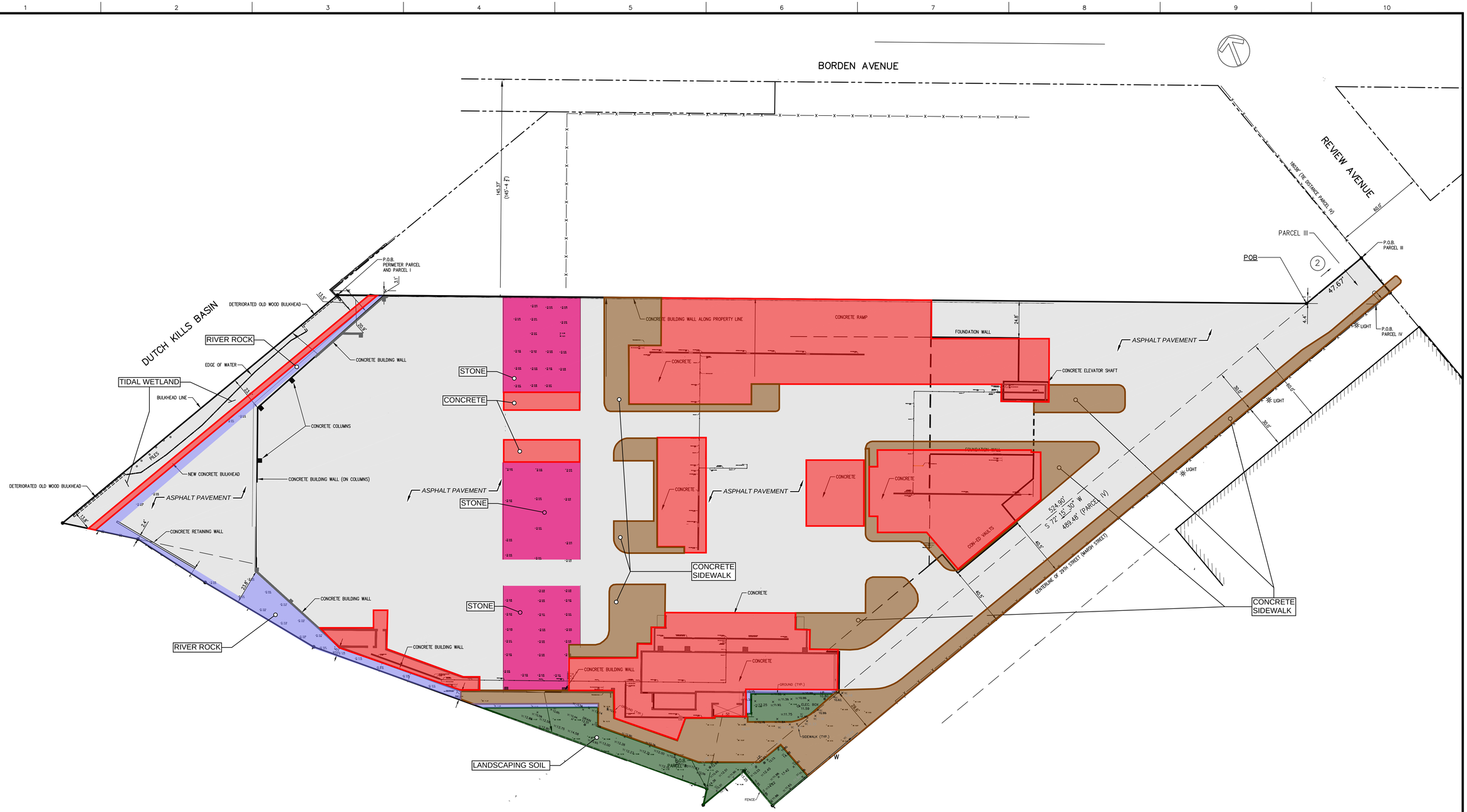


Soil / Rock Classification	Depth (ft)
ASPHALT	0
FILL	0.63
	2.5
	5.5
	6
SILTY SAND	
SAND	
SILTY SAND	
SAND SAND	21
	21.5

\\LANGAN.COM\DATA\PAR\DATA6\100652601\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\100652601_ENTERPRISE.GPJ ... 1/21/2021 8:21:17 AM ... Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY

APPENDIX F

COMPOSITE COVER SYSTEM SURVEY



NOTE:
ALL INFORMATION ON THIS DRAWING
IS BASED ON SURVEY BY OTHERS

REV.	DATE	BY	CHECKED	DESCRIPTION
0	11/25/25			

SCALE
1"=30'
30' 0 30' 60'
0m 2.5m 5m 7.5m 10m

EUGENE LEZAJA
PROFESSIONAL LAND SURVEYOR
CERTIFICATION OF FACTUAL ACCURACY

STATE OF NEW YORK
EUGENIJ LEZAJA
050629
LICENSED LAND SURVEYOR

FIELD WORK BY:	AB/JB
DRAWN BY:	AB
DESIGNED BY:	N/A
CHECKED BY:	MB
APPROVED BY:	EL
CLASSIFICATION	SURVEYING

50 STATES ENGINEERING
ENGINEERING SURVEYING PLANNING
www.50StatesEngineering.com
43 MOONACHIE ROAD PH (201) 50-STATE
HACKENSACK, NJ 07601 FAX (201) 591-7907

PROJECT NAME
INNOVO PROPERTY GROUP
28-90 REVIEW AVENUE

DRAWING TITLE
SITE-CAP AND SLAB
FINAL-AS-BUILT SURVEY
LONG ISLAND CITY, QUEENS COUNTY
CITY & STATE OF NEW YORK

PROJECT NUMBER
25-102

DRAWING NUMBER
25-102-111

APPENDIX G

EXCAVATION WORK PLAN

LANGAN

APPENDIX G – EXCAVATION WORK PLAN (EWP)

1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B of the SMP.

Table 1: Notifications*

Brittany Taranto NYSDEC Project Manager	Phone: 518-402-9791 Email: brittany.taranto@dec.ny.gov
Douglas MacNeal NYSDEC Project Manager's Supervisor	Phone: 518-402-9684 Email: douglas.macneal@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	Phone: 518-402-0193 Email: kelly.lewandowski@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;

- A schedule for the work, detailing the start and completion of all intrusive work, and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP appended to this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g., photoionization detector [PID]) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections 6 and 7 of this EWP.

3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). Trucks

transporting contaminated soil must have either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck traffic would be routed on the most direct course using major thoroughfares where possible and flaggers would be used to protect pedestrians at site entrances and exits. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to

major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 361-5 registered or permitted facility).

7 MATERIALS REUSE ON-SITE

The qualified environmental professional, as defined in 6 NYCRR Part 375, will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e., contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances April 2023 guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections 2 and 3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site may only be reused on-site with written approval from the NYSDEC project manager.

8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e., a local pond, stream or river) will be performed under a SPDES permit.

9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the decision document. The existing cover system is comprised of impervious areas including concrete slabs (minimum 12- to 14-inch thick), heavy duty asphalt (7-inch thick), and concrete sidewalk (minimum 4-inch thick). Pervious areas of the cover system include a minimum of 1 foot of clean fill over a demarcation layer within landscaped areas. The demarcation layer will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. Acceptable cover system elements include concrete, asphalt or a minimum of 1 foot of soil meeting the lower of the Protection of Groundwater SCOs or the Commercial Restricted Use SCOs overlying a visual demarcation layer. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix K of the SMP.

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for commercial use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 1 of the SMP. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC’s Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

13 COMMUNITY AIR MONITORING PLAN

Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP outlined below and as provided in Appendix G of the SMP.

The CAMP will include real-time monitoring for VOCs and particulates at the upwind and downwind perimeter of each designated work area when ground-intrusive work is in progress. Continuous monitoring will be required for all ground-intrusive work. Ground-intrusive work includes, but is not limited to, soil/fill excavation and handling and utility trenching. Periodic monitoring for VOCs may be required during non-intrusive work such as the collection of soil samples. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location and taking a reading prior to leaving a sample location.

CAMP monitoring of total VOC levels will be conducted using PIDs, and monitoring for particulates will be conducted using particulate sensors equipped with filters that can detect airborne particulates less than 10 microns in diameter (PM10). Monitoring for particulates and odors will be conducted during ground-intrusive work by a field engineer, scientist, or geologist under the supervision of the RE. The work zone is defined as the general area in which machinery is operating in support of remediation. A portable PID will be used to monitor the work zone and for periodic monitoring of total VOC levels during work such as soil sampling. The Site perimeter will be visually monitored for fugitive dust emissions.

The following actions will be taken based on total VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work will resume provided that the total VOC level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/ commercial structure, whichever is

less – but in no case less than 20 feet, is below 5 ppm above background for the 15-minute average.

- If the total VOC level is above 25 ppm at the perimeter of the hot zone, work will be shut down.

The following actions will be taken based on dust levels measured or visual dust observations:

- If the downwind particulate level is 100 µg/m³ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind PM10 levels do not exceed 150 µg/m³ above the background level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m³ above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the daily report. In addition, a map showing the location of the downwind and upwind CAMP stations will be included in the daily report.

14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include the application of foam suppressants or tarps over the odorous material or VOC source areas. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor

events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section 13 and Appendix H of the SMP. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.

- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX H

HEALTH AND SAFETY PLAN

LANGAN

HEALTH AND SAFETY PLAN

for

SITE MANAGEMENT

28-90 REVIEW AVENUE
Long Island City, New York

Prepared For:

28-90 Review Ave Property Owner LLC
c/o Innovo Property Group
1350 Avenue of the Americas, 17th Floor
New York, New York 10019

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, New Jersey 07054

June 2025
100652601

LANGAN

ENVIRONMENTAL HEALTH AND SAFETY PLAN

Client:	**28-90 Review Ave Property Owner LLC**
Project:	**Site Management Plan**
Location:	**28-90 Review Avenue, Long Island City, NY**
Chemical Hazards:	**Volatile organic compounds (VOCs), Semi-volatile organic compounds (SVOCs), Polychlorinated biphenyls (PCBs), Pesticides, Metals, Per- and Polyfluoroalkyl Substances (PFAS)**
Prepared By:	**LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C.**
Version:	**1**
Date:	**June 2025**

Client Contact:	**Stephen Kim**	**(212) 218-3158**
Langan Project Manager (PM):	**Ashley Sandve**	**(973) 560-4900**
Langan Health & Safety Manager (HSM):	**Tony Moffa, CHMM**	**(215) 491-6545**
Langan Health and Safety Officer (HSO):	**Field Personnel**	
WorkCare:	**1-888-449-7787**	
Langan Incident/Injury Hotline:	**(973) 560-4699**	

LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C., (LANGAN), AND LANGAN SUBCONTRACTORS, DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY A TRAINED HEALTH AND SAFETY SPECIALIST. THIS HASP HAS BEEN PREPARED FOR LANGAN EMPLOYEES ONLY. ALL OTHER PARTIES WORKING ON THE SITE THAT HAVE THE POTENTIAL TO BE EXPOSED TO HAZARDOUS MATERIALS MUST DEVELOP AND IMPLEMENT THEIR OWN HASP FOR USE BY THEIR EMPLOYEES.

APPROVALS

By signature, the personnel identified below hereby acknowledge that they have reviewed this Health and Safely Plan (HASP) and agree to comply with the requirements contained therein as well as the applicable provisions of 29 CFR Parts 1910 and 1926. Furthermore, in reviewing and accepting this HASP, as currently written, the undersigned agree that to the best of their knowledge, this HASP adequately identifies the activities and hazards associated with work at this site and describes the appropriate and necessary precautions and protections for site workers required by the applicable OSHA statutes and regulations.



LANGAN Project Manager - PM (Ashley Sandve)	6/23/2025 Date
LANGAN Health and Safety Manager (Tony Moffa, CHMM)	Date
LANGAN Health and Safety Officer – HSO	Date

TABLE OF CONTENTS

ENVIRONMENTAL HEALTH AND SAFETY PLAN ii
Client: **28-90 Review Ave Property Owner LLC** ii
APPROVALS iii
1.0 INTRODUCTION 1
1.1 Purpose and Policy 1
1.2 Site Description 3
1.3 Scope of Work 4
2.0 PROJECT TEAM ORGANIZATION AND RESPONSIBILITIES 4
2.1 Langan Project Manager 4
2.2 Health and Safety Manager (HSM) 5
2.3 Langan Health and Safety Officer (HSO) 5
3.0 HAZARDS ANALYSIS 6
3.1 General Hazard Assessment 6
3.2 Chemical Exposure Hazards 7
3.2.1 Specific Chemical Hazards Detected at the Site 7
3.2.2 Chemical Hazard Exposure Routes 7
3.2.3 Control of Exposure to Chemical Hazards 8
3.3 Physical Hazards 8
3.3.1 Temperature Extremes 8
3.3.2 Noise Resources 9
3.3.3 Hand and Power Tools 9
3.3.4 Slips, Trips, and Falls 9
3.3.5 Fire and Explosion 9
3.3.6 Material Handling 10
3.3.7 Confined Space/Excavation Hazards 10
3.3.8 Working Near Equipment 11
3.3.9 Drill Rig Operations 11
3.3.10 Electrical Safety 12
3.3.11 Utilities 12
3.3.12 Vehicular Traffic 12
3.4 Biological Hazards 12
3.4.1 Animals 13
3.4.2 Insects 13
3.4.3 Wound Care 13
3.5 Coronavirus 14
3.6 Task Hazard Analysis 15
3.6.1 Installation and Maintenance of Monitoring Wells 15
3.6.2 Collection of Groundwater Samples 15
3.6.3 Site Inspections 16
3.6.4 SSDS Inspections 16
4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) 16
4.1 Levels of Protection 16

TABLE OF CONTENTS
(Continued)

4.2 Respirator Fit-Test 17
4.3 Respirator Cartridge Change-Out Schedule 18
5.0 AIR QUALITY MONITORING AND ACTIONS LEVELS 18
5.1 Monitoring During Ground Intrusive Site Operations 18
5.1.1 Volatile Organic Compounds 19
5.1.2 Dust 19
5.1.3 Determination of Background Levels 20
5.2 Monitoring Equipment Calibration and Maintenance 20
5.3 Noise Monitoring 20
6.0 COMMUNITY HEALTH AND SAFETY CONSIDERATIONS 20
7.0 WORK ZONES and DECONTAMINATION 21
7.1 Site Control 21
7.2 Contamination Control 21
7.2.1 Personnel Decontamination Station 21
7.2.2 Minimization of Contact with Contaminants 21
7.2.3 Personnel Decontamination Sequence 22
7.2.4 Emergency Decontamination 22
7.2.5 Hand-Held Equipment Decontamination 23
7.2.6 Heavy Equipment Decontamination 23
7.3 Communications 23
8.0 MEDICAL SURVEILLANCE 24
9.0 EMERGENCY RESPONSE PLAN 24
9.1 Responsibilities 24
9.1.1 Langan Health and Safety Officer (HSO) 24
9.1.2 Emergency Coordinator 25
9.1.3 Site Personnel 25
9.2 Communications 25
9.3 Local Emergency Support Units 25
9.4 Pre-Emergency Planning 26
9.5 Emergency Medical Treatment 26
9.6 Non-Emergency Medical Treatment 27
9.7 Emergency Site Evacuation Routes and Procedures 27
9.8 Fire Prevention and Protection 27
9.8.1 Fire Prevention 28
9.9 Significant Vapor Release 28
9.10 Overt Chemical Exposure 29
9.11 Decontamination During Medical Emergencies 29
9.12 Incident Reporting 30
9.13 Adverse Weather Conditions 30
9.14 Spill Control and Response 31
9.15 Emergency Equipment 32

TABLE OF CONTENTS
(Continued)

9.16 Restoration and Salvage 32
10.0 TRAINING 33
10.1 General Health and Safety Training 33
10.2 Site Specific Training 33
10.3 Onsite Safety Briefings 33
10.4 Hazard Communication 33
11.0 RECORDKEEPING 34
11.1 Field Change Authorization Request 34
11.2 Medical and Training Records 34
11.3 Onsite Log 34
11.4 Daily Safety Meetings ("Tailgate Talks") 34
11.5 Exposure Records 34
11.6 Hazard Communication Program/SDS 35
11.7 Documentation 35
12.0 FIELD PERSONNEL REVIEW 36

TABLE OF CONTENTS
(Continued)

TABLES

Table 1 **Contaminants of Concern**
Table 2 **Chemical Exposure Limits and Health Effects**
Table 3 **Hazard Analysis**
Table 4 **Instrumentation Action Levels**
Table 5 **Personal Protective Equipment**

FIGURES

Figure 1 **Site Location Map**
Figure 2 **Emergency Hospital Route Map**

ATTACHMENTS

ATTACHMENT A **Health and Safety Briefing Statement**
ATTACHMENT B **Field Procedures Change Authorization Form**
ATTACHMENT C **Unsafe Conditions and Practices Form**
ATTACHMENT D **Calibration Log**
ATTACHMENT E **Emergency Notification Numbers**
ATTACHMENT F **Accident / Incident Report Form**
ATTACHMENT G **Jobsite Safety Inspection Checklist**
ATTACHMENT H **Safety Data Sheets (SDS)**
ATTACHMENT I **Langan Guidelines**

1.0 INTRODUCTION

1.1 Purpose and Policy

This Health and Safety Plan (HASP) has been developed to comply with the regulations under Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120(b)(4), Hazardous Waste Operations and Emergency Response. It addresses foreseeable activities associated with the site work activities to be conducted at 28-90 Review Avenue (see Figure 1). This HASP establishes personnel protection standards and mandatory safety practices and procedures. Additionally, it assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at known or suspected hazardous waste sites.

Langan personnel involved with inspection of site work activities which involve the displacement of groundwater and/or material during the proposed groundwater, soil vapor, and indoor air sampling activities and during the proposed sub-slab depressurization system monitoring activities shall comply with the requirements of this HASP. All Langan personnel engaged in onsite activities will read this document carefully and complete the Safety Briefing Form (Attachment A), a copy of which will be provided to Langan's Project files. Contractors and subcontractors conducting activities which will disturb or displace soil in the identified AOC and/or perform the injections are required to develop and follow their own HASP based on the identified hazards. All sampling data and environmental reports pertaining to the site that are available to Langan will be provided upon request to the Langan PM. Contractors and subcontractors are responsible for their own workers Health and Safety and providing a safe working environment in accordance with all applicable federal, state and local requirements. Each Subcontractor will have a designated Site Health and Safety Manager who will be responsible for ensuring that the designated procedures are implemented in the field. Personnel who have any questions or concerns regarding implementation of this plan are encouraged to request clarification from the Langan PM. Langan field personnel must follow the designated health and safety procedures, be alert to the hazards associated with working close to vehicles and equipment, and use common sense and exercise reasonable caution at all times.

This HASP covers site management-related field activities which have the potential to disturb and/or displace potentially contaminated soil, soil vapor, and groundwater. These activities include, but are not limited to: installation and maintenance of monitoring wells, the collection of groundwater samples, the collection of soil vapor and indoor air samples, site inspections, and sub-slab depressurization system (SSDS) inspections.

This HASP was prepared in accordance with the following documents and/or guidelines:

- Occupational Safety and Health Administration (OSHA) regulations for hazardous site workers (29 CFR 1910.120 and 29 CFR 1926); and,
- NIOSH/OSHA/USCG/USEPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.*

Langan's Health and Safety Program and Safe Operating Procedures support this site-specific HASP.

The level of protection and the procedures specified in this HASP represent the minimum health and safety requirements to be observed by Langan site personnel engaged in the referenced site management activities. Unknown conditions may exist, and known conditions may change. Should an employee find himself or herself in a potentially hazardous situation, the employee will immediately discontinue the hazardous procedure(s) and either personally effect appropriate preventative or corrective measures, or immediately notify the Health and Safety Officer or the Langan PM of the nature of the hazard. In the event of an immediately dangerous or life threatening situation, the employee always has "stop work" authority. Any necessary revision to the Health and Safety procedures will be recorded in the Field Procedure Change Authorization Form (Attachment B), and will require authorization from the Langan Health and Safety Manager and Langan PM.

The provisions of this HASP address worker health and safety within defined contaminant zones and assume that work will be completed within vacant building cellars and outdoor vacant lots. Additional provisions including air sampling and modifications to drilling techniques to further limit potential exposure to sensitive populations will be required if work is to be conducted within occupied building areas or in occupied areas that may be impacted by the proposed work. Additional

provisions including the use of traffic control measures will be employed in order to avoid possible hazards associated with vehicular traffic and pedestrians

THE ULTIMATE RESPONSIBILITY FOR THE HEALTH AND SAFETY OF THE INDIVIDUAL EMPLOYEE RESTS WITH THE EMPLOYEE AND HIS OR HER COLLEAGUES. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel as designated above and to follow-up the verbal notification by completing the Unsafe Conditions and Practices Form provided in Attachment C, a copy of which will be provided to the Langan Health and Safety Officer.

"Extenuating" circumstances such as budget or time constraints, equipment breakdown, changing or unexpected conditions, never justify unsafe work practices or procedures. In fact, the opposite is true. Under stressful circumstances all project personnel must be mindful of the potential to consciously or unconsciously compromise health and safety standards, and be especially safety conscious. **ALL SITE PERSONNEL ARE EXPECTED TO CONSIDER "SAFETY FIRST" AT ALL TIMES.**

1.2 Site Description

The Site is located in the Long Island City neighborhood of Queens, New York and is identified as Block 294, Lot 106. The Site consists of a five-story commercial and industrial warehouse building. The ground level will consist of approximately 152,110 square feet (SF) of at-grade open air parking and ground vehicle circulation space, 15,085 SF of truck ramps, 1,450 SF of building lobby spaces, 2,755 SF by egress spaces (i.e.; stairs and elevators) and approximately 9,820 SF of mechanical spaces. Enclosed space and associated drive ramps and structured parking areas will be located on levels two through five and the rooftop of the building will be used for fleet parking and a large solar array. The Site is bound to the north by an asphalt-paved parking lot, to the east by 29th Street followed by an asphalt-paved parking lot associated with a four-story storage facility, to the south by at-grade railroad tracks associated with the Metropolitan Transportation Authority Long Island Rail Road (MTA LIRR) lines, and to the west by the Dutch Kills Creek. The Long Island Expressway/Queens Midtown Expressway and the

Newtown Creek are in proximity to the north and to the south of the site, respectively.

1.3 Scope of Work

The site work activities which will require the oversight by a Langan Engineer include the following scope and will include the completion of:

- Task 1: Installation and maintenance of monitoring wells;
- Task 2: Collection of groundwater samples;
- Task 3: Collection of soil vapor and indoor air samples;
- Task 4: Site inspections; and,
- Task 5: SSDS inspections.

Details of the scopes of work to be completed for this project are provided within the June 2025 Site Management Plan (SMP).

2.0 PROJECT TEAM ORGANIZATION AND RESPONSIBILITIES

This section specifies the Langan Project Organization.

2.1 Langan Project Manager

The Langan Project Manager (PM) is Ashley Sandve. The PM responsibilities include:

- Prepares and organizes the background review of site conditions, the site HASP, and the field team;
- Obtains permission for site access and coordinates activities with appropriate officials;
- Briefs the field team on their specific assignments;
- Coordinates with the Health and Safety Officer (HSO) to ensure that health and safety requirements are met;
- Serves as the liaison with public officials;
- Ensuring that this HASP is developed and approved prior to on-site activities;

- Ensuring that all the tasks in the project are performed in a manner consistent with Langan's comprehensive Health and Safety Program for Hazardous Waste Operations and this HASP.

2.2 Health and Safety Manager (HSM)

The Langan Corporate Health and Safety Manager (HSM) is Tony Moffa. His responsibilities include:

- Serving as a resource in the development and implementation of HASPs;
- Assist in reviewing results of Jobsite Safety Inspections;
- Assisting site Health and Safety Officer (HSO) with development of the HASP, updating HASP as dictated by changing conditions, jobsite inspection results, etc.;
- Maintaining all records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Langan Health and Safety Officer (HSO)

The Langan Health and Safety Officer (HSO) is to be identified prior to the start of field work. The HSO responsibilities include:

- Participating in the development and implementation of this HASP;
- Conducting Jobsite Safety Inspections (Attachment G) and correcting any shortcomings in a timely manner;
- Helping to select proper Personal Protective Equipment (PPE) and periodically inspecting it;
- Ensuring that PPE is properly stored and maintained;
- Controlling entry into and exit from the contaminated areas or zones of the site;
- Confirming each team member's suitability for work based on a current physician's recommendation;
- Monitoring the work parties for signs of stress, such as heat stress, fatigue, and cold exposure;
- Monitoring site hazards and conditions;

- Knowing (and ensuring that all site personnel also know) emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department;
- Resolves conflicting situations which may arise concerning safety requirements and working conditions.
- Conducting daily tailgate meetings to review applicable Hazard Analyses (Table 3) as well as check-in with site personnel.

3.0 HAZARDS ANALYSIS

This section presents an assessment of the general, chemical, physical, and biological hazards that may be encountered during the tasks specified under this HASP (Section 1.3). A detail on types of potential contaminants of concerns Langan anticipates to encounter at different locations during the intrusive activities is listed in Tables 1 and 2 of this HASP.

3.1 General Hazard Assessment

A general hazard assessment was conducted for the required field work described in Section 1.3 and the following potential hazards have been identified:

- Inhalation of volatile organic compounds (VOCs) including chlorinated VOCs with high volatilization potential;
- Inhalation of semi volatile organic compounds (SVOCs) with low volatilization potential;
- Skin and eye contact with contaminants;
- Ingestion of contaminants;
- Inhalation of dusts impacted with SVOCs, pesticides, and/or metals;
- Physical hazards associated with the use of heavy equipment;
- Excavation hazards;
- Tripping hazards;
- Noise exposure;
- Heat stress (depending on weather conditions);
- Cold exposure (depending on weather conditions);
- Flammable hazards;
- Electrical hazards; and,
- Use of personal protective equipment.

These hazards are further described in the task-by-task hazard analysis in Table 3. Specific chemical, physical and biological hazards are discussed below.

Mitigation and controls will include as needed work procedures, work/rest regiment, dust control measures, personal protective equipment, and respiratory protection as appropriate.

3.2 Chemical Exposure Hazards

The following chemical hazard evaluation for the proposed site management activities is based on the previous environmental investigation of the site and typical compounds commonly associated with contaminated fill. The evaluation has been conducted to identify chemicals/ materials that potentially may be present at the site, and to ensure that work activities, personnel protection, and emergency response are consistent with the specific contaminants that potentially could be encountered.

3.2.1 Specific Chemical Hazards Detected at the Site

Elevated concentrations of metals in soil as well as low-mobility NAPL-contaminated soil was remediated during implementation of the Remedial Action Work Plan (RAWP). Impacted fill material and groundwater remains at the Site as reported in the June 2025 SMP. In addition, impacted soil vapor was identified on-site. Table 1 lists Contaminants of Concern and potentially affected media. The potential contaminants that might be encountered during the field activities and the exposure limits are listed in Table 2.

3.2.2 Chemical Hazard Exposure Routes

Potential hazards and their exposure routes include:

- Inhalation of organic vapors due to the presence of volatile organic compounds in soil, groundwater, and soil vapor and from diesel-powered equipment (if used) and minimal volatilization potential related to the presence of SVOCs in soil.
- Inhalation of dust impacted with SVOCs, pesticides, metals should soil become exposed during implementation of the excavation work plan.

- Inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of materials inadvertently contaminated with potentially toxic materials or injection reagents.
- Dermal exposure and possible percutaneous (skin) absorption of certain lipophilic (readily absorbed through the skin) SVOCs.
- Skin and eye contact with contaminants or injection reagents at the site and decontamination activities.

Exposure limits and health effects of selected chemicals are in Table 2. The probability of exposure for each task is outlined in Table 3.

3.2.3 Control of Exposure to Chemical Hazards

To protect potentially exposed personnel the following procedures and protocols will be adopted and used as needed: work procedures will be adhered to, work zones will be established, dust control will be utilized, respirators (if required) and personal protective equipment will be worn, Dust monitoring will be conducted during times of disturbance of the impacted soil to assess the potential inhalation pathway of exposure and strict personnel decontamination procedures will be followed.

3.3 Physical Hazards

3.3.1 Temperature Extremes

Hot Temperatures

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE, in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke. If onsite workers exhibit the signs of heat exhaustion or heat stroke, they should seek immediate medical attention.

Cold Temperatures

Workers may be exposed to the hazard of working in a cold environment. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia, as well as slippery surfaces, brittle equipment, poor judgment, and unauthorized procedural changes. In order to prevent frostbite, hypothermia, trench foot and immersion foot, the workers are responsible for dressing warmly in layers with thick socks,

gloves, and appropriate head and face gear. Upon the onset of discomfort due to the cold, onsite workers should take regular five to ten minute breaks to warm up inside nearby buildings and to drink warm fluids. Please note that the NYCDEP statute prohibits idling an engine for more than three minutes (one-minute if adjacent to a school). This statue includes the use of a vehicle for the purpose of warming up employees. As such, all contractors and employees shall identify a place to warm up in advance. If discomfort continues and the onsite workers start to exhibit the signs of frostbite, hypothermia, trench foot or immersion foot, they should seek immediate medical attention.

3.3.2 Noise Resources

Noise may pose a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Hearing protection is required and shall be used in designated areas of the site as indicated by the posted signs.

3.3.3 Hand and Power Tools

In order to complete the various tasks for the project, personnel may utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Hand and power tools will be inspected prior to use. Proper personal protective equipment shall be worn while utilizing hand and power tools. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.4 Slips, Trips, and Falls

Working in and around the site may pose slip, trip and fall hazards due to equipment, piping, slippery surfaces that may be oil covered, or from surfaces that are wet from rain or ice. Potential adverse health effects include falling to the ground and becoming injured or twisting an ankle. Good housekeeping at the site must be maintained at all times.

3.3.5 Fire and Explosion

Prior to starting all intrusive work, a review of appropriate New York City maps will be conducted to identify potential hazards. The possibility of

encountering fire and explosion hazards exists from under- ground utilities and gases. Therefore, all excavation equipment must be grounded.

3.3.6 Material Handling

Manual lifting of heavy objects may be required. Failure to follow proper lifting techniques can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

Whenever possible, heavy objects must be lifted and moved by mechanical devices rather than by manual effort. The mechanical devices will be appropriate for the lifting or moving task and will be operated only by trained and authorized personnel. Objects that require special handling or rigging will only be moved under the guidance of a person who has been specifically trained to move such objects, such as a Master Rigger or equivalent. Lifting devices, including equipment, slings, ropes, chains, and straps, will be inspected, certified, and labeled to confirm their weight capacities. Defective equipment will be taken out of service immediately and repaired or destroyed.

The lift and swing path of a crane/equipment will be watched and maintained clear of obstructions. Personnel will not pass under a raised load, nor will a suspended load be left unattended. Personnel will not be carried on lifting equipment, unless it is specifically designed to carry passengers.

All reciprocating, rotating, or other moving parts will be guarded at all times. Accessible fire extinguishers will be made available in all mechanical lifting devices. All material must be stored in tiers, racked, blocked, or otherwise secure to prevent sliding, falling, or collapse. All loads/material will be verified to be secure before transportation.

3.3.7 Confined Space/Excavation Hazards

Personnel entry into confined spaces, trenches, or unshored (e.g., lagging) excavations is not anticipated and will not be permitted. No other confined spaces are known to exist on Site. If entry into trenches or excavations is

required, all work will stop until the HASP has been revised to address the new hazards.

3.3.8 Working Near Equipment

Personnel working in the immediate vicinity of heavy equipment (*e.g.*, drill rigs, excavators, loaders, etc.) may encounter physical hazards resulting from contact with equipment. Field personnel should be aware of the presence of these hazards at all times and take appropriate action to avoid them. Due to the limited ability to communicate when wearing respiratory protection, the risk is increased. Workers must be careful to communicate with heavy equipment operators regarding their location, and should maintain a safe distance from operating equipment at all times. Prior to working around equipment, the site personnel will review appropriate hand signals with the operator.

Equipment will be equipped with back up alarms.

3.3.9 Drill Rig Operations

In order to complete well installation, a track mounted drill rig will be used. Working with and near this equipment and associated power generators pose many potential hazards, including being struck by or against, or pinched/caught by moving parts. These hazards can result in serious physical harm. Other hazards include electrocution and explosion due to encountering overhead or underground utilities.

Drill rigs for hollow stem auger drilling and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and other field personnel must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency switch. Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed.

The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment. A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. Drillers, helpers, and other field personnel must secure all loose clothing when in the vicinity of drilling operations. No person shall climb the drill mast while tools are rotating or without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder that meets the requirement of the OSHA standard.

3.3.10 Electrical Safety

The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.11 Utilities

Prior to the start of any intrusive work, the location of above-ground and underground utilities and other structures will be completed by the contractor/subcontractor responsible for completing site management activities.

3.3.12 Vehicular Traffic

The site contains a vehicle parking access structure. As such, vehicular and pedestrian traffic will be present. Appropriate precautions to protect the on-site workers and civilians should be used including the use of cones and traffic vests as appropriate.

3.4 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals and insects. As the potential for exposure to blood borne pathogens during the site management activities is anticipated to be low, a Blood Borne Pathogen Exposure Plan (BBPEP) is not required. A BBPEP will be prepared if site operation requires its implementation.

3.4.1 Animals

During site operations, animals such as dogs, cats, pigeons, mice, and rats may be encountered. Workers shall use discretion and avoid all contact with animals. Bites and scratches from dogs and cats can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis. Cryptococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

3.4.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, spiders, and ticks may be present at the site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis.

3.4.3 Wound Care

A source of occupational exposure may occur when an employee gives First Aid and or CPR to an individual who had infectious blood. The occupational exposure occurs when there is the possibility for an employee's eyes, mucous membranes, non-intact skin (i.e., cut and abraded skin) to come into contact with potentially infectious materials from another employee. If an accident were to occur where First Aid would need to be administered, the person administering the First Aid will presume that any wounds and materials used are contaminated with BBP and should wear the appropriate PPE to prevent contact with these materials. Additionally, should the use of First Aid materials and or clothing that was potentially contaminated with BBP be encountered these materials should be property containerized and transported to the nearest hospital for proper disposal.

3.5 Coronavirus

General Preventative Measures

Field personnel must follow general proper hygiene measures while in the field including:

- Avoid touching eyes, nose and mouth.
- Cover cough or sneeze with tissue, and throw in trash.
- Wash hands often with soap and water for 20 seconds after going to bathroom, before eating, after blowing nose, coughing or sneezing.
- Use hand sanitizer with at least 60% alcohol if soap and water are not available.
- Avoid physical contact with other people (e.g., no handshakes).
- Maintain a safe distance of at least 6 feet from other people (social distancing).
- Wear face coverings when around other worker to minimize spread of COVID-19. (May be required in certain states or locations.)

Construction Trailers

Employees should avoid use of shared construction trailers or where employees cannot maintain a safe distance (minimum 6 feet) from other workers. If trailer use is needed, areas such as desks, phones, chairs and other common areas, should be cleaned and disinfected before and after use. Protocols should be developed to minimize trailer use to essential personal, restrict use from any workers who are ill or showing symptoms of being ill, use if face coverings and ensure a safe distance of 6 feet can be established between workers.

Communication

Include Coronavirus topics and prevention topics in daily tailgate meetings to ensure Coronavirus awareness is communicated daily. Discussions can focus on general topics including: social distancing, prevention measures for field personnel, signs and symptoms and recent news on the Coronavirus. Site-specific topics should include minimizing face-to-face contact, disinfecting/sterilizing field equipment, use of PPE to reduce exposure, site security, use of face coverings and other potential exposure issues/concerns.

Sick/Ill Workers

No Langan employee is permitted to be onsite when ill and/or showing potential symptoms of the Coronavirus. Symptoms of the Coronavirus may appear 2-14

days after exposure and can range from mild to severe. The most common symptoms include: fever, fatigue, dry cough, shortness of breath chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell. If an employee or subcontractor is observed being ill or exhibiting symptoms of Coronavirus, employees must immediately utilize their Stop Work Authority and contact their project manager to address the situation. If an employee observes another worker onsite exhibiting symptoms of Coronavirus, immediately utilize Stop Work Authority and notify their project manager and site construction manager or safety officer. Work should resume when the safety and health of Langan and subcontractors is adequately addressed.

3.6 Task Hazard Analysis

The tasks to be completed during the proposed site work activities, as summarized in Section 1.3, are listed in Table 3 with a Hazard Analysis for each task. Chemical exposures may occur, as described in Table 1. For all tasks, if evidence of historical contamination is encountered other than what is anticipated as part of the intended site management activities, work will be stopped and emergency contacts listed in Attachment D of this HASP will be immediately notified. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

3.6.1 Installation and Maintenance of Monitoring Wells

Five monitoring wells are proposed to be installed along the northwestern boundary of the Site immediately following the construction of the composite cover system. Chemical exposure may occur as the well is installed or the wells are maintained as described in Table 1.

3.6.2 Collection of Groundwater Samples

Groundwater samples will be collected from the subsurface. Chemical exposure may occur as these samples are collected and handled as described in Table 1.

3.6.3 Site Inspections

Site inspections, including a site-wide and composite cover system inspection, are required. If the composite cover system is breached, chemical exposure may occur as described in Table 1.

3.6.4 SSDS Inspections

SSDS inspections are required to ensure the system is operating correctly. Chemical exposure may occur as described in Table 1.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.1 Levels of Protection

PPE must protect workers from the specific hazards they are likely to encounter on site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and, (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards. Based on anticipated site conditions and the proposed work activities to be performed at the site, Level D Protection will be used for work completed within the defined exclusion zone. This will include any work within the defined drilling areas. Level D Protection will be required for all personnel working outside the investigation area but engaged with site management activities. The upgrading/downgrading of these levels of protection will be based on continuous air monitoring results as described in Section 5.0. The decision to modify standard PPE will be made by the HSO after conferring with the Project Manager. The levels of protection are described below.

- **Level D Protection**

  a. Safety glasses w/ sideshields or chemical splash goggles
  b. Safety boots/shoes (toe-protected)
  c. Hard hat
  d. Long sleeve work shirt and work pants
  e. Nitrile gloves
  f. Hearing protection (as needed)
  g. Reflective traffic vest

- **Level D Protection (Modified)**

    a. Safety glasses w/ sideshields or chemical splash goggles
    b. Safety boots/shoes (toe-protected)
    c. Disposable chemical-resistant boot covers
    d. Coveralls Tyvek or equivalent to be worn when contact with contaminated soil or groundwater, or non-aqueous phase liquids is anticipated)
    e. Hard hat
    f. Long sleeve work shirt and work pants
    g. Nitrile gloves
    h. Hearing protection (as needed)
    i. Reflective traffic vest

- **Level C Protection**

    a. Full face-piece, air-purifying, cartridge*-equipped, NIOSH-approved respirator [*combo cartridge P100/OV/CL/HC/SD/CD/HS (escape)]
    b. Inner (latex) and outer (nitrile) chemical-resistant glove
    c. Chemical-resistant safety boots/shoes (toe-protected)
    d. Disposable chemical-resistant boot covers
    e. Hard hat
    f. Long sleeve work shirt and work pants
    g. Coveralls (Tyvek or equivalent, poly-coated Tyvek will be worn when contact, or anticipated contact with wet contaminated soils, ground water, and/or non-aqueous phase liquids (NAPL) is anticipated))
    h. Hearing protection (as needed)
    i. Reflective traffic vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are summarized in Table 4. The written Respiratory Protection Program is maintained by Langan's H&S Department in Langan's Doylestown, Pennsylvania office. The monitoring procedures and equipment are outlined in Section 5.0.

4.2 Respirator Fit-Test

All Langan employees and subcontractors performing site work who could be exposed to hazardous substances at the work site are in possession of a full face-piece, air-purifying respirator and have been successfully quantitative fit-tested

within the past year. Quantitative fit-test records are maintained by Langan's H&S Department.

4.3 Respirator Cartridge Change-Out Schedule

Respiratory protection is required to be worn when certain action levels (Table 2) are reached. A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short the time period was the previous day they were used.

5.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

5.1 Monitoring During Ground Intrusive Site Operations

Air monitoring shall be conducted when ground intrusive operations occur. Atmospheric air monitoring results are used to provide data to determine when exclusion zones need to be established and when certain levels of personal protective equipment are required. For all instruments there are Site-specific action level criteria which are used in making field health and safety determinations. Other data, such as the visible presence of contamination or the steady state nature of air contaminant concentration, are also used in making field health and safety decisions. Therefore, the Langan Health and Safety Officer may expand the exclusion zone beyond the extents of the excavation or sampling area or require a person to wear a respirator even though atmospheric air contaminant concentrations are below established HASP action levels.

During site work involving disturbance of soils, real time air monitoring will be conducted to assess the potential for exposure to airborne contaminants of concern including VOCs, SVOCs, and metals. A photoionization detector (PID)

and/or flame ionization detector (FID) will be used to monitor concentrations of VOCs at personnel breathing-zone height to assess the potential exposure to petroleum related VOCs related to use of machinery including backhoes, drill rigs, compressors etc. Dust monitoring will be completed with an aerosol monitor. Air monitoring will be the responsibility of the Langan Health and Safety Officer or designee. Air monitoring will be conducted during intrusive activities associated with the installation of permanent monitoring wells. All manufacturers' instructions for instrumentation and calibration will be available onsite.

Subcontractors' air monitoring plans must be equal or more stringent as the Langan plan.

An air monitoring calibration log is provided in Attachment D of this HASP.

5.1.1 Volatile Organic Compounds

Monitoring with a PID, such as a RKI GX-6000 will occur during all intrusive activities. Colormetric Indicator Tubes for benzene may be used as backup for the PID, if measurements remain above background monitor every 2 hours. The HSO will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, appearance of drill cuttings, etc.) since the last measurement. If VOC levels are observed above 5 ppm for longer than 5 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the workzone every 30 minutes in additional to the employee breathing zone. Instrument action levels for monitored gases are provided in Table 4.

5.1.2 Dust

During invasive procedures that have the potential for creating airborne dust, real time air monitoring with an aerosol monitor, such as an Aeroqual Ranger Air Quality Monitor will occur. The HSO will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (appearance of visible dust) since the last measurement. If dust levels are observed to be greater than 0.100 mg/m3 or visible dust is observed for longer than 15 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the AOC every 30 minutes in

addition to the employee breathing zone. If dust is generated during disturbance activities, dust suppression methods will be employed to minimize potential for exposure. Action levels for dust monitoring are provided in Table 4.

5.1.3 Determination of Background Levels

Background (BKD) levels for VOCs and dust will be established prior to intrusive activities within the work zone. A notation of BKD levels will be referenced in the daily monitoring log. BKD levels are a function of prevailing conditions. BKD levels will be taken in an appropriate upwind location as determined by the Langan Health and Safety Officer.

5.2 Monitoring Equipment Calibration and Maintenance

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments shall be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

All instruments shall be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on site by the HSO for reference.

5.3 Noise Monitoring

As a standard work practice, hearing protection will be worn within the area that exceeds 85 dBA created by any loud machinery as a precaution. Work areas or tasks which pose an exposure risk greater than 85 dBA will require hearing protection. Hearing protection is required and should be used in the exclusion zone while the drill rig is operating.

6.0 COMMUNITY HEALTH AND SAFETY CONSIDERATIONS

Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP outlined in Appendix G of the June 2025 SMP.

7.0 WORK ZONES AND DECONTAMINATION

7.1 Site Control

Work zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas.

Any person working in an area where the potential for exposure to site contaminants exists will only be allowed access after providing the HSO with proper training and medical documentation.

Exclusion Zone (EZ) - All activities which may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an EZ. Decontamination of field equipment will also be conducted in the Contaminant Reduction Zone (CRZ) which will be located on the perimeter of the EZ. The EZ and the CRZ will be clearly delineated by cones, tapes or other means. The Langan Health and Safety Officer may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the Langan Health and Safety Officer allowing adequate space for the activity to be completed, field members and emergency equipment. For purposes of this HASP the exclusion zones are defined by ta 10-foot buffer around each vacuum monitoring point, soil vapor sampling location and groundwater monitoring well location but may be expanded based on the results of air monitoring or any other field conditions identified by the HSO. All personnel working in the EZ must have 40 hours HAZWOPER training and be enrolled in a medical monitoring program prior to conducting any site activities.

7.2 Contamination Control

7.2.1 Personnel Decontamination Station

Personal hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure.

7.2.2 Minimization of Contact with Contaminants

During completion of all site activities, personnel should attempt to minimize the chance of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel

should minimize kneeling, splash generation, and other physical contact with contamination as PPE is intended to minimize accidental contact. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control over spray and runoff and to ensure that unprotected personnel working nearby are not affected.

7.2.3 Personnel Decontamination Sequence

Decontamination will be performed by removing all PPE used in EZ and placing it in drums/trash cans at the CRZ. Baby wipes shall be available for wiping hands and face. Drums/trash cans will be labeled by the field crews in accordance with all local, state, and federal requirements. Management plans for contaminated PPE, tools and investigative-derived waste (i.e., soil cutting) are provided below.

7.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment.

If the injured person can be moved, he/she will be decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury), provisions shall be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent data.

7.2.5 Hand-Held Equipment Decontamination

Hand-held equipment includes all monitoring instruments as stated earlier, samples, hand tools, and notebooks. The hand-held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the CRZ.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident. Sampling equipment, hand tools, etc. will be cleaned with non-phosphorous soap to remove any potentially contaminated soil, and rinsed with deionized water. All decontamination fluids will be containerized and stored on-site pending waste characterization sampling and appropriate off-site disposal.

7.2.6 Heavy Equipment Decontamination

All heavy equipment and vehicles arriving at the work site will be free from contamination from offsite sources. Any vehicles arriving to work that are suspected of being impacted will not be permitted on the work site. Potentially contaminated heavy equipment will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the HSO or his designee.

7.3 Communications

The following communications equipment will be utilized as appropriate.

- Telephones - A cellular telephone will be located with the HSO for communication with the HSM and emergency support services/facilities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

Signal	Meaning
Hand gripping throat	Out of air, can't breathe
Grip on partner's wrist or placement of both hands around partner's waist	Leave area immediately, no debate
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand
Thumbs down	No, negative

8.0 MEDICAL SURVEILLANCE

All personnel who will be performing field work involving potential exposure to toxic and hazardous substances will be required to have passed an initial baseline medical examination, with annual follow-up medical exams thereafter, consistent with 29 CFR 1910.120(f). Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by Langan's H&S Department.

9.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures that are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures. In case of emergency, in addition to 911 the Langan Incident/Injury Hotline (973-560-4699) should be called as soon as possible.

9.1 Responsibilities

9.1.1 Langan Health and Safety Officer (HSO)

The HSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The HSO is responsible for ensuring the HSM are notified of all incidents, all injuries, near misses, fires, spills,

releases or equipment damage. The HSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can notify OSHA within the required time frame.

9.1.2 Emergency Coordinator

For this project the Emergency Coordinator is the HSO.

The Emergency Coordinator shall locate emergency phone numbers and identify hospital routes prior *to beginning* work on the sites. The Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator is responsible for implementing the Emergency Response / Contingency Plan whenever conditions resulting from the Site Investigation warrant such action.

9.1.3 Site Personnel

Project site personnel are responsible for knowing the Emergency Response Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency. Project site personnel, including all subcontractors will be trained in the Emergency Response Plan.

9.2 Communications

Once an emergency situation has been stabilized or as soon as practically possible, the HSO will contact the Langan Incident/Injury Hotline (973-560-4699) and Project Manager to identify any emergency situation.

9.3 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during investigative activities at the site, Attachment E Emergency Notification Numbers, will be available in the field vehicles and provided to all personnel conducting work within the EZ.

Figure 2 is the hospital route map. Outside emergency number 911 and local ambulance should be relied on for response to medical emergencies and transport to emergency rooms. Due to traffic congestion that is prevalent in the New York metropolitan area, alternate hospital routes will need to be considered. The Emergency Coordinator will determine the appropriate route based on time of day and traffic patterns. Changes in the referenced primary facilities shall be documented with the HASP Field Change Authorization Request Form (Attachment B).

The Emergency Phone Numbers listed are preliminary. Upon mobilization, the HSO shall verify all numbers and document the changes in the Site Logbook. Any changes shall also be documented with the HASP Field Change Authorization Request Form.

A Hospital route map is provided as Figure 2.

9.4 Pre-Emergency Planning

Langan will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

9.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the HSO on site immediately. First-aid equipment will be available on site at the following locations:

First Aid Kit:	Vehicles
Emergency Eye Wash:	Vehicles

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors

or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

Personnel with current first aid and CPR certification will be identified.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance.

Nearest hospital: **New York City Health, Elmhurst Hospital**
79-01 Broadway
Queens, New York 11373
Telephone: 718-334-4000
(directions from site to hospital found on Figure 2)

9.6 Non-Emergency Medical Treatment

In case of injury to personnel, which is not a medical emergency the employee will contact WorkCare at (1-888-449-7787). WorkCare provides access 24 hours / 7 days a week to experienced occupational health nurses and physicians who confer with employees at the onset of a work-related injury or illness. WorkCare will provide over the phone injury treatment or direct employees to medical treatment by third party provider, if appropriate.

9.7 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs as a result of the site management activities, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, the Langan Project Manager will be verbally notified immediately. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the nearest intersection to be accounted for and to receive further instructions.

9.8 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site and notification of the Langan Project Manager of the site management activities. Portable fire extinguishers will be provided at the work zone. The extinguishers located in the various locations should also be identified prior to the

start of work. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

9.8.1 Fire Prevention

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.

The person responsible for the control of fuel source hazards and the maintenance of fire prevention and/or control equipment is the HSO.

9.9 Significant Vapor Release

Based on the proposed tasks, the potential for a significant vapor release is low. However, if a release occurs, the following steps will be taken:

- Move all personnel to an upwind location. All non-essential personnel shall evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations shall be monitored for volatile organics..
- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator shall notify the Langan Project Manager.
- Local emergency response coordinators will be notified.

9.10 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Safety Data Sheet (SDS) will be followed, when necessary.

SKIN AND EYE: Use copious amounts of soap and water from eye-wash kits and portable hand wash stations.

CONTACT: Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Skin shall also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs. Affected items of clothing shall also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

9.11 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or omitted. The HSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

9.12 Incident Reporting

Once first aid and/or emergency response needs have been met, the following parties are to be contacted:

- WorkCare (1-888-449-7787)
- Langan Incident/Injury Report Hotline (973-560-4699)
- Langan Project Manager, Ashley Sandve (973-560-4900)
- Langan Health and Safety Manager, Tony Moffa (215-491-6500)
- The employer of any injured worker who is not a Langan employee

For emergencies involving personal injury and/or exposure including near-misses, the HSO or designee will complete and submit an Accident/Incident Report Form (Attachment F) within 24 hours. If the employee involved is not a Langan employee, his employer shall receive a copy of the report.

9.13 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work will continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The HSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

9.14 Spill Control and Response

All small spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the SDS will be consulted to assist in determining proper waste characterization and the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. All spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill.

All contractor vehicles shall have spill kits on them with enough material to contain and absorb the worst-case spill from that vehicle. All vehicles and equipment shall be inspected prior to be admitted on site. Any vehicle or piece of equipment that develops a leak will be taken out of service and removed from the job site.

The following seven steps shall be taken by the Emergency Coordinator:

1. Determine the nature, identity and amounts of major spills.
2. Make sure all unnecessary persons are removed from the spill area.
3. Notify the HSO immediately.
4. Use proper PPE in consultation with the HSO.
5. If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosion-proof equipment to contain or clean up the spill (diesel-only vehicles, air-operated pumps, etc.).
6. If possible, try to stop the leak with appropriate material.
7. Remove all surrounding materials that can react or compound with the spill.

In addition to the spill control and response procedures described in this HASP, Langan personnel will coordinate with the designated project manager relative to spill response and control actions. Notification to the Project Manager must be immediate and, to the extent possible, include the following information:

- Time and location of the spill.
- Type and nature of the material spilled.

- Amount spilled.
- Whether the spill has affected or has a potential to affect a waterway or sewer.
- A brief description of affected areas/equipment.
- Whether the spill has been contained.
- Expected time of cleanup completion. If spill cleanup cannot be handled by Langan's on-site personnel alone, such fact must be conveyed to the Project Manager immediately.

Langan shall not make any notification of spills to outside agencies. The client will notify regulatory agencies as per their reporting procedures.

9.15 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on site:

- Industrial first aid kit.
- Fire extinguishers (one per site).
- Absorbent material.

9.16 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers.
- Refilling medical supplies.
- Recharging eyewashes and/or showers.
- Replenishing spill control supplies.

10.0 TRAINING

10.1 General Health and Safety Training

Completion of an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program (or its equivalent) as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees who will perform work in areas where the potential for a toxic exposure exists. Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment.

10.2 Site Specific Training

Prior to commencement of site activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include a documented verbal review of the entire HASP and all the provisions within the HASP document. Should any new employees arrive on-site, they will also be given a documented full HASP review – or one that address the appropriate tasks that remain at the time of the new employee's arrival.

10.3 Onsite Safety Briefings

Project personnel and visitors will participate in documented daily on-site health and safety briefings ("Tailgate Talks") led by the HSO to assist site personnel in safely conducting their work activities. The briefings will include information on operations to be conducted that shift, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity for the work crews to be updated on monitoring results. Prior to starting any new activity, a training session will be held for crew members involved in the activity. The Health and Safety Briefing Statement (Attachment A) can be used to facilitate this effort.

10.4 Hazard Communication

All material brought on-site will be in the appropriate containers and will be properly labeled. The SDS for contaminants previously identified on the Site and

those typically associated with historic fill are provided in Attachment H. Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.0 RECORDKEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

11.1 Field Change Authorization Request

A Field Procedures Change Authorization Request Form is to be completed for requesting a change to this HASP (Attachment B). Any changes to the work to be performed that is not included in the HASP will require an Addendum that is approved by the Langan Project Manager and Langan HSM to be prepared. Approved changes will be reviewed with all field personnel at a safety briefing.

11.2 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training, documentation of three-day OJT, and respirator fit-test records) and medical clearance for Site work and respirator use will be maintained in the office and available upon request. Records for all subcontractor employees must also be available upon request. All employee medical records will be maintained by Langan's H&S Department.

11.3 Onsite Log

A log of personnel on site each day will be kept by the Site Supervisor or designee.

11.4 Daily Safety Meetings ("Tailgate Talks")

Completed Safety Briefing forms will be maintained by the HSO.

11.5 Exposure Records

All personal monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be maintained by the HSO during site work. At the end of the project they will be maintained according to 29 CFR 1910.1020.

11.6 Hazard Communication Program/SDS

Safety Data Sheets (SDS) have been obtained for applicable substances and are included in this HASP (Attachment H). Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.7 Documentation

Employees are required to contact WorkCare at 1-888-449-7787 to document incidents/injuries which are not medical emergencies. Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at 973-560-4699 and the client representative to report the incident or near miss. A written report must be completed and submitted to the client representative within 24 hours of the incident. For emergencies involving personnel injury and/or exposure, employee will complete and submit the Langan Incident/Injury Report to the Langan Corporate Health and Safety Manager as soon as possible following the incident. Accidents will be investigated in-depth to identify all causes and to recommend hazard control measures.

12.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have been verbally given a full HASP review by Langan personnel, and understand the provisions of this EHS Plan. It is maintained on site by the HSO as a project record.

Each field team member shall sign this section after Site-specific training is completed and before being permitted to work onsite.

Name (Print and Sign)	***Company***	***Date***

TABLES

TABLE 1
CONTAMINANTS OF CONCERN
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Contaminant Of Concern	Affected Media
VOLATILES	
1,2,4-Trimethylbenzene	Soil / Soil Vapor / Groundwater
Acetone	Soil
Benzene	Soil / Groundwater
Ethylbenzene	Soil / Soil Vapor / Groundwater
Isopropylbenzene	Groundwater
Naphthalene	Soil
n-Butylbenzene	Groundwater
n-Hexane	Soil Vapor
n-Propylbenzene	Groundwater
Tetrachlorethylene	Soil Vapor
Toluene	Soil Vapor / Groundwater
Total Volatiles	Soil Vapor
Vinyl Chloride	Soil Vapor
Xylenes (m,p-Xylene, and o-Xylene)	Soil / Soil Vapor / Groundwater
NAPL	Soil
SEMI-VOLATILES	
Benzo(a)anthracene	Soil / Groundwater
Benzo(a)pyrene	Soil / Groundwater
Benzo(b)flouranthene	Soil / Groundwater
Benzo(k)flouranthene	Soil / Groundwater
Chrysene	Soil / Groundwater
Dibenzo(a,h)anthracene	Soil
Indeno (1,2,3-cd) pyrene	Soil / Groundwater
PESTICIDES	
4,4'-DDE	Soil
4,4'-DDT	Soil
Chlordane	Groundwater
PCBs	
Total PCBs	Soil

TABLE 1
CONTAMINANTS OF CONCERN
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

METALS	
Antimony	Groundwater
Arsenic	Soil / Groundwater
Cadmium	Soil
Chromium, Trivalent	Soil
Copper	Soil
Iron	Groundwater
Lead	Soil / Groundwater
Magnesium	Groundwater
Manganese	Groundwater
Mercury	Soil
Nickel	Soil
Selenium	Soil / Groundwater
Silver	Soil
Sodium	Groundwater
Zinc	Soil
Per- and Polyfluoroalkyl Substances (PFAS)	
Perfluorooctanesulfonic Acid (PFOS)	Soil / Groundwater
Perfluorooctanoic Acid (PFOA)	Groundwater
Total PFAS	Groundwater

\\langan.com\data\PAR\data6\100652601\Engineering Data\Environmental\Reports\2025-06 - SMP\Appendix F - HASP\Tables\HASP TABLE 1 - Contaminants of Concern.doc

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
1,2,4-Trimethylbenzene	> 0 ppm	---	Inhalation, ingestion, skin and/or eye contact	Irritate eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)
Acetone	1000 ppm	2500 ppm	inhalation, ingestion, skin and/or eye contact	irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis
Benzene	1 ppm	50 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, skin, nose; respiratory system; giddiness; head, nausea, staggered gait; fatigue, anorexia, lassitude; dermatitis; bone marrow depression; [carcinogenic]
Ethylbenzene	100 ppm	800 ppm (10% LEL)	Inhalation, Ingestion, skin and/or eye contact	Irritate eyes, skin, mucous membrane ;headache, dermatitis; narcosis, coma
Naphthalene	10 ppm	250 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritate eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Tetrachloroethene	15 ppm	150 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Nausea, vomiting, abdominal pain, tremor fingers, jaundice, hepatitis, liver tenderness, dermatitis, monocytosis, kidney damage [potential occupational carcinogen]
Toluene	200 ppm	500 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation; nervousness, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage; mucous membrane; narcosis, coma
Total Volatile Organics	15 ppm	150 ppm	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]
Vinyl Chloride	5 ppm over 15 minutes	> 0 ppm	Inhalation, skin and/or eye contact (liquid)	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]
Xylenes	100 ppm	900 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corn vacuolization; anorexia, nausea, vomit, abdominal pain; dermatitis
Benzo(a)anthracene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Benzo(a)pyrene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(b)fluoranthene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(k)fluoranthene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Chrysene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Dibenzo(a,h)anthracene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Indeno (1,2,3-cd) pyrene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Pesticides	1 mg/m^3	500 mg/m^3	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]
Antimony	0.5 mg/m^3	50 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritate eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly
Arsenic	0.010 mg/m^3	5 mg/m^3	Inhalation, Ingestion, Skin Absorption, Skin and/or Eye Contact	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Cadmium	0.005 mg/m^3	9 mg/m^3	Inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]
Chromium	1 mg/m^3	250 mg/m^3	inhalation, ingestion, skin and/or eye contact	irritation eyes, skin; lung fibrosis (histologic)
Copper	1 mg/m^3	100 mg/m^3	Inhalation, Ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational carcinogen]
Iron	10 mg/m^3	2,500 mg/m^3	Inhalation	Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis)
Lead	0.05 mg/m^3	100 mg/m^3	Inhalation, Ingestion, Skin and/or Eye Contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension
Magnesium	15 mg/m^3	750 mg/m^3	Inhalation, skin and/or eye contact	Irritate eyes, nose; metal fume fever: cough, chest pain, flu-like fever

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Manganese	5 mg/m^3	500 mg/m^3	Inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage
Mercury	0.1 mg/m^3	10 $mg/^3$	Inhalation, Ingestion, Skin Absorption, Skin and/or Eye Contact	Irritate eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria
Nickel	1 mg/m^3	10 mg/m^3	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria
Selenium	0.2 mg/m^3	1 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritate eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; In Animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Silver	0.01 mg/m^3	10 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance
Sodium	2 mg/m^3	10 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritate eyes, skin, mucous membrane; pneumonitis; eye, skin burns; temporary loss of hair
Zinc	5 mg/m^3	500 mg/m^3	Inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function

--- No exposure limits listed in the NIOSH Pocket Guide to Chemical Hazards dated November 2010.

TABLE 3
HAZARD ANALYSIS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Task	Potential Risk	Description	Control Measure
1, 2	Lifting equipment	Improper lifting/carrying of equipment and materials	Follow safe lifting and general material handling
1	Noise	Loud sounds caused by the machines during drilling, or excavation	Wear proper PPE (hearing protection)
1	Working near heavy machinery	Close proximity to drill rig and/or construction equipment	Be aware of surroundings, wear safety vest and hard hat
1, 2, 3, 4, 5	Slips, trips, and falls	Any number of injuries from slips, trips, and falls in carrying out these tasks	Good housekeeping at site, constant awareness and focus on the task
1	Inhalation of Dust	Breathing in visible dust from earthwork using drills or excavators	Wear proper PPE, monitor air for dust concentrations, use dust suppression techniques
1, 2, 3, 5	Inhalation of Volatiles	Breathing in volatiles from earthwork using drills or excavators causing dust	Wear proper PPE, monitor air for volatile concentrations, use dust suppression techniques
1	Utilities	Hitting utility lines during drilling and or excavating	Use proper mark out of underground utilities before beginning earthwork
1, 2, 3, 4, 5	Skin contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5	Ingestion of contaminated material	Material falls on skin; gets into mouth	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5	Skin and eye contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5	Heat Stress	Stress or exhaustion related to high temperatures	Hydrate and rest as needed
1, 2, 3, 4, 5	Cold Stress	Stress or exhaustion related to low temperatures; hypothermia	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5	Bites and stings	Bee stings, ticks, snake bites	Wear proper PPE, be watchful, follow safe work practices
1, 2, 3, 4, 5	Lacerations and abrasions	Many opportunities working with hand tools	Inspect equipment being used for sharp edges, wear proper PPE; follow safe work practices

TABLE 4
INSTRUMENTATION ACTION LEVELS
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

Instrument	Action Level	Level of Protection / Action Required
PID	Background to 5 ppm	Level D/No respirator; no further action required
	> 5 ppm for > 5 minutes	1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., by slowing drilling or excavation activities), contact HSO to review conditions and determine source and appropriate response action. 2. If PID readings remain above 5 ppm, temporarily discontinue work and upgrade to Level C protection. 3. If sustained PID readings fall below 1 ppm, downgrading to Level D protection may be permitted
	> 5 ppm but < 150 ppm for > 5 minutes	Level C/ 1. Discontinue all work; all workers shall move to an area upwind of the jobsite. 2. Evaluate potential causes of the excessive readings and allow work area to vent until VOC concentrations fall below 5 ppm. 3. Level C protection will continue to be used until PID readings fall below 1 ppm.
	> 30 ppm (steady state condition) within AOC zone	Stop Work / Suppress Emissions / Evacuate and re-evaluate.
	> 150 ppm	Evacuate the work area
Total Dust Aerosol Monitor	> 0.100 mg/m^3 above BKD (steady state condition) at perimeter of AOC zone for 15-minutes or visible dust.	Stop Work / Implement dust control / Continue dust monitoring if dust levels are less than 0.150 mg/m^3
	> 0.150 mg/m3 above BKD (following dust suppression measures)	Stop Work / implement dust control, continue work once levels are <0.150 mg/m^3
	>5 mg/m^3	Level C

Notes:

1. 1 ppm level based on OSHA Permissible Exposure Limit (PEL) for benzene.
2. 5 ppm level based on OSHA Short Term Exposure Limit (STEL) maximum exposure for vinyl chloride for any 15 minute period.
3. 150 ppm level based on NIOSH Immediately Dangerous to Life and Health (IDLH) for tetrachloroethylene

TABLE 5
PERSONAL PROTECTIVE EQUIPMENT
28-90 REVIEW AVENUE
LONG ISLAND CITY, NEW YORK

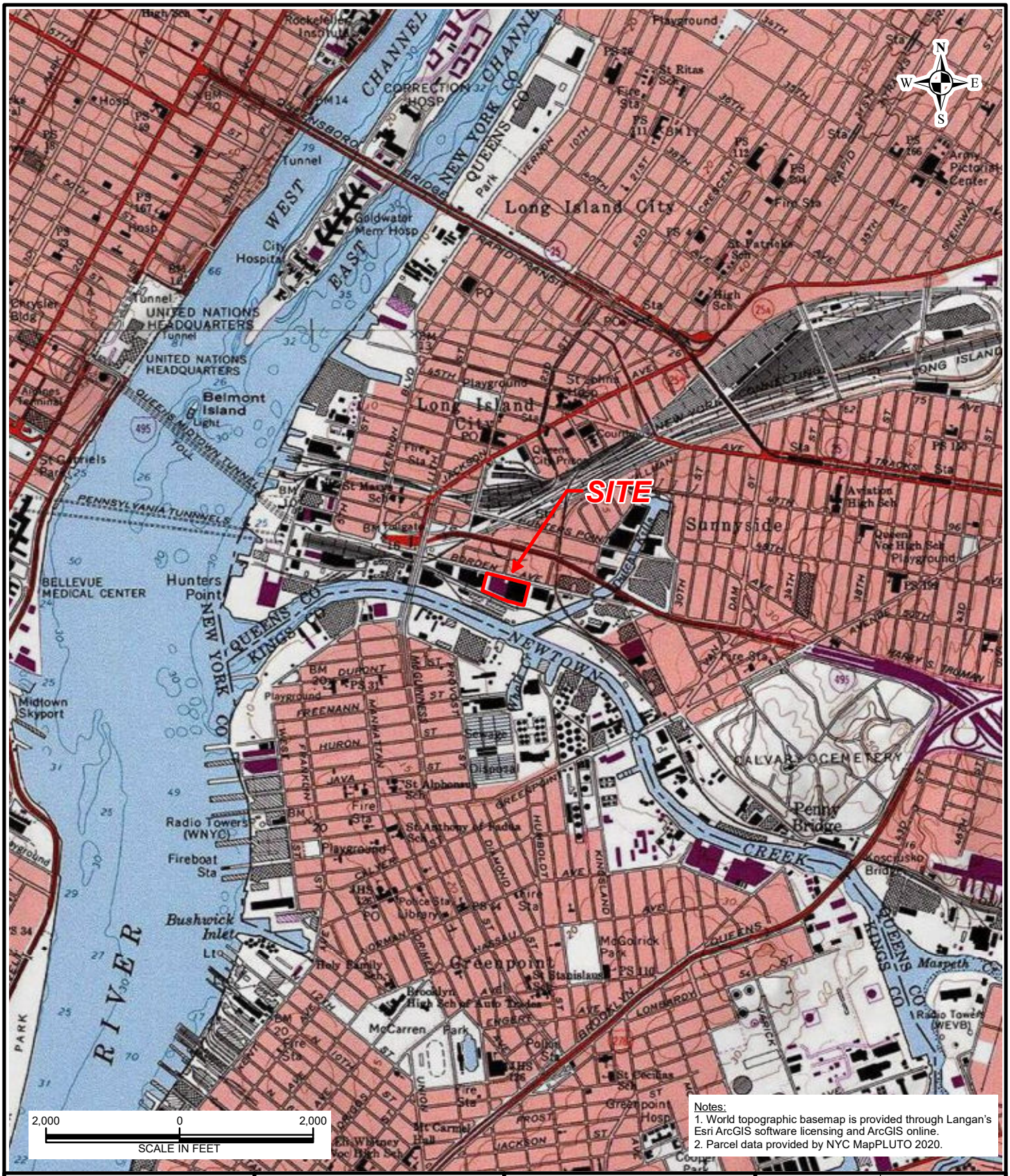
Respiratory Protection*:*

Level D:	No respirator required.
Level C:	Half-face, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols) and organic vapor cartridges. The respirator will be NIOSH-approved.
Level C - supplemental by task	Fullface, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols), acid gas, organic vapor cartridges. The respirator will be NIOSH-approved.

Personal Protective Clothing*:*

Level D:	Hard-hat, traffic vest (if working on or adjacent to the roadway), long sleeve work shirt & work pants of natural fibers, safety glasses or goggles, steel-toed boots, hearing protection (if needed), nitril inner gloves and leather outer gloves.
Level D - supplemental PPE by task	Tyvek disposal suit
Level C:	Chemically resistant outer boots and Chemical resistant Tyvek disposal suite.

FIGURES



LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

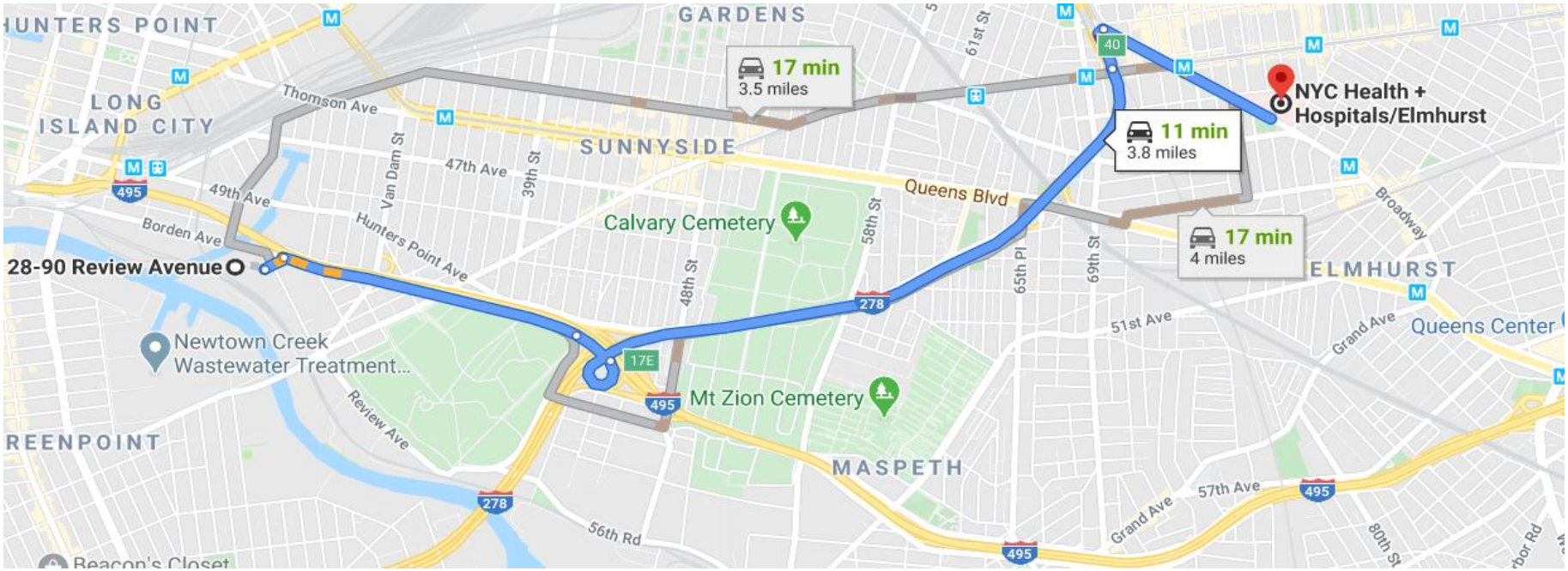
Project
23-30 BORDEN AVENUE DEVELOPMENT
NYSDEC BCP SITE No.: C241238
BLOCK No. 68, LOT No. 38
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
USGS SITE LOCATION MAP

Project No.	100766601
Date	10/20/2020
Scale	1"=2,000'
Drawn By	IHB
Last Revised	5/20/2021
Figure	1

© 2013 Langan

Path: \\Langan.com\data\PAR\data6\100766601\Project Data\ArcGIS\MXD\Environmental_Figures\2021-05 - BCP RAWP\Figure 1 - Site Location Map.mxd Date: 5/20/2021 User: ibaker Time: 4:28:56 PM



Emergency Route to New York City Health, Elmhurst Hospital (Phone # (718) 334-4000) :

1 Start traveling Northeast on 29th Street towards Borden Avenue
2 Turn Right at the 2nd cross street onto Borden Avenue
3 Use the Right lane to keep right at the fork and continue to merge onto Interstate 278 East
4 Keep right at the fork to continue on Exist 17E follow signs for 1-278/La Guardia Airport/Bronx
5 Take exit 40 towatd Roosevelt Ave
6 Turn Right onto Broadway
7 Elmhurst Hospital Emergency Room is on the left.

MAP REFERENCE: Google Maps

LANGAN

Project

28-90 REVIEW AVENUE
EMERGENGY HOSPITAL ROUTE MAP

Queens **New York**

Project	DATE	SCALE	FIGURE NO.
100652601	**6/23/2025**	**NTS**	**3**

\\langan.com\data\PAR\data6\100652601\Engineering Data\Environmental\Reports\2025-06 - SMP\Appendix F - HASP\Figures\Figure 2 - Hospital Route

ATTACHMENT A

Health and Safety Briefing Statement

LANGAN

ATTACHMENT A

HEALTH AND SAFETY BRIEFING STATEMENT

The following personnel were present at a pre-job safety briefing conducted at _____(time) on _____ (date) at _____(location), and have read this Health and Safety Plan for the above Site and are familiar with its provisions:

Name	Signature
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Fully charged ABC class fire extinguisher available on Site? _____
Fully stocked First Aid Kit available on Site? _____
All project personnel advised of location of nearest phone? _____
All project personnel advised of location of designated medical facility? _____

_____
Name of Field Team Leader or Site Safety Officer

_____
Signature Date

ATTACHMENT B

Field Procedures Change Authorization Form

LANGAN

ATTACHMENT B

FIELD PROCEDURES CHANGE AUTHORIZATION FORM

Section to be changed:_____

Duration of Authorization Requested Date:_____

_____ Today only

_____ Duration of Task

_____ Other_____

_____

_____

Description of Procedures Modification:

_____

_____

_____

Justification:

_____ _____

Person Requesting Change Verbal Authorization Received From:

_____ _____

Name Name Time

_____ _____

Title Title

_____

Signature

Approvals:

_____

_____

_____

ATTACHMENT C

Unsafe Conditions and Practices Form

LANGAN

ATTACHMENT C

UNSAFE CONDITIONS AND PRACTICES FORM

DESCRIPTION OF CIRCUMSTANCES REGARDING UNSAFE CONDITION OR PRACTICE:

_____

_____

_____

_____

_____

_____

_____

IS THIS CONDITION EXISTING OR POTENTIAL?_____

REPORTED TO: _____

REPORTED BY:_____

DATE REPORTED:_____

COMMENTS:_____

_____

_____

ATTACHMENT D

Calibration Log

LANGAN

ATTACHMENT D

PROJECT:_____

DATE:_____

CALIBRATION LOG

Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calib Reading	Performed By:

ATTACHMENT E

Emergency Notification Numbers

ATTACHMENT E

EMERGENCY NOTIFICATION NUMBERS

The following list provides names and telephone numbers for emergency contact personnel.

ORGANIZATION	CONTACT		TELEPHONE
New York City Police			911
New York City Fire			911
New York City Health, Elmhurst Hospital			718-334-4000
Langan Incident/Injury Hotline			1-800-952-6426 or (973)560-4699
Langan Project Manager	Ashley Sandve		973-560-4900
National Response Center			800-424-8802
Center for Disease Control			404-488-4100
CHEMTREC			800-424-9300
TSCA HOTLINE			202-554-1404
RCRA HOTLINE			800-424-9346
CDC		(DAY) (NIGHT)	404-452-4100 404-329-2888
BUREAU OF ALCOHOL, TOBACCO & FIREARMS			800-424-9555 202-566-7777
NATIONAL RESPONSE CENTER			800-424-8802
PESTICIDE INFORMATION SERVICE			800-424-9346
BUREAU OF EXPLOSIVES, A.A. RAILWAYS			202-835-9500
FEDERAL EXPRESS - HAZARDOUS MATERIAL INFO			901-922-1666

ATTACHMENT F

Accident / Incident Report Form

LANGAN

ATTACHMENT F

INCIDENT REPORT

LANGAN EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Submit a Separate Report for Each Employee and/or Incident)

Date: _____

Employee's Name:_____ Employee No:_____

Sex: M _____ F _____ Age: _____

Region: _____ Location:_____

Project: _____ Project No: _____

Incident:_____

Type: Possible Exposure _____ Exposure _____ Physical Injury _____

Location: _____

Date of Incident: _____ Time of Incident: _____

Date of Report Incident: _____

Person(s) to Whom Incident was Reported: _____

Weather Conditions During Incident: Temperature _____ Humidity _____

Wind Speed and Direction: _____ Cloud Cover: _____

Clear: _____ Precipitation: _____

Materials Potentially Encountered: _____

Chemical (give name of description - liquid, solid, gas, vapor, fume, mist):

_____

_____

Radiological:_____

Other: _____

Nature of the Exposure/Injury: (State the nature of the exposure/injury in detail and list the parts of the body affected. Attach extra sheets if necessary).

_____

_____

_____

_____

_____

Did you receive medical care? Yes _____ No _____ If so, when _____

Where? On-Site _____ Off-Site _____

By Whom: Name of Paramedic: _____

Name of Physician: _____

Other: _____

If Off-Site, name facility (hospital, clinic, etc):_____

_____

Length of stay at the facility?_____

Was the Site Safety Officer contacted? Yes _____ No _____ When?_____

Was the Corporate Health and Safety Officer contacted? Yes _____ No _____

If so, who was the contact?_____

Did the exposure/injury result in permanent disability? Yes _____ No _____

If so, explain:_____

_____

_____

_____

Has the employee returned to work? Yes _____ No _____

List the names of other persons affected during this incident:

_____

_____

_____

_____

_____

_____

_____

List the names of persons who witnessed the exposure/injury incident:

_____

_____

_____

_____

Possible cause of the exposure/injury incident: _____

_____

_____

_____

_____

_____

What was the name and title of the field team leader or immediate supervisor at the site of the incident?

_____

Was the operation being conducted under an established Health and Safety Plan?

Yes _____ No _____ If yes, attach a copy. If no, explain

_____

_____

_____

_____

_____

_____

Describe protective equipment and clothing used by the employee:

_____

_____

_____

_____

_____

_____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure? If so, explain:

_____

_____

_____

What was the employee doing when the exposure/injury occurred? (Describe briefly as Site Reconnaissance, Site Characterization, or Sampling, etc.):

_____

_____

_____

_____

Where exactly on site or off site did the exposure/injury occur?

_____

_____

_____

_____

_____

How did the exposure/injury occur? (Describe fully what factors led up to and/or contributed to the incident):

_____

_____

_____

_____

_____

Name of person(s) initiating report, job title, phone number:

_____

_____

_____

_____ _____

Employee Signature Date

_____ _____

Site Safety Officer Signature or Field Team Leader Signature Date

ATTACHMENT G

Jobsite Safety Inspection Checklist

LANGAN

LANGAN

JOBSITE SAFETY INSPECTION CHECKLIST

Client: _____ Inspection Date: _____

Site: _____ Inspector: _____

Employees: _____

Notes: _____

_____

_____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remarks
GENERAL				
Appropriate PPE being worn by Langan employees and subcontractors?				
Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
Air monitoring readings recorded on the air monitoring data sheet/field log book?				
Incident reporting procedures known?				
Site security an issue?				
Vehicle /pedestrian traffic issue?				
Adequate size/type fire extinguisher supplied?				
Evidence that drilling operator is responsible for the safety of his rig.				
First Aid kit available?				
PERSONAL PROTECTIVE EQUIPMENT				
Eye Protection?				
Head protection?				
Safety Shoes?				
Safety vests?				
Hand protection?				
Other?				
Deficiencies??				
HOUSEKEEPING				
Work area kept clean/tidy to minimize potential hazards?				
Waste being disposed of quickly and properly				
Adequate lighting for job?				
Portable water available?				
HAND TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are proper tools being used?				
Are tools safety stored when not in use?				
Have tools been inspected prior to use?				
Are employees familiar with using tools?				
Is additional PPE required for tools? Available?				
POWER TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are tools properly grounded?				
Safety guards in place and used correctly?				
Competent instruction / supervision?				
Cords include in inspection?				

HAZWOPER				
Employees have current 40-hr./8-hr./Supervisor HAZWOPER training?				
Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
Respiratory protection readily available?				
Subcontract workers have current 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
Subcontract workers have respirators readily available?				
HEALTH & SAFETY PLAN				
HASP available on site for inspection?				
Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and subcontractors?				
Hospital route map with directions posted on site?				
Emergency Notification List posted on site?				
Personnel trained in CPR/First Aid on site?				
MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
Project site safe practices ("Standing Orders") posted?				
Health & Safety Incident Report forms available?				
Decontamination procedures being followed as outlined in HASP?				
UNDERGROUND UTILITY				
Mark outs of underground utilities done prior to initiating any subsurface activities?				
Underground utilities located and authorities contacted before digging?				
Visually observed mark-outs?				
Is subsurface work within three feet of underground utilities?				
- Is so, is or was soft dig techniques used?				
Drilling performed in areas free from underground utilities?				
EXCAVATION / TRENCH				
Are excavations/trenches over 5 feet deep sloped, shored or a trench box used?				
Operations supervised by a Competent Person?				
Is Competent Person preforming daily inspections of excavation/trench?				
Adequate barricades in place?				
Have underground utilities been identified?				
Ladders / means of egress in trench with 25-foot of every worker?				
Has PE designed or approved protective system?				
Excavated material and other objects placed more than 2 feet away from excavation edge?				
Public protected from exposure to open excavation?				
CONFINED / PERMIT-ENTRY CONFINED SPACE				
People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
Confined space entry permit is completed and posted?				
All persons knowledgeable about the conditions and characteristics of the confined space?				
All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
Attendant and/or supervisor certified in basic first aid and CPR?				
Confined space atmosphere checked before entry and continuously while the work is going on?				
Results of confined space atmosphere testing recorded?				
Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
ELECTRICAL SAFETY				
Equipment at least 10 feet from overhead power lines?				
Is equipment grounded?				
GFCI used and tested where required?				
Are extension cords rated for this work being used and are they properly maintained?				
Electrical dangers posted at site?				

FLAMMABLE LIQUIDS				
Are flammable liquids used at site?				
Are flammable liquids stored in appropriate containers?				
Are flammable liquids kept away from combustion sources?				
Do flammable liquid containers have warning labels?				

LADDERS				
Are ladders used at site?				
Were ladders inspected prior to use?				
Are ladders in good working condition?				
Are ladders secured to prevent slipping, sliding or falling?				
Do side rails extend three feet above top of landing area?				
Are top two steps of stepladders being used?				
Is extension on ladder facing out?				
Are ladders sufficient for task?				
Are ladders sufficient for task?				

Unsafe acts observed? _____

Additional remarks _____

Notes: _____

Distribution: Project Manager - Name: _____
Health & Safety Officer - Name: _____
Health & Safety Manager- Name: Anthony Moffa, CHMM

Q:\Other\HealthandSafety\GenericAppendixAJobsiteSafetyInspectionChecklist

ATTACHMENT H

Safety Data Sheets
(SDS)

LANGAN

MATHESON
ask. . .The Gas Professionals™

Safety Data Sheet

Material Name METHYL CHLOROFORM **SDS ID: MAT14370**

* * *Section 1 - IDENTIFICATION* * *

Product Identifier: METHYL CHLOROFORM

Trade Names/Synonyms

MTG MSDS 219; 1,1,1-TRICHLOROETHANE; ALPHA-TRICHLOROETHANE; AEROTHENE TT; METHYLTRICHLOROMETHANE; METHYLCHLOROFORM; TRICHLOROMETHYLMETHANE; TRICHLOROETHANE; ETHANE, 1,1,1-TRICHLOROETHANE; CHLORTEN; 1,1,1-TRICHLORETHANE; UN 2831; C2H3Cl3

Chemical Family

halogenated, aliphatic

Recommended Use

industrial

Restrictions on Use

None known.

Manufacturer Information

MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920

General Information: 1-800-416-2505
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

* * *Section 2 - HAZARDS IDENTIFICATION* * *

Classification in accordance with 29 CFR 1910.1200

Acute Toxicity (Inhalation), Category 4
Skin Corrosion / Irritation, Category 2
Eye Damage / Irritation, Category 2A
Toxic to Reproduction, Category 2
Specific Target Organ Toxicity - Single Exposure, Category 1 (central nervous system and heart)
Specific Target Organ Toxicity - Single Exposure, Category 3 (respiratory system)
Specific Target Organ Toxicity - Repeated Exposure, Category 1 (central nervous system, heart, and liver)
Specific Target Organ Toxicity - Repeated Exposure, Category 2 (brain, lungs, and nervous system)
Hazardous to the Aquatic Environment - Acute Hazard, Category 2
Hazardous to the Aquatic Environment - Chronic Hazard, Category 2
Hazardous for the ozone layer, Category 1

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

DANGER

Hazard Statement(s)

Harmful if inhaled
Causes skin irritation
Causes serious eye irritation
Suspected of damaging fertility or the unborn child
Causes damage to central nervous system and heart.
May cause respiratory tract irritation.
Causes damage to central nervous system, heart, and liver through prolonged or repeated exposure.
May cause damage to brain, lungs, nervous system through prolonged or repeated exposure.
Toxic to aquatic life with long lasting effects
Harms public health and the environment by destroying ozone in the upper atmosphere

Precautionary Statement(s)

Prevention

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Do not breathe vapor or mist. Use only outdoors or in a well-ventilated area. Wear protective gloves and eye/face protection. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment.

Response

IF exposed: Call a POISON CENTER or doctor/physician. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. Collect spillage.

Storage

Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal

Dispose of in accordance with applicable regulations.
Refer to manufacturer/supplier for information on recovery/recycling.

* * *Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS* * *

CAS	Component	Percent
71-55-6	METHYL CHLOROFORM	100

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Trichloroethane (25323-89-1).

* * *Section 4 - FIRST AID MEASURES* * *

Description of Necessary Measures

Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

Eyes

Flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion

If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

Most Important Symptoms/Effects

Acute

respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, central nervous system damage, heart damage

Delayed

central nervous system damage, heart damage, liver damage, reproductive effects, lung damage, brain damage, nervous system damage

Indication of Immediate Medical Attention and Special Treatment

For inhalation, consider oxygen.

* * *Section 5 - FIRE FIGHTING MEASURES* * *

Suitable Extinguishing Media

carbon dioxide, regular dry chemical, water spray

Large fires: Use dry chemical, carbon dioxide, alcohol-resistant foam or water spray.

Unsuitable Extinguishing Media

Do not scatter spilled material with high-pressure water streams.

Specific Hazards Arising from the Chemical

Slight fire hazard.

Hazardous Combustion Products

Combustion: hydrogen chloride, phosgene, oxides of carbon

Fire Fighting Measures

Move container from fire area if it can be done without risk. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with water spray until well after the fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Stay away from the ends of tanks. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile).

Special Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

* * *Section 6 - ACCIDENTAL RELEASE MEASURES* * *

Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment, see Section 8. Avoid release to the environment.

Methods and Materials for Containment and Cleaning Up

Avoid heat, flames, sparks and other sources of ignition. Eliminate all ignition sources if safe to do so. Stop leak if possible without personal risk. **Small spills:** Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. **Large spills:** Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

* * *Section 7 - HANDLING AND STORAGE* * *

Precautions for Safe Handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Do not breathe vapor or mist. Use only outdoors or in a well-ventilated area. Wear protective gloves and eye/face protection. Wash thoroughly after handling. Do not eat, drink, or smoke when using this product. Avoid release to the environment.

Conditions for Safe Storage, including any Incompatibilities

Store and handle in accordance with all current regulations and standards. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in a cool, dry place. Keep separated from incompatible substances.

Incompatibilities combustible materials, bases, metals, oxidizing materials

* * *Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION* * *

Component Exposure Limits

METHYL CHLOROFORM (71-55-6)

ACGIH:	350 ppm TWA
	450 ppm STEL
Europe:	100 ppm TWA; 555 mg/m3 TWA
	200 ppm STEL; 1110 mg/m3 STEL
OSHA (Final):	350 ppm TWA; 1900 mg/m3 TWA
OSHA (Vacated):	350 ppm TWA; 1900 mg/m3 TWA
	450 ppm STEL; 2450 mg/m3 STEL
NIOSH:	350 ppm Ceiling (15 min); 1900 mg/m3 Ceiling (15 min)

Component Biological Limit Values

METHYL CHLOROFORM (71-55-6)

ACGIH: 40 ppm Medium: end-exhaled air Time: prior to last shift of workweek Parameter: Methyl chloroform; 10 mg/L Medium: urine Time: end of workweek Parameter: Trichloroacetic acid (nonspecific, semi-quantitative); 30 mg/L Medium: urine Time: end of shift at end of workweek Parameter: Total trichloroethanol (nonspecific, semi-quantitative); 1 mg/L Medium: blood Time: end of shift at end of workweek Parameter: Total trichloroethanol (nonspecific)

IDLH

700 ppm

Appropriate Engineering Controls

Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eyes/Face Protection

Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection

Wear appropriate chemical resistant clothing.

Glove Recommendations

Wear appropriate chemical resistant gloves.

Respiratory Protection

The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

700 ppm

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.
Emergency or planned entry into unknown concentrations or IDLH conditions -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.

* * *Section 9 - PHYSICAL AND CHEMICAL PROPERTIES* * *

Physical State:	Liquid	**Appearance:**	clear, colorless liquid
Color:	colorless	**Physical Form:**	volatile liquid
Odor:	sweet odor	**Odor Threshold:**	44 - 100 ppm
pH:	Not available	**Melting/Freezing Point:**	-32 °C
Boiling Point:	74 °C	**Flash Point:**	>93.3 °C
Decomposition:	Not available	**Evaporation Rate:**	5.0 (butyl acetate=1)
LEL:	7.5 %	**UEL:**	12.5 %
Vapor Pressure:	100 mmHg @ 20 °C	**Henry's Law Constant:**	0.072 atm-cu m/mole @ 25°C
Vapor Density (air = 1):	4.55	**Specific Gravity (water=1):**	1.3390
Water Solubility:	0.078 % @ 25 °C	**Log KOW:**	2.49
KOC:	17823.79 estimated from water solubility	**Auto Ignition:**	537 °C
Viscosity:	0.858 cP @20 °C	**Volatility:**	100%
Molecular Weight:	133.40	**Molecular Formula:**	C-H3-C-Cl3

Other Property Information

No additional information is available.

Solvent Solubility

Soluble: acetone, benzene, chloroform, methanol, ethanol, carbon disulfide, ether, carbon tetrachloride, heptane

* * *Section 10 - STABILITY AND REACTIVITY* * *

Reactivity

No reactivity hazard is expected.

Chemical Stability

Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions

Will not polymerize.

Conditions to Avoid

Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

Incompatible Materials

combustible materials, bases, metals, oxidizing materials

Hazardous Decomposition

Combustion: hydrogen chloride, phosgene, oxides of carbon

* * *Section 11 - TOXICOLOGICAL INFORMATION* * *

Acute and Chronic Toxicity

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

METHYL CHLOROFORM (71-55-6)

Dermal LD50 Rabbit >15800 mg/kg; Inhalation LC50 Rat 18000 ppm 4 h; Oral LD50 Rat >2000 mg/kg

RTECS Acute Toxicity (selected)

The components of this material have been reviewed, and RTECS publishes the following endpoints:

METHYL CHLOROFORM (71-55-6)

Inhalation: 24400 mg/m3 Inhalation Cat LC50; 29492 ppm/10 minute(s) Inhalation Mouse LC50; 3911 ppm/2 hour Inhalation Mouse LC50
20000 ppm/2 hour Inhalation Rat LC50; 14250 ppm/7 hour Inhalation Rat LC50; 17000 ppm/4 hour Inhalation Rat LC50

Acute Toxicity Level

METHYL CHLOROFORM (71-55-6)

Slightly Toxic: inhalation, dermal absorption, ingestion

Information on Likely Routes of Exposure

Inhalation

irritation, changes in blood pressure, nausea, vomiting, diarrhea, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, mood swings, loss of coordination, blood disorders, heart disorders, kidney damage, liver damage, convulsions, unconsciousness, coma, heart damage, reproductive effects

Ingestion

irritation, nausea, vomiting, diarrhea, stomach pain, irregular heartbeat, headache, drowsiness, dizziness, disorientation, loss of coordination, kidney damage, liver damage, convulsions, unconsciousness, coma, reproductive effects

Skin Contact

irritation (possibly severe)

Eye Contact

irritation

Immediate Effects

respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, central nervous system damage, heart damage

Delayed Effects

central nervous system damage, heart damage, liver damage, reproductive effects, brain damage, lung damage, nervous system damage

Medical Conditions Aggravated by Exposure

heart or cardiovascular disorders, kidney disorders, liver disorders, skin disorders and allergies

Irritation/Corrosivity Data

respiratory tract irritation, skin irritation, eye irritation

RTECS Irritation

The components of this material have been reviewed, and RTECS publishes the following endpoints:

METHYL CHLOROFORM (71-55-6)

450 ppm/8 hour Eyes Man; 100 mg Eyes Rabbit mild; 2 mg/24 hour Eyes Rabbit severe; 5 gm/12 day(s) intermittent Skin Rabbit mild; 20 mg/24 hour Skin Rabbit moderate

Local Effects

METHYL CHLOROFORM (71-55-6)

Irritant: inhalation, skin, eye

Target Organs

METHYL CHLOROFORM (71-55-6)

central nervous system

Respiratory Sensitization

No data available.

Dermal Sensitization

No data available.

Carcinogenicity

Component Carcinogenicity

METHYL CHLOROFORM (71-55-6)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: Monograph 71 [1999]; Supplement 7 [1987]; Monograph 20 [1979] (Group 3 (not classifiable))

RTECS Mutagenic

The components of this material have been reviewed, and RTECS publishes data for one or more components.

Reproductive Effects Data

Available data characterizes this substance as a reproductive hazard.

RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:

METHYL CHLOROFORM (71-55-6)

2100 ppm Inhalation Rat TCLo (6 hour, pregnant 1-20 day(s)); 7000 ppm Inhalation Rat TCLo (3 hour, pregnant 13-19 day(s)); 43 mg/kg Oral Rat TDLo (pregnant 1-22 day(s), 21 day(s))

RTECS Tumorigenic

The components of this material have been reviewed, and RTECS publishes data for one or more components.

Additional Data

Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

Specific Target Organ Toxicity - Single Exposure

central nervous system, heart, respiratory system

Specific Target Organ Toxicity - Repeated Exposure

central nervous system, heart, liver, brain, lungs, nervous system

Aspiration Hazard

Not expected to be an aspiration hazard.

* * *Section 12 - ECOLOGICAL INFORMATION* * *

Ecotoxicity

Toxic to aquatic life with long lasting effects.

Component Analysis - Aquatic Toxicity

METHYL CHLOROFORM (71-55-6)

Fish: 96 Hr LC50 Pimephales promelas: 35.2 - 50.7 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 57 - 90 mg/L [static] (juvenile); 96 Hr LC50 Cyprinus carpio: 56 mg/L [flow-through]; 96 Hr LC50 Poecilia reticulata: 52.9 mg/L [flow-through]; 96 Hr LC50 Poecilia reticulata: 69.7 mg/L [static]; 96 Hr LC50 Pimephales promelas: 91 - 126 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss: 46 - 59 mg/L [static]

Algae: 96 Hr EC50 Pseudokirchneriella subcapitata: >500 mg/L

Invertebrate: 48 Hr LC50 Daphnia magna: >530 mg/L; 48 Hr EC50 Daphnia magna: 2384 mg/L; 48 Hr EC50 Daphnia magna: 9.7 - 12.8 mg/L [Static]

Persistence and Degradability

This material may biodegrade in soil and water.

Bioaccumulative Potential

Bioconcentration potential in aquatic organisms is low based on BCF value of 0.7-4.9.

Mobility

Expected to have high mobility in soil.

* * *Section 13 - DISPOSAL CONSIDERATIONS* * *

Disposal Methods

Dispose in accordance with all applicable regulations.

Component Waste Numbers

METHYL CHLOROFORM (71-55-6)

RCRA: waste number U226

* * *Section 14 - TRANSPORT INFORMATION* * *

US DOT Information

Shipping Name: 1,1,1-Trichloroethane
UN/NA #: UN2831 **Hazard Class:** 6.1 **Packing Group:** III
Required Label(s): 6.1

IMDG Information

Shipping Name: 1,1,1-Trichloroethane
UN #: UN2831 **Hazard Class:** 6.1 **Packing Group:** III
Required Label(s): 6.1

* * *Section 15 - REGULATORY INFORMATION* * *

Component Analysis

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

METHYL CHLOROFORM (71-55-6)

SARA 313: 1.0 % de minimis concentration

CERCLA: 1000 lb final RQ; 454 kg final RQ

SARA 311/312 Hazardous Categories

Acute Health: Yes **Chronic Health:** Yes **Fire:** No **Pressure:** No **Reactive:** No

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
METHYL CHLOROFORM	71-55-6	Yes	Yes	Yes	Yes	Yes

Not regulated under California Proposition 65

Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
METHYL CHLOROFORM	71-55-6	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes

* * *Section 16 - OTHER INFORMATION* * *

NFPA Ratings: Health: 2 **Fire:** 1 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Other Information

Matheson Tri-Gas, Inc. makes no express or implied warranties, guarantees or representations regarding the product or the information herein, including but not limited to any implied warranty or merchantability or fitness for use. Matheson Tri-Gas, Inc. shall not be liable for any personal injury, property or other damages of any nature, whether compensatory, consequential, exemplary, or otherwise, resulting from any publication, use or reliance upon the information herein.

End of Sheet MAT14370

SAFETY DATA SHEET

Ethylene Dichloride (1,2 Dichloroethane)

Section 1. Identification

GHS product identifier : Ethylene Dichloride (1,2 Dichloroethane)

Chemical name : 1,2-dichloroethane

Other means of identification : ethylene dichloride; Ethane, 1,2-dichloro-; Glycol dichloride; Ethylene chloride; ETHYLENE DICHLORIDE (1,2-DICHLORO-ETHANE)

Product use : Synthetic/Analytical chemistry.

Synonym : ethylene dichloride; Ethane, 1,2-dichloro-; Glycol dichloride; Ethylene chloride; ETHYLENE DICHLORIDE (1,2-DICHLORO-ETHANE)

SDS # : 001068

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
ACUTE TOXICITY (inhalation) - Category 3
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
May form explosive mixtures with air.
Toxic if inhaled.
Causes serious eye irritation.
Causes skin irritation.
May cause respiratory irritation.
May cause cancer.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Powered by IHS

Section 2. Hazards identification

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling.

Response : IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : 1,2-dichloroethane

Other means of identification : ethylene dichloride; Ethane, 1,2-dichloro-; Glycol dichloride; Ethylene chloride; ETHYLENE DICHLORIDE (1,2-DICHLORO-ETHANE)

CAS number/other identifiers

CAS number : 107-06-2

Product code : 001068

Ingredient name	%	CAS number
1,2-dichloroethane	100	107-06-2

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Powered by IHS

Section 4. First aid measures

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Toxic if inhaled. May cause respiratory irritation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Causes skin irritation.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Powered by IHS

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
carbonyl halides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact

Powered by IHS

Section 6. Accidental release measures

information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
1,2-dichloroethane	**ACGIH TLV (United States, 3/2012).** TWA: 40 mg/m³ 8 hours. TWA: 10 ppm 8 hours. **NIOSH REL (United States, 1/2013).** STEL: 8 mg/m³ 15 minutes. STEL: 2 ppm 15 minutes. TWA: 4 mg/m³ 10 hours. TWA: 1 ppm 10 hours. **OSHA PEL 1989 (United States, 3/1989).** STEL: 8 mg/m³ 15 minutes. STEL: 2 ppm 15 minutes. TWA: 4 mg/m³ 8 hours. TWA: 1 ppm 8 hours. **OSHA PEL Z2 (United States, 11/2006).** AMP: 200 ppm 5 minutes. CEIL: 100 ppm TWA: 50 ppm 8 hours.

Powered by IHS

Section 8. Exposure controls/personal protection

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [Viscous liquid.]

Color : Colorless. Clear.

Molecular weight : 98.96 g/mole

Molecular formula : C2-H4-Cl2

Boiling/condensation point : 83.6°C (182.5°F)

Melting/freezing point : -35.3°C (-31.5°F)

Critical temperature : 287.85°C (550.1°F)

Odor : Characteristic.

Odor threshold : Not available.

Powered by IHS

Section 9. Physical and chemical properties

pH	:	Not available.
Flash point	:	Closed cup: 13°C (55.4°F)
Burning time	:	Not applicable.
Burning rate	:	Not applicable.
Evaporation rate	:	5.05 (butyl acetate = 1)
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	Lower: 6.2% Upper: 16%
Vapor pressure	:	10.2 kPa (76.860212364 mm Hg) [room temperature]
Vapor density	:	3.42 (Air = 1)
Specific Volume (ft ^{3}/lb)	:	0.8029
Gas Density (lb/ft ^{3})	:	1.2455 (298.15°C / 568.7 to °F)
Relative density	:	1.235
Solubility	:	Not available.
Solubility in water	:	7.9 g/l
Partition coefficient: n-octanol/water	:	1.45
Auto-ignition temperature	:	440°C (824°F)
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	Dynamic (room temperature): 0.775 mPa·s (0.775 cP)

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	The product is stable.
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	:	Under normal conditions of storage and use, hazardous polymerization will not occur.

Powered by IHS

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
1,2-dichloroethane	LC50 Inhalation Gas.	Rat	2646 ppm	1 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
1,2-dichloroethane	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Eyes - Severe irritant	Rabbit	-	63 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	625 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
1,2-dichloroethane	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
1,2-dichloroethane	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Toxic if inhaled. May cause respiratory irritation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Causes skin irritation.

Powered by IHS

Section 11. Toxicological information

Ingestion : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Powered by IHS

Section 12. Ecological information

Product/ingredient name	Result	Species	Exposure
1,2-dichloroethane	Acute EC50 443 ppm Marine water	Algae - Skeletonema costatum	72 hours
	Acute EC50 433 mg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 160000 to 190000 µg/l Fresh water	Daphnia - Daphnia magna - Instar	48 hours
	Acute LC50 110 ppm Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 115 mg/l Marine water	Fish - Pleuronectiformes	96 hours
	Chronic NOEC 29000 µg/l Fresh water	Fish - Pimephales promelas - Larvae	32 days

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
1,2-dichloroethane	1.45	2	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Ethylene dichloride; Ethane, 1,2-dichloro-	107-06-2	Listed	U077

Powered by IHS

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1184	UN1184	UN1184	UN1184	UN1184
UN proper shipping name	ETHYLENE DICHLORIDE	ETHYLENE DICHLORIDE	ETHYLENE DICHLORIDE	ETHYLENE DICHLORIDE	ETHYLENE DICHLORIDE
Transport hazard class(es)	3 (6.1) 	3 (6.1) 	3 (6.1) 	3 (6.1) 	3 (6.1) 
Packing group	II	II	II	II	II
Environment	No.	No.	No.	No.	No.
Additional information	Inhalation hazard zone C **Reportable quantity** 100 lbs / 45.4 kg [9.6294 gal / 36.451 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 1 L **Cargo aircraft** Quantity limitation: 60 L **Special provisions** IB2, T7, TP1	**Explosive Limit and Limited Quantity Index** 1 **Passenger Carrying Road or Rail Index** 1	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 1 L **Cargo Aircraft Only** Quantity limitation: 60 L **Limited Quantities - Passenger Aircraft** Quantity limitation: 1 L

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) PAIR**: 1,2-dichloroethane

TSCA 8(a) CDR Exempt/Partial exemption: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Water Act (CWA) 307: 1,2-dichloroethane

Clean Water Act (CWA) 311: 1,2-dichloroethane

Powered by IHS

Section 15. Regulatory information

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
1,2-dichloroethane	100	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	1,2-dichloroethane	107-06-2	100
Supplier notification	1,2-dichloroethane	107-06-2	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
1,2-dichloroethane	Yes.	No.	Yes.	No.

Canada inventory : This material is listed or exempted.

International regulations

Powered by IHS

Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

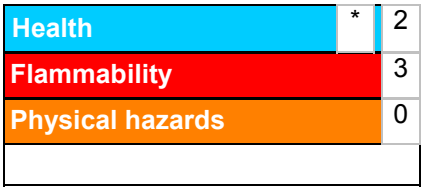
WHMIS (Canada) : Class B-2: Flammable liquid
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2A: Material causing other toxic effects (Very toxic).

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class B-2: Flammable liquid
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2A: Material causing other toxic effects (Very toxic).

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



Powered by IHS

Section 16. Other information

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 5/18/2015.

Date of issue/Date of revision : 5/18/2015.

Date of previous issue : 4/25/2015.

Version : 0.04

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

Powered by IHS

Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Powered by IHS

Safety Data Sheet

1,1-Dichloro-2,2-bis(4-chlorophenyl-d_4)ethylene

Section 1. Chemical product and company identifications

Product code: D-3005
Chemical formula: $C_{14}D_8Cl_4$
CAS: 93952-19-3
CAS (unlabelled): 72-55-9
Synonyms: 4,4'-DDE, 2,2-Bis(4-chlorophenyl)-1,1-dichloroethylene

Supplier / Manufacturer:

C/D/N Isotopes Inc.
88 Leacock Street
Pointe-Claire (Québec) H9R 1H1
Phone: 514-697-6254
Toll-Free (Canada & USA): 1-800-565-4696
Fax: 514-697-6148
Website: www.cdnisotopes.com

In case of emergency:

TOXYSCAN HOTLINE: 1-855-780-0599

Section 2. Hazards identifications

Physical state: Solid
Warning: Harmful if swallowed. Suspected of causing cancer.
Routes of entry: Inhalation, skin and eyes

GHS (Globally Harmonized System of Classification and Labelling of Chemicals):

GHS Classification:
- Acute toxicity, Oral (Category 4)
- Carcinogenicity (Category 2)

GHS Label elements:
- Pictograms: 
- Signal word: Warning

Hazards statement:
- H302 Harmful if swallowed.
- H351 Suspected of causing cancer.

Precautionary statement: - P281 Use personal protective equipment as required.

Section 3. Composition and information on ingredients

Name	CAS	Concentration %
1,1-Dichloro-2,2-bis(4-chlorophenyl-d_4)ethylene	93952-19-3	> 98

Section 4. First aid measures

Eye contact: Flush eyes with water as a precaution.
Skin contact: Wash off with soap and plenty of water. Consult a physician.
Inhalation: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
Ingestion: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
General advice: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

©2015 All rights reserved C/D/N Isotopes, Inc. / Toxyscan, Inc.

Section 5. Firefighting measures

Flammability of the product: Not flammable or combustible.
Lower explosion limit: No data available.
Upper explosion limit: No data available.
Auto-ignition temperature: No data available.
Flash point: No data available.
Products of combustion: Hazardous decomposition products formed under fire conditions: Carbon oxides, hydrogen chloride gas.
Firefighting media and instructions: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special protective equipment for firefighters: Wear self-contained breathing apparatus for firefighting if necessary.

Section 6. Accidental release measures

Personal precautions: Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
Methods for cleaning up: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

Section 7. Handling and storage

Handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.
Storage: Store at room temperature. Adequate ventilation. Protect from light.

Section 8. Exposure Controls, Personal Protections

Engineering controls: Use mechanical exhaust or laboratory fumehood to avoid exposure.
Eyes: Safety glasses with side-shields conforming to NIOSH (US).
Respiratory: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US).
Hands: Handle with gloves. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
Skin/body: Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Section 9. Physical and chemical properties (unlabelled)

Molecular weight: 318.03 g/mol
Physical status: Solid
Color: White-pale yellow
Odour: No data available
Density: No data available
Melting point: 88 - 90 °C (190 - 194 °F)
Boiling point: 336 °C (637 °F)
Vapour pressure: < 0.00001 hPa (< 0.00001 mmHg)
Vapour density: No data available
Partition coefficient (octanol/water): log Pow: 6.51
Water solubility: 0.04 mg/L

Section 10. Stability and reactivity

Stability and reactivity: Stable under recommended storage conditions.
Incompatibility: Strong oxidizing agents, strong bases.
Products of combustion: Hazardous decomposition products formed under fire conditions: Carbon oxides, hydrogen chloride gas.
Reactivity conditions: No data available.

©2015 All rights reserved C/D/N Isotopes, Inc. / Toxyscan, Inc.

Section 11. Toxicological information (unlabelled)

Toxicological data: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene

Information on ingredients:

Name	CAS	LD_{50}	LC_{50}
1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene	72-55-9	Oral - rat - 880 mg/kg	No data available

Potential acute effects

- **Eyes:** May cause eye irritation.
- **Skin:** Harmful if absorbed through skin. May cause skin irritation.
- **Inhalation:** May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion:** Harmful if swallowed.

Potential chronic effects

- **Carcinogenic effects:** This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification. Limited evidence of carcinogenicity in animal studies. IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- **Mutagenic effects:** No data available.
- **Teratogenic effects:** No data available.
- **Medical conditions aggravated by overexposure:** No data available.

Section 12. Ecological information

Ecological data:

Name	Results	Species	Period
1,1-Dichloro-2,2-bis	0.2 - 0.3 mg/l LC50	Lepomis macrochirus	96 h
(4-chlorophenyl)ethylene	0.03 - 0.04 mg/l LC50	Oncorhynchus mykiss	96 h
	0.05 - 0.18 mg/l LC50	Salmo salar	96 h

Effects on environment: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Mobility: No data available.
Environmental precautions: No data available.
Persistence and degradability: No data available.
Bioaccumulative potential: Gambusia affinis (Mosquito fish) - 33 d. Bioconcentration factor (BCF): 12,037.

Section 13. Disposal considerations

Waste disposal: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Section 14. Transportation information

Classification DOT/IMDG/IATA label:

Shipping name: Not dangerous goods
UN number: None
Class: None
Packaging group: None

Additional information: None

©2015 All rights reserved C/D/N Isotopes, Inc. / Toxyscan, Inc.

Section 15. Regulatory information

UNITED STATES:
NFPA classification



Health: 1
Flammable: 0
Reactivity: 0
Specials conditions: None

Legend: 4: Severe, 3: High, 2: Moderate, 1: Slightly, 0: Not hazardous

U.S. Federal regulations:

TSCA 8(b) inventory: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene
SARA 302/304/311/312 extremely hazardous substances: Not Listed
SARA 302/304 emergency planning and notification: Not Listed
SARA 302/304/311/312 hazardous chemicals: Not Listed
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard: Not Listed
CWA (Clean Water Act) 307: Not Listed
CWA (Clean Water Act) 311: Not Listed
CAA (Clean Air Act) 112 accidental release prevention: Not Listed
CAA (Clean Air Act) 112 regulated flammable substances: Not Listed
CAA (Clean Air Act) 112 regulated toxic substances: Not Listed

State regulations:

DEA List I Chemicals (Precursor Chemicals): Not Listed
DEA List II Chemicals (Essential Chemicals): Not Listed
Substances in Massachusetts: Not Listed
Dangerous substances in New Jersey: Not Listed
New York – Dangerous substances with acute effects: Not Listed
Dangerous substances in Pennsylvania – right to know: Not Listed

WHMIS (Canada):



Not WHMIS controlled.

Section 16. Additional information

References:

- ANSI Z400.1, MSDS Standard, 2001.
- Manufacturer's Material Safety Data Sheet.
- 29CFR Part1910.1200 OSHA MSDS Requirements.
- 49CFR Table List of Hazardous Materials, UN#, Proper Shipping Names, PG. -Canada
- Gazette Part II, Vol. 122, No. 2 Registration SOR/88-64 31 December, 1987 Hazardous Products Act "Ingredient Disclosure List".
- Federal act on the controlled products
- Canadian Transport of Dangerous Goods, Regulations and Schedules, Clear Language version 2002.
- Toxicological repertory, HSC.
- Material safety data sheet from the components.

Date of issue: **February 20th, 2017**
Version: 1
Elaborated by: **Toxyscan Inc., 1-866-780-0599**
Notice to reader: To the best of our knowledge, the information contained herein is accurate. However, C/D/N Isotopes Inc., Toxyscan Inc., or any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

©2015 All rights reserved C/D/N Isotopes, Inc. / Toxyscan, Inc.

Safety Data Sheet

Revision Date: 12/23/16

www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**32203 / 4,4'-DDT Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	8
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1
Flammable Liquid Category 2
Acute Toxicity - Inhalation Dust / Mist Category 3
Acute Toxicity - Dermal Category 3
Acute Toxicity - Oral Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
Toxic if swallowed, in contact with skin or if inhaled.
Causes damage to organs.

GHS Precautions:

Safety Precautions:
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF SWALLOWED: Immediately call a POISON CENTER/doctor/....
IF ON SKIN: Wash with plenty of soap and water.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF exposed: Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician if you feel unwell.
Specific treatment see section 4.
Rinse mouth.
Take off immediately all contaminated clothing and wash it before reuse.
In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.900000
4,4'-DDT	50-29-3	200-024-3	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA
4,4'-DDT	50-29-3	500 mg/m3 IDLH		1 mg/m3 TWA	1 mg/m3 TWA (listed under Dichlorodiphenyltrichloroethane)

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available.
Odor:	Mild
Physical State:	No data available.
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	1.1 (air = 1)
Boiling Point:	No data available.
Melting Point:	-98 °C
Flash Point:	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
Autoignition Temperature:	464 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	No data available.
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	99.9
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation, Skin, GI Tract, Respiratory Tract
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.
Skin Contact:	Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Eye Contact:	Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.
Ingestion Toxicity:	Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	Contains a known human reproductive and/or developmental hazard.
Inhalation:	Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)
Skin Contact:	Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Ingestion:	Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Inhalation LC50 Rat 22500 ppm 8 h
DDT	50-29-3	Dermal LD50 Rabbit 300 - 2820 mg/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
DDT	50-29-3	Present

ACGIH:

Chemical Name	CAS No.	
DDT	50-29-3	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
DDT	50-29-3	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
DDT	50-29-3	Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview:	Moderate ecological hazard. This product may be dangerous

to plants and/or wildlife.

Mobility: No data
Persistence: No data
Bioaccumulation: No data
Degradability: Biodegrades slowly.
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3(6.1)
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X
4,4'-DDT	50-29-3	X	-	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
DDT	50-29-3	Prop 65 Cancer
Methanol	67-56-1	Prop 65 Devolop Tox
p,p''-DDT	50-29-3	Prop 65 Devolop Tox
p,p''-DDT	50-29-3	Prop 65 Rep Female
p,p''-DDT	50-29-3	Prop 65 Rep Male

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
4,4'-DDT	50-29-3	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 09/30/14
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose

prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Version 4.7
Revision Date 05/23/2016
Print Date 06/23/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657
Brand : Aldrich
Index-No. : 033-001-00-X

CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H331 Toxic if inhaled.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.

P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Hazardous components

Component	Classification	Concentration
Arsenic		
	Acute Tox. 4; Acute Tox. 3; Aquatic Acute 1; Aquatic Chronic 1; H302, H331, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen		
		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Arsenic	7440-38-2	inorganic arsenic plus methylated metabolites	35µg As/l	In urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of the workweek (After four or five consecutive working days			

		with exposure)			
		inorganic arsenic plus methylated metabolites	35µg As/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of the workweek (After four or five consecutive working days with exposure)			

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Pieces Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available

d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 817 °C (1,503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C (1,135 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	5.727 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat Exposure to air may affect product quality.

10.5 Incompatible materials
Oxidizing agents, Halogens, Palladium undergoes a violent reaction with arsenic, Zinc, Platinum oxide, Nitrogen trichloride, Bromine azide

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Arsenic oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 763 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC:	1 - Group 1: Carcinogenic to humans (Arsenic)
NTP:	Known to be human carcinogen (Arsenic)
	Known to be human carcinogen (Arsenic)
OSHA:	OSHA specifically regulated carcinogen (Arsenic)

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CG0525000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9.9 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant:yes

IATA
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Arsenic	7440-38-2	2008-10-10

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H302	Harmful if swallowed.
H331	Toxic if inhaled.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 05/23/2016 Print Date: 06/23/2016

SAFETY DATA SHEET

Version 5.6
Revision Date 06/02/2016
Print Date 07/20/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Benz[*a*]anthracene
Product Number	:	48563
Brand	:	Supelco
Index-No.	:	601-033-00-9
CAS-No.	:	56-55-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	+1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word: Danger

Hazard statement(s)

H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.

P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,2-Benzanthracene Tetraphene
Formula	:	$C_{18}H_{12}$
Molecular weight	:	228.29 g/mol
CAS-No.	:	56-55-3
EC-No.	:	200-280-6
Index-No.	:	601-033-00-9

Hazardous components

Component	Classification	Concentration
Benz[a]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber

Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 157 - 159 °C (315 - 318 °F)
f)	Initial boiling point and boiling range	437.6 °C (819.7 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available

t) Oxidizing properties No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - > 200 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)
NTP:	Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
NTP:	Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.6 Revision Date: 06/02/2016 Print Date: 07/20/2017

SAFETY DATA SHEET

Revision Date 22-May-2017 **Revision Number** 2

1. Identification

Product Name **Benzo[a]pyrene, 98%**

Cat No. : **AC105600010; AC105601000**

Synonyms Benzo[def]chrysene.; 3,4-Benzopyrene; 3,4-Benzpyrene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 1A
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 1A

Label Elements

Signal Word
Danger

Hazard Statements
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
May damage fertility or the unborn child



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Avoid breathing dust/fume/gas/mist/vapors/spray
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Benzo[a]pyrene	50-32-8	> 96

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes.

Inhalation Move to fresh air.

Ingestion Do not induce vomiting.

Most important symptoms/effects May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point
Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up No information available.

7. Handling and storage

Handling Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Benzo[a]pyrene		TWA: 0.2 mg/m³		

Legend

OSHA - Occupational Safety and Health Administration

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Dark yellow
Odor	aromatic
Odor Threshold	No information available
pH	
Melting Point/Range	175 179 °C
Boiling Point/Range	°C @ 760 mmHg

Flash Point	
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Specific Gravity	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C20H12
Molecular Weight	252.31

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzo[a]pyrene	50-32-8	Group 1	Reasonably Anticipated	A2	X	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Benzo[a]pyrene	Group III Chemical	Not applicable	Not applicable

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

Component	log Pow
Benzo[a]pyrene	6.06

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Benzo[a]pyrene - 50-32-8	U022	-

14. Transport information

DOT

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

TDG

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

IATA

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

IMDG/IMO

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzo[a]pyrene	X	X	-	200-028-5	-		X	-	-	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Benzo[a]pyrene	50-32-8	> 96	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Benzo[a]pyrene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Benzo[a]pyrene	1 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Benzo[a]pyrene	50-32-8	Carcinogen	0.06 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzo[a]pyrene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N

DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 22-May-2017
Print Date 22-May-2017
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Barium**

Cat No. : **AC317860000; AC317860250; AC317861000; AC317865000**

Synonyms None Known.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 2
Acute oral toxicity	Category 3
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Toxic if swallowed
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Wear protective gloves/protective clothing/eye protection/face protection
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Response
Call a POISON CENTER or doctor/physician if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store locked up
Store in a closed container
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
Barium	7440-39-3	99.9

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Contact with water liberates toxic gas. Water reactive. Combustible material. Produce flammable gases on contact with water.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	W

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Handle under inert gas, protect from moisture. Wear personal protective equipment.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Protect from moisture. Never allow product to get in contact with water during storage. Store under an inert atmosphere.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Barium	TWA: 0.5 mg/m^3	(Vacated) TWA: 0.5 mg/m^3	

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Barium			TWA: 0.5 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration

Engineering Measures Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Grey
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	725 °C / 1337 °F
Boiling Point/Range	1640 °C / 2984 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	10 mmHg @ 1094 °C
Vapor Density	No information available
Relative Density	3.51 @ 20 °C
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	Ba
Molecular Weight	137.34

10. Stability and reactivity

Reactive Hazard Yes

Stability Moisture sensitive. Air sensitive.

Conditions to Avoid Exposure to air. Incompatible products. Exposure to moisture.

Incompatible Materials Acids, Water, Alcohols, Halogens

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information
Oral LD50 Category 3. ATE = 50 - 300 mg/kg.
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Barium	132 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Barium	7440-39-3	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available
Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1400
Proper Shipping Name	BARIUM
Hazard Class	4.3
Packing Group	II

TDG

UN-No	UN1400
Proper Shipping Name	BARIUM
Hazard Class	4.3
Packing Group	II

IATA

UN-No	UN1400
Proper Shipping Name	Barium
Hazard Class	4.3
Packing Group	II

IMDG/IMO

UN-No	UN1400
Proper Shipping Name	Barium
Hazard Class	4.3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Barium	X	X	-	231-149-1	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Barium	7440-39-3	99.9	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Barium	1000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Barium	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class
B4 Flammable solid
B6 Reactive flammable material
D2B Toxic materials
D1A Very toxic materials



16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage,

transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

Safety Data Sheet

Revision Date: 12/08/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31272 / Benzo(b)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	9
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:





GHS Classification:	Flammable Liquid Category 2 Serious Eye Damage/Eye Irritation Category 2 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Causes serious eye irritation. May cause drowsiness or dizziness.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. If eye irritation persists: Get medical advice/attention. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.900000
benzo (b) fluoranthene	205-99-2	205-911-9	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from

incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	500 ppm STEL 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA 500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (b) fluoranthene	205-99-2	ND		No TLV	No data available.

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

Medical Conditions Aggravated By Exposure: Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color: Depends upon product selection
Odor: Strong
Physical State: No data available.
pH: No data available.
Vapor Pressure: No data available.
Vapor Density: 2.0 (air = 1)
Boiling Point: No data available.
Melting Point: -95.4 °C Melting Point
Flash Point: 39
Flammability: Highly Flammable
Upper Flammable/Explosive Limit, % in air: No data available.
Lower Flammable/Explosive Limit, % in air: No data available.
Autoignition Temperature: 465 deg C
Decomposition Temperature: No data available.
Specific Gravity: 0.7845 g/cm3 at 25 °C
Evaporation Rate: No data available.
Odor Threshold: ND
Solubility: Complete; 100%
Partition Coefficient: n-octanol in water: No data available.
VOC % by weight: 0
Molecular Weight: 58.08

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to Avoid: No data available.
Materials to Avoid / Chemical Incompatiability: Strong oxidizing agents Strong acids
Hazardous Decomposition Products: Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin
Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Can cause minor skin irritation, defatting, and dermatitis.
Eye Contact:	Can cause minor irritation, tearing and reddening.
Ingestion Irritation:	May be harmful if swallowed.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:
NIOSH:

Chemical Name	**CAS No.**	**LD50/LC50**
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Oral LD50 Rat 5800 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h

Component Carcinogenic Data:
OSHA:

Chemical Name	**CAS No.**	
Benzo(b)fluoranthene	205-99-2	Present

ACGIH:

Chemical Name	**CAS No.**	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen
Benzo[b]fluoranthene	205-99-2	A2 - Suspected Human Carcinogen

NIOSH:

Chemical Name	**CAS No.**
No data available.	

NTP:

Chemical Name	**CAS No.**
No data available.	

IARC:

Chemical Name	**CAS No.**	**Group No.**
No data.		Group 1
No data.		Group 2A
Benzo(b)fluoranthene	205-99-2	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	This material is not expected to be harmful to the ecology.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	No data
Ecological Toxicity Data:	No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product:	Spent or discarded material is a hazardous waste.
Disposal Methods:	Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging:	Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Acetone

UN Number: UN1090
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (b) fluoranthene	205-99-2	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[b]fluoranthene	205-99-2	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (b) fluoranthene	205-99-2	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 03/23/15
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

1 Identification

Product identifier

Product name: Benzene

Stock number: L14012
CAS Number:
71-43-2
EC number:
200-753-7
Index number:
601-020-00-8
Relevant identified uses of the substance or mixture and uses advised against.
Identified use: SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com
Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

2 Hazard(s) identification

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)



GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.



GHS08 Health hazard

Muta. 1B H340 May cause genetic defects.
Carc. 1A H350 May cause cancer.
STOT RE 1 H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.



GHS07

Skin Irrit. 2 H315 Causes skin irritation.
Eye Irrit. 2 H319 Causes serious eye irritation.
Hazards not otherwise classified No information known.

Label elements
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms



GHS02 GHS07 GHS08

Signal word Danger
Hazard statements
H225 Highly flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
H304 May be fatal if swallowed and enters airways.
Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor/…
P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
WHMIS classification
B2 - Flammable liquid
D2A - Very toxic material causing other toxic effects



Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)



Health (acute effects) = 2
Flammability = 3
Physical Hazard = 1

(Contd. on page 2)

Product name: Benzene

(Contd. of page 1)

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients

Chemical characterization: Substances
CAS# Description:
71-43-2 Benzene
Identification number(s):
EC number: 200-753-7
Index number: 601-020-00-8

4 First-aid measures

Description of first aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing Seek medical treatment.
Information for doctor
Most important symptoms and effects, both acute and delayed No further relevant information available.
Indication of any immediate medical attention and special treatment needed No further relevant information available.

5 Fire-fighting measures

Extinguishing media
Suitable extinguishing agents Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Carbon monoxide and carbon dioxide
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Keep away from ignition sources
Environmental precautions: Do not allow product to reach sewage system or any water course.
Methods and material for containment and cleaning up:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Prevention of secondary hazards: Keep away from ignition sources.
Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.
Information about protection against explosions and fires:
Protect against electrostatic charges.
Fumes can combine with air to form an explosive mixture.
Keep ignition sources away.

Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles: Store in a cool location.
Information about storage in one common storage facility:
Do not store together with acids.
Store away from strong bases.
Store away from oxidizing agents.
Store away from halogens.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.
Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

(Contd. on page 3)

Product name: Benzene

(Contd. of page 2)

Control parameters

Components with limit values that require monitoring at the workplace:

71-43-2 Benzene (100.0%)

PEL (USA)	Short-term value: 15* mg/m³, 5* ppm Long-term value: 3* mg/m³, 1* ppm *table Z-2 for exclusions in 29CFR1910.1028(d)
REL (USA)	Short-term value: 1 ppm Long-term value: 0.1 ppm See Pocket Guide App. A
TLV (USA)	Short-term value: 8 mg/m³, 2.5 ppm Long-term value: 1.6 mg/m³, 0.5 ppm Skin; BEI
EL (Canada)	Short-term value: 2.5 ppm Long-term value: 0.5 ppm Skin; ACGIH A1; IARC 1
EV (Canada)	Short-term value: 2.5 ppm Long-term value: 0.5 ppm Skin

Ingredients with biological limit values:

71-43-2 Benzene (100.0%)

BEI (USA)	25 µg/g creatinine Medium: urine Time: end of shift Parameter Parameter: S-Phenylmercapturic acid (background 500 µg/g creatinine Medium: urine Time: end of shift Parameter: t,t-Muconic acid (background)

Additional information: No data

Exposure controls
Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
Maintain an ergonomically appropriate working environment.
Breathing equipment: Use suitable respirator when high concentrations are present.
Recommended filter device for short term use:
Use a respirator with organic vapor/acid gas cartridges as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).
Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.
Material of gloves Fluorocarbon rubber (Viton)
Penetration time of glove material (in minutes) Not determined
Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties
General Information
Appearance:

Form:	Liquid
Color:	Colorless
Odor:	Aromatic
Odor threshold:	Not determined.
pH-value:	Not determined.
Change in condition	
Melting point/Melting range:	5 °C (41 °F)
Boiling point/Boiling range:	80 °C (176 °F)
Sublimation temperature / start:	Not determined
Flash point:	-11 °C (12 °F)
Flammability (solid, gaseous)	Not determined.
Ignition temperature:	555 °C (1031 °F)
Decomposition temperature:	Not determined
Auto igniting:	Not determined.
Danger of explosion:	Product is not explosive. However, formation of explosive air/vapor mixtures is possible.
Explosion limits:	
Lower:	1.2 Vol %
Upper:	8 Vol %
Vapor pressure at 20 °C (68 °F):	101 hPa (76 mm Hg)
Density at 20 °C (68 °F):	0.874 g/cm³ (7.294 lbs/gal)
Relative density	Not determined.
Vapor density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water at 25 °C (77 °F):	1.8 g/l
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
dynamic at 20 °C (68 °F):	0.66 mPas
kinematic:	Not determined.

(Contd. on page 4)

Product name: Benzene

(Contd. of page 3)

Other information No further relevant information available.

10 Stability and reactivity

Reactivity No information known.
Chemical stability Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions Reacts with strong oxidizing agents
Conditions to avoid No further relevant information available.
Incompatible materials:
Acids
Oxidizing agents
Bases
Halogens
Hazardous decomposition products: Carbon monoxide and carbon dioxide

11 Toxicological information

Information on toxicological effects
Acute toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.

LD/LC50 values that are relevant for classification:

Oral	LD50	930 mg/kg (rat)
Dermal	LD50	>9400 µL/kg (rabbit)
Inhalative	LC50/7H	10000 ppm/7H (rat)

Skin irritation or corrosion: Causes skin irritation.
Eye irritation or corrosion: Causes serious eye irritation.
Sensitization: No sensitizing effects known.
Germ cell mutagenicity:
May cause genetic defects.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.
Carcinogenicity:
May cause cancer.
EPA-A: human carcinogen: sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.
IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity.
ACGIH A1: Confirmed human carcinogen: Agent is carcinogenic to humans based on epidemiologic studies of, or convincing clinical evidence in, exposed humans.
EPA-K: Known human carcinogens.
Carcinogen as defined by OSHA.
NTP-K: Known to be carcinogenic: sufficient evidence from human studies.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.
Reproductive toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for this substance.
Specific target organ system toxicity - repeated exposure:
Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
Specific target organ system toxicity - single exposure: No effects known.
Aspiration hazard: May be fatal if swallowed and enters airways.
Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information: To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

12 Ecological information

Toxicity
Aquatic toxicity: No further relevant information available.
Persistence and degradability No further relevant information available.
Bioaccumulative potential No further relevant information available.
Mobility in soil No further relevant information available.
Additional ecological information:
General notes:
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Avoid transfer into the environment.
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects No further relevant information available.

13 Disposal considerations

Waste treatment methods
Recommendation Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

UN-Number	
DOT, IMDG, IATA	UN1114
UN proper shipping name	
DOT	RQ Benzene
IMDG, IATA	BENZENE
Transport hazard class(es)	
DOT	



Class	3 Flammable liquids.
Label	3
Class	3 (F1) Flammable liquids

(Contd. on page 5)

Product name: Benzene

(Contd. of page 4)

Label **IMDG, IATA**	3
	
Class **Label**	3 Flammable liquids. 3
Packing group **DOT, IMDG, IATA**	II
Environmental hazards:	Not applicable.
Special precautions for user **EMS Number:**	Warning: Flammable liquids F-E,S-D
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.
Transport/Additional information:	
DOT **Hazardous substance:** **Marine Pollutant (DOT):**	 10 lbs, 4.54 kg No
UN "Model Regulation":	UN1114, Benzene, 3, II

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms



GHS02 GHS07 GHS08

Signal word Danger
Hazard statements
H225 Highly flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
H304 May be fatal if swallowed and enters airways.
Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor/…
P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)
71-43-2 | Benzene

California Proposition 65

Prop 65 - Chemicals known to cause cancer
71-43-2 | Benzene

Prop 65 - Developmental toxicity
71-43-2 | Benzene

Prop 65 - Developmental toxicity, female Substance is not listed.

Prop 65 - Developmental toxicity, male
71-43-2 | Benzene

Information about limitation of use:
Workers are not allowed to be exposed to this hazardous material. Exceptions can be made by the authorities in certain cases.
For use only by technically qualified individuals.
Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006. Substance is not listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use) Substance is not listed.
Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department
Date of preparation / last revision 11/23/2015 / -
Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
vPvB: very Persistent and very Bioaccumulative

(Contd. on page 6)
USA

Product name: Benzene

(Contd. of page 5)

ACGIH: American Conference of Governmental Industrial Hygienists (USA)
OSHA: Occupational Safety and Health Administration (USA)
NTP: National Toxicology Program (USA)
IARC: International Agency for Research on Cancer
EPA: Environmental Protection Agency (USA)

Safety Data Sheet

Revision Date: 12/30/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31274 / Benzo(k)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:





GHS Classification:	Flammable Liquid Category 2 Serious Eye Damage/Eye Irritation Category 2 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Causes serious eye irritation. May cause drowsiness or dizziness.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. If eye irritation persists: Get medical advice/attention. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.900000
benzo (k) fluoranthene	207-08-9	205-916-6	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from

incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	500 ppm STEL 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA 500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (k) fluoranthene	207-08-9	ND		No TLV	No data available.

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

Medical Conditions Aggravated By Exposure: Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color: Depends upon product selection
Odor: Strong
Physical State: No data available.
pH: No data available.
Vapor Pressure: No data available.
Vapor Density: 2.0 (air = 1)
Boiling Point: No data available.
Melting Point: -95.4 °C Melting Point
Flash Point: 39
Flammability: Highly Flammable
Upper Flammable/Explosive Limit, % in air: No data available.
Lower Flammable/Explosive Limit, % in air: No data available.
Autoignition Temperature: 465 deg C
Decomposition Temperature: No data available.
Specific Gravity: 0.7845 g/cm3 at 25 °C
Evaporation Rate: No data available.
Odor Threshold: ND
Solubility: Complete; 100%
Partition Coefficient: n-octanol in water: No data available.
VOC % by weight: 0
Molecular Weight: 58.08

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to Avoid: No data available.
Materials to Avoid / Chemical Incompatiability: Strong oxidizing agents Strong acids
Hazardous Decomposition Products: Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin
Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Can cause minor skin irritation, defatting, and dermatitis.
Eye Contact:	Can cause minor irritation, tearing and reddening.
Ingestion Irritation:	May be harmful if swallowed.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:
NIOSH:

Chemical Name	**CAS No.**	**LD50/LC50**
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Oral LD50 Rat 5800 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h

Component Carcinogenic Data:
OSHA:

Chemical Name	**CAS No.**	
Benzo(k)fluoranthene	207-08-9	Present

ACGIH:

Chemical Name	**CAS No.**	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen

NIOSH:

Chemical Name	**CAS No.**
No data available.	

NTP:

Chemical Name	**CAS No.**
No data available.	

IARC:

Chemical Name	**CAS No.**	**Group No.**
No data.		Group 1
No data.		Group 2A
Benzo(k)fluoranthene	207-08-9	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	This material is not expected to be harmful to the ecology.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	No data
Ecological Toxicity Data:	No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product:	Spent or discarded material is a hazardous waste.
Disposal Methods:	Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging:	Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:	
DOT Proper Shipping Name:	Acetone
UN Number:	UN1090

Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (k) fluoranthene	207-08-9	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[k]fluoranthene	207-08-9	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (k) fluoranthene	207-08-9	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 05/15/15
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

Chromium

Safety Data Sheet

Section 1: Identification

1.1 Product Identifier

Product Name:	Chromium
Product Form:	Solid
Chemical Family:	Metal
CAS Number:	7440-47-3
Molecular Formula:	Cr
Molecular Weight	51.996

1.2 Other Means of Identification

Synonyms:	Chrome; Chromium Element; Chromium Metal; Metallic Chromium; Cr; DLA05001; RTECS GB4200000

1.3 Recommended Uses

Recommended Use:	Variety of mechanical and industrial applications

1.4 Manufacturer, Importer, or Responsible Party

Responsible Party:	Defense Logistics Agency Strategic Materials 8725 John J. Kingman Road Fort Belvoir, Virginia 22060-6223 (571) 767-5525

1.5 Emergency Phone Number

Emergency Phone Number:	(800) 424-9300 (CHEMTREC) (703) 527-3887 (CHEMTREC INTERNATIONAL)

Section 2: Hazard(s) Identification

2.1 Classification of Chemical per OSHA CFR 1910.1200

Acute Toxicity (Oral):	Category 2
Skin Irritation:	Category 2
Eye Irritation:	Category 2B
Skin Sensitization:	Category 1A
Germ Cell Mutagenicity:	Category 2
Reproductive Toxicity:	Effects on or via Lactation
Target Organ Toxicity– Prolonged:	Category 1 (Lungs, Kidney)

2.2 Label Elements

Signal Word: DANGER

Symbol(s):





Hazard Statements:	Fatal if swallowed. Causes skin irritation. Causes eye irritation. May cause an allergic skin reaction. Suspected of causing genetic defects. May cause harm to breast-fed children. Causes damage to lungs and kidneys through prolonged or repeated exposure.
Precautionary Statements:	Prevention: Wear protective gloves, protective clothing, eye protection, and face protection. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe dust. Contaminated clothing must not be allowed out of the workplace. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid contact during pregnancy and/or while nursing. Response: If swallowed, immediately call a poison center and/or doctor. Rinse mouth. If on skin, wash with plenty of water. If skin irritation or rash occurs, get medical advice and/or attention. Take off contaminated clothing and wash it before reuse. If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention. If exposed, concerned, or feeling unwell, get medical advice and/or attention. Storage: Store locked up. Disposal: Dispose of contents in accordance with federal, state, and local regulations.

2.3 Other Hazards
Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

2.4 Unknown Acute Toxicity
Does not apply to this product.

Section 3: Composition / Information on Ingredients

3.1 Chemical Name

Chemical Name:	Chromium
Composition:	99.00%-99.82% Cr

The health and physical hazards information provided in this SDS are for its major component. Chromium metal contains other elements in addition to Cr. For concentrations of other components, see the Certificates of Analysis for each lot.

3.2 Common Names/Synonyms
Synonyms: See **Section 1.2** for common names and synonyms.

3.3 CAS Number/Unique Identifiers

CAS Number:	7440-47-3
EC Number (EINECS):	231-157-5

3.4 Impurities/Stabilizing Additives
No data available.

Section 4: First-Aid Measures

4.1 Description of First-Aid Measures

Inhalation:	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.
Skin Contact:	Wash skin with soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Cover skin burns with dry, sterile dressings after decontamination. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.
Eye Contact:	Flush eyes with plenty of water for at least 15 minutes. Get immediate

	medical attention.
Ingestion:	Rinse mouth and administer water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Get medical attention.

4.2 Most Important Symptoms/Effects, Acute and Delayed

Inhalation (Acute):	Irritation.
Inhalation (Chronic):	Digestive disorders and lung damage.
Skin Contact (Acute):	Irritation.
Skin Contact (Chronic):	Kidney damage.
Eye Contact (Acute):	Irritation.
Eye Contact (Chronic):	Tearing.
Ingestion (Acute):	Vomiting, stomach pain, and dizziness.
Ingestion (Chronic):	No data available.

4.3 Indication of immediate Medical Attention/Special Treatment

Antidote:	Dimercaprol, intramuscular

Section 5: Fire-Fighting Measures

5.1 Suitable Extinguishing Media

Dolomite, dry powder for metal fires, dry sand, graphite, soda ash, and sodium chloride. Do not get water directly on material.

5.2 Specific Hazards

Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

5.3 Special Protective Equipment and Precautions

Respiratory protection from chromium metal and insoluble chromium salts should include a self-contained breathing apparatus with a full face piece operated in pressure-demand or other positive pressure mode. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep all unauthorized people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

Section 6: Accidental Release Measures

6.1 Personal Precautions, Protective Equipment, and Emergency Procedures

Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202) 426-2675 (USA). Personal protective equipment is discussed in **Section 8.3**. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Cover solids with a plastic sheet to prevent dissolving in rain or firefighting water. If spilled in water, neutralize with agricultural lime, crushed limestone, or sodium bicarbonate. Adjust pH to neutral.

6.2 Methods and Materials for Containment and Clean Up

If chromium metal or insoluble chromium salts are spilled, the following steps should be taken:

1. Remove all ignition sources where metallic chromium has been spilled.
2. Ventilate area of spill.
3. Dampen the solid spill material with 5% ammonium hydroxide, and transfer the dampened material to a suitable container.
4. Deposit material and contaminated clothing in sealed containers for reclamation or for disposal in a secured sanitary landfill.
5. Wash all contaminated surfaces with 5% ammonium hydroxide followed by washing with a strong soap and water solution.
6. Do not re-enter the contaminated area until the Safety Officer (or other responsible person) has verified

that the area has been properly cleaned.

Liquid containing chromium metal or insoluble chromium salts should be absorbed in vermiculite, dry sand, earth, or a similar material.

Section 7: Handling and Storage

7.1 Precautions for Safe Handling

Handle in accordance with all current regulations and standards. Utilize personal protective equipment to avoid contact with skin. Personal protective equipment is discussed in **Section 8.3**.

7.2 Conditions for Safe Storage

Store in accordance with all current regulations and standards. Store in a tightly closed container. Store in a cool, dry place. Store in a well-ventilated area. Keep separated from incompatible substances. Incompatible materials are identified in **Section 10.5**.

Section 8: Exposure Controls / Personal Protection

8.1 Exposure Limits

OSHA PEL TWA (metal):	1 mg (Cr)/m^3
ACGIH TWA (metal):	0.5 mg (Cr)/m^3
NIOSH REL TWA 10 hour(s) (metal):	0.5 mg (Cr)/m^3
EC OEL TWA (IOELV) (metal):	2 mg/m^3
UK WEL TWA 8 hour(s) (metal):	0.5 mg/m^3

8.2 Appropriate Engineering Controls

Ventilation: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

8.3 Individual Protection Measures

Eye Protection: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate area.

Clothing: Wear appropriate chemical resistant clothing.

Gloves: Wear appropriate chemical resistant gloves.

Respirator:

The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

2.5 mg/m^3: **1.** Any quarter-mask respirator.

5 mg/m^3: **1.** Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100 or P100.
2. Any supplied-air respirator.

12.5 mg/m^3: **1.** Any supplied-air respirator operated in a continuous-flow mode.
2. Any powered, air-purifying respirator with a high-efficiency particulate filter.

25 mg/m^3: **1.** Any air-purifying, full-facepiece respirator equipped with an N100, R100, or P100 filter.
2. Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
3. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece.

250 mg/m^3:	**1.** Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
Unknown Concentrations/IDLH:	**1.** Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. **2.** Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape:	**1.** Any air-purifying, full-facepiece respirator equipped with an N100, R100, or P100 filter. **2.** Any appropriate escape-type, self-contained breathing apparatus.

Section 9: Physical and Chemical Properties

9.1 Appearance

Physical State:	Solid
Physical Description:	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid in pig, ingot or tub form.

9.2 Odor

Odor:	Odorless

9.3 Odor Threshold

Not available.

9.4 pH

Not applicable.

9.5 Melting / Freezing Points

Melting Point:	3,339°F-3,411°F (1,837°C-1877°C)
Freezing Point:	No data available.

9.6 Boiling Point

Boiling Point:	4,842°F (2,672°C)

9.7 Flash Point

No data available.

9.8 Evaporation Rate

Not applicable.

9.9 Flammability

Flammability:	0.230 oz/ft^3

9.10 Upper/Lower Explosive Limits

No data available.

9.11 Vapor Pressure

Vapor Pressure:	1 mmHg @ 1,616°C

9.12 Vapor Density

Not applicable.

9.13 Relative Density

Water = 1:	7.20 @ 28°C

9.14 Solubility(ies)

Insoluble:	Water, Nitric Acid, and Aqua Regia
Soluble:	Dilute Sulfuric Acid and Hydrochloric Acid

9.15 Partition Coefficient

No data available.

9.16 Auto-Ignition Temperature

No data available.

9.17 Decomposition Temperature

No data available.

9.18 Viscosity

No data available.

Section 10: Stability and Reactivity

10.1 Reactivity

Stable at normal temperatures and pressures.

10.2 Chemical Stability

Stable at normal temperatures and pressures. Not oxidized by air, even in presence of much moisture.

10.3 Possibility of Hazardous Reactions

Alkali Carbonates:	Attacked.
Alkalies (Caustic):	Attacked.
Ammonium Nitrate (Fused):	Violent or explosive reaction.
Bromine Pentafluoride:	Violent reaction and possible ignition.
Hydrogen Peroxide:	Violent decomposition reaction.
Lithium (Molten):	Vigorous reaction at elevated temperatures.
Nitrogen Oxide:	Incandescent reaction.
Oxidizers (Strong):	Fire and explosion hazard.
Potassium Chlorate (Fused):	Vigorous incandescent reaction.
Sulphur Dioxide:	Incandescent reaction.

10.4 Conditions to Avoid

None reported.

10.5 Incompatible Materials

Incompatibilities:	Bases, oxidizing materials, halogens, peroxides, and metals.

Reacts with dilute hydrochloric acid and sulfuric acid. Safe storage of the material is discussed in **Section 7.2**.

10.6 Hazardous Decomposition Products

Thermal Decomposition Products:	Oxides of chromium.

Section 11: Toxicological Information

11.1 Likely Routes of Exposure

Routes of entry include inhalation, skin contact, eye contact, and ingestion.

11.2 Symptoms

See **Section 4.2** for symptoms related to the physical, chemical, and toxicological characteristics.

11.3 Short and Long Term Effects

Inhalation (Acute):	High concentrations of dusts or fumes may cause irritation.
Inhalation (Chronic):	Repeated or prolonged exposure to various chromium compounds has been reported to result in ulceration and perforation of the nasal septum, irritation of the throat and lower respiratory tract, less commonly in gastrointestinal disturbances, blood changes, pulmonary sensitization, pulmonary pneurnoconiosis or fibrosis, and rarely liver effects. These effects have not been reported from exposure to the metal per se.
Skin Contact (Acute):	Contact with dusts or powder may cause irritation.
Skin Contact (Chronic):	Repeated or prolonged exposure to various chromium compounds has been reported to cause various types of dermatitis, including eczema, "chrome holes", sensitization, and, in contact with damaged skin, kidney damage. These effects have not been reported from exposure to the metal per se.
Eye Contact (Acute):	Contact with dusts or powders may cause irritation.
Eye Contact (Chronic):	Repeated or prolonged exposure to some chromium compounds may cause conjunctivitis and lacrimation. These effects have not been reported from exposure to the metal per se.
Ingestion (Acute):	Chromium metal is poorly absorbed by the intestinal tract. Absorption of sufficient amounts of some chromium compounds may result in dizziness, intense thirst, abdominal pain, vomiting, shock, oliguria or anuria, and uremia, which may be fatal.
Ingestion (Chronic):	No data available.

11.4 Numerical Measures of Toxicity

Lethal Dose (LD_{50}):	27,500 µg/kg unreported-rat
Tumorigenic Data:	2,160 µg/kg intravenous-rat TDLo/6 week(s) intermittent; 1,200 µg/kg implant-rat TDLo/6 week(s) intermittent; 75 mg/kg implant-rabbit TDLo
Mutagenic Data:	DNA damage - human lung 1 µmol/L

11.5 Carcinogen Status

IARC:	Human Inadequate Evidence, Animal Inadequate Evidence, Group 3 (metal)
ACGIH:	A4 -Not Classifiable as a Human Carcinogen (metal)

Section 12: Ecological Information

12.1 Ecotoxicity

Fish Toxicity:	14,300 µg/L 96 hour(s) LC_{50} (Mortality) Common, mirror, colored, carp (*Cyprinus carpio*)
Invertebrate Toxicity:	2,000 µg/L 0-5 hour(s) LETH (Mortality) Copepod (*Tisbe holothuriae*)
Algal Toxicity:	3,000-5,000 µg/L NR hour(s) (Population Growth) Blue-green algae (*Synechocystis aquatilis*)
Phytotoxicity:	9,900 µg/L 32 week(s) EC_{50} (Biomass) Water-milfoil (*Myriophyllum spicatum*)

12.2 Persistence and Degradability

No data available.

12.3 Bioaccumulative Potential

Bioconcentration:	20-40 µg/L NR week(s) BCF (Residue) Common bay mussel, blue mussel (*Mytilus edulis*) 100 µg/L

12.4 Mobility in Soil

No data available.

12.5 Other Adverse Effects

No data available.

Section 13: Disposal Considerations

Hazardous Waste Number(s): D007. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the regulatory level (5.0 mg/L). Dispose of in accordance with all applicable regulations.

Section 14: Transport Information

14.1 UN Number

UN Number:	3077

14.2 UN Proper Shipping Name

UN Proper Shipping Name:	RQ Environmentally hazardous substances, solid, n.o.s. (chromium)

14.3 Transport Hazard Class(es)

U.S. Department of Transportation:	Hazard Class or Division 9
CA Transportation/Dangerous Goods:	Hazard Class or Division 9
Land Transport ADR:	Hazard Class or Division 9; Classification Code M7
Land Transport RID:	Hazard Class or Division 9; Classification Code M7
Air Transport IATA:	Hazard Class or Division 9
Air Transport ICAO:	Hazard Class or Division 9
Maritime Transport IMDG:	Hazard Class or Division 9

14.4 Packing Group

U.S. Department of Transportation:	III
CA Transportation/Dangerous Goods:	III
Land Transport ADR:	III
Land Transport RID:	III
Air Transport IATA:	III
Air Transport ICAO:	III
Maritime Transport IMDG:	III

14.5 Environmental Hazards

No data available.

14.6 Transport in Bulk

No data available.

14.7 Special Precautions

No data available.

Section 15: Regulatory Information

US Regulations

CERCLA 102A/103 (40 CFR 302.4):	5,000 LBS RQ {solid metal particles <100 µm diameter (0.004 inches)}

SARA Title III

Section 302 (40 CFR 355.30):	Not regulated.
Section 304 (40 CFR 355.40):	Not regulated.
Sections 311/312 (40 CFR 370.21):	Not regulated.
Section 313 (40 CFR 372.65):	Yes (Chromium)

OSHA Process Safety:	Not regulated.

State Regulations
California Proposition 65: Not regulated.

National Inventory Status
US Inventory (TSCA): Listed on inventory.
TSCA 12(b) Export Notification: Not listed.

Section 16: Other Information

The information in this Safety Data Sheet meets the requirements of the United States Department of Labor OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.). This document is intended only as a guide to the appropriate precautionary material handling by a person trained in, or supervised by a person trained in, chemical handling. Exposure to this chemical may have serious adverse health effects. This chemical may interact with other substances. Since the potential uses are so varied, all of the potential hazards of use or interaction with other chemicals or materials cannot be identified on this Safety Data Sheet. The user should recognize that this chemical can cause injury, especially if improperly handled, precautionary measures are not followed, and personal protective equipment not worn. Read and understand all precautionary information prior to use. The Defense Logistics Agency (DLA) shall not be held liable for any damage resulting from handling or from contact with the above chemical.

References:

ChemADVISOR®, Inc. *Material Safety Data Sheet, Chromium*. September 4, 2008. (as provided by the Defense Logistics Agency)

American Conference of Governmental Industrial Hygienists. *2013 TLVs® and BEIs®*, ACGIH® Publication #0113. 2013.

US Department of Transportation. *Emergency Response Guidebook*. 2012

Centers for Disease Control and Prevention. *NIOSH Pocket Guide to Chemical Hazards*, http://www.cdc.gov/niosh/npg/.

National Institute of Health, Toxicology Data Network. http://toxnet.nlm.nih.gov/

NOTE: No data available: no data for this topic found using references listed.

Date of Preparation of Updated SDS: April 24, 2015

SAFETY DATA SHEET

Version 5.3
Revision Date 03/04/2015
Print Date 05/13/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Chrysene

Product Number : 35754
Brand : Sigma-Aldrich
Index-No. : 601-048-00-0

CAS-No. : 218-01-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{18}H_{12}$
Molecular weight	:	228.29 g/mol
CAS-No.	:	218-01-9
EC-No.	:	205-923-4
Index-No.	:	601-048-00-0

Hazardous components

Component	Classification	Concentration
Chrysene		
	Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen with unknown relevance to humans		
Chrysene	218-01-9	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar		

		products. cyclohexane-extractable fraction See Appendix C See Appendix A

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Chrysene	218-01-9	1-Hydroxypyrene (1-HP)		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 252 - 254 °C (486 - 489 °F) - lit.
f)	Initial boiling point and boiling range	448 °C (838 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.73
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - > 320 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Chrysene)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	OSHA specifically regulated carcinogen (Chrysene)

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GC0700000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date

Chrysene	218-01-9	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Chrysene	218-01-9	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.3 Revision Date: 03/04/2015 Print Date: 05/13/2016

SAFETY DATA SHEET

Creation Date 22-Sep-2009 **Revision Date** 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **cis-1,2-Dichloroethylene**

Cat No. : **AC113380000; AC113380025; AC113380100; AC113380500**

Synonyms cis-Acetylene dichloride.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Harmful if inhaled
Causes serious eye irritation
Causes skin irritation
May cause respiratory irritation



Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Avoid breathing dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Take precautionary measures against static discharge
Do not eat, drink or smoke when using this product
Response
Call a POISON CENTER or doctor/physician if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
Rinse mouth
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store in a well-ventilated place. Keep cool
Store in a closed container
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
cis-1,2-Dichloroethylene	156-59-2	97

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Use water spray to cool unopened containers. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point 6 °C / 42.8 °F
Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits
Upper 12.80%
Lower 9.70%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.

Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Ensure adequate ventilation. Wear personal protective equipment. Use explosion-proof equipment. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing dust/fume/gas/mist/vapours/spray. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
cis-1,2-Dichloroethylene	TWA: 200 ppm		

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
cis-1,2-Dichloroethylene			TWA: 200 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-80 °C / -112 °F
Boiling Point/Range	60 °C / 140 °F @ 760 mmHg
Flash Point	6 °C / 42.8 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	12.80%
Lower	9.70%
Vapor Pressure	201 mmHg @ 25 °C
Vapor Density	3.34 (Air = 1.0)
Relative Density	1.280
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

Incompatible Materials Bases

Hazardous Decomposition Products Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
cis-1,2-Dichloroethylene	156-59-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains. Do not flush into surface water or sanitary sewer system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
cis-1,2-Dichloroethylene	Not listed	Not listed	EC50 = 721 mg/L 5 min EC50 = 905 mg/L 30 min	Not listed

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IATA

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
cis-1,2-Dichloroethylene	X	-	X	205-859-7	-		-	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes

Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA

Component	Hazardous Substances RQs	CERCLA EHS RQs
cis-1,2-Dichloroethylene	1000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
cis-1,2-Dichloroethylene	X	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B2 Flammable liquid
D1B Toxic materials
D2B Toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 22-Sep-2009
Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally

Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
CRUDE COKE OVEN TAR, CRUDE COAL TAR

Synonyms
CENTRIFUGE TAR

Product Use
process chemical.

Restrictions on Use
None known.

Details of the supplier of the safety data sheet

KOPPERS INC.
436 Seventh Avenue
Pittsburgh, PA 15219-1800
Mfg Contact: 412-227-2001 (SDS Requests: 866-852-5239)

CHEMTREC: 800-424-9300 (Outside USA: +1 703-527-3887)
Emergencies: (Medical in USA): 877-737-9047
Emergencies: (Medical Outside of USA): 651-632-9269
E-mail: naorgmsds@koppers.com

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Acute Toxicity - Dermal - Category 4
Acute Toxicity - Inhalation - Dust/Mist - Category 3
Skin Corrosion/Irritation - Category 2
Serious Eye Damage/Eye Irritation - Category 2A
Skin Sensitization - Category 1
Germ Cell Mutagenicity - Category 1B
Carcinogenicity - Category 1A
Reproductive Toxicity - Category 1B
Specific target organ toxicity - Single exposure - Category 1 (blood , respiratory system , kidneys , nervous system , heart)
Specific target organ toxicity - Single exposure - Category 2 (eyes)
Specific Target Organ Toxicity - Repeated Exposure - Category 1 (blood , eyes , respiratory system , central nervous system)
Hazardous to the Aquatic Environment - Acute - Category 2
Hazardous to the Aquatic Environment - Chronic - Category 2

GHS Label Elements

Symbol(s)



Signal Word
Danger

Hazard Statement(s)

Toxic if inhaled.
Harmful in contact with skin.
Causes skin irritation.
Causes serious eye irritation.
May cause an allergic skin reaction.
May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.
Causes damage to organs. (blood , respiratory system , kidneys , nervous system , heart)
May cause damage to organs. (eyes)
Causes damage to organs through prolonged or repeated exposure. (blood , eyes , respiratory system , central nervous system)
Toxic to aquatic life with long lasting effects.

Precautionary Statement(s)

Prevention

Do not breathe vapor or mist.
Wash thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Do not eat, drink or smoke when using this product.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves/protective clothing/eye protection/face protection.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid release to the environment.

Response

IF exposed or concerned: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water.
Call a POISON CENTER or doctor/physician if you feel unwell.
If skin irritation or rash occurs: Get medical advice/attention.
Take off contaminated clothing and wash before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
Collect spillage.

Storage

Store in a well-ventilated place.
Keep container tightly closed.
Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Statement(s) of Unknown Acute Toxicity

Dermal	72% of the mixture consists of ingredient(s) of unknown acute toxicity.
Inhalation	97% of the mixture consists of ingredient(s) of unknown acute toxicity.

Other Hazards

Heated material may cause thermal burns.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component Name	Percent
65996-89-6	Tar, coal, high-temperature	100
-	The above listed complex substance contains the following constituents	-
Not Available	POLYCYCLIC AROMATIC HYDROCARBONS	7.0-31.0
91-20-3	Naphthalene	3.0-12.0
85-01-8	Phenanthrene	2.5-7.5
206-44-0	Fluoranthene	1.5-5.0
120-12-7	Anthracene	0.7-4.0
83-32-9	Acenaphthene	0.10-3.0
205-99-2	Benzo(b)fluoranthene	0.4-2.5
132-64-9	Dibenzofuran	1.0-2.5
50-32-8	Benzo[a]pyrene	0.1-2.0
56-55-3	Benz[a]anthracene	0.5-1.6
207-08-9	Benzo(k)fluoranthene	0.1-1.5
218-01-9	Chrysene	0.1-1.5
193-39-5	Indeno(1,2,3-cd)pyrene	0.1-1.0
108-88-3	TOLUENE	0.1-1.0
71-43-2	Benzene	0.1-1.0
108-95-2	Phenol	0.1-1.0

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Aromatic hydrocarbons, polycyclic (130489-29-2).

Section 4 - FIRST AID MEASURES

Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

Take off immediately all contaminated clothing. Wash all affected skin areas with warm soapy water. Skin contact causes photosensitization which can last for 36-72 hours after exposure. Keep out of direct sunlight for the next two

to three days to avoid sunburn to the photosensitized skin areas. Use a broad spectrum blockout cream to protect against UV alpha ray exposure. Get medical attention, if needed.

Eyes
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion
Not a likely route of exposure. Rinse mouth. Do NOT induce vomiting. If a large amount is swallowed, get medical attention. Do not give anything by mouth to unconscious or convulsive person. If vomiting occurs, keep head lower than hips to help prevent aspiration.

Most Important Symptoms/Effects
Acute
Harmful in contact with skin, toxic if inhaled, skin irritation, eye irritation, thermal burns from heated material, allergic reactions, blood damage, respiratory system damage, kidney damage, nervous system damage, heart damage, eye damage

Delayed
allergic reactions, mutagenic effects, Reproductive Effects, blood damage, eye damage, respiratory system damage, central nervous system damage, lung cancer, bladder cancer, skin cancer, scrotal cancer

Indication of any immediate medical attention and special treatment needed
Treat symptomatically and supportively.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media
regular dry chemical, carbon dioxide, regular foam, water spray, fog or mist

Unsuitable Extinguishing Media
Do not use high-pressure water streams.

Hazardous Combustion Products
oxides of carbon

Advice for firefighters
Contact with heat may generate toxic and/or flammable gases. Containers may rupture or explode if exposed to heat.

Fire Fighting Measures
Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Use extinguishing agents appropriate for surrounding fire. Flood with fine water spray. Directly spraying water or foam onto hot burning product may cause frothing. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.

Special Protective Equipment and Precautions for Firefighters
Wear full protective firefighting gear including self-contained breathing apparatus (SCBA) for protection against possible exposure.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
Wear personal protective clothing and equipment, see Section 8. Avoid release to the environment.

Methods and Materials for Containment and Cleaning Up

Stop leak if possible without personal risk. To prevent liquid from flowing into drains, completely contain spilled material with dikes, sandbags, etc. Collect spilled material in appropriate container for disposal. In Canada, report releases to provincial authorities, municipal authorities, or both, as required. Due to the concentration of Benzo(b)fluoranthene and the CERCLA (40 CFR 302.4) reportable quantity of 1 pound, the release of 40 pounds (4 gallons) of this product requires National Response Center notification. See Section 13 for waste disposal information.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling

Do not breathe vapor or mist. Avoid breathing vapors of heated materials. Avoid contact with eyes, skin and clothing. Use only outdoors or in a well-ventilated area. When using, do not eat, drink or smoke. Wear protective gloves/clothing and eye/face protection. Wash exposed areas thoroughly with soap and water, or a waterless hand cleaner, after skin contact and before eating, drinking, using tobacco products, or restrooms. Use protective skin cream on exposed skin before and during work shift. To reduce sun sensitivity a sun-blocking lotion can also be applied prior to application of a protective cream. Contaminated clothing should be removed and laundered before reuse. Contaminated work clothing should not be allowed out of the workplace unless laundered or decontaminated. After working with the product use warm soapy water and a wash cloth to thoroughly wash all areas of skin that have been contacted with product. After washing, apply a broad spectrum UV blockout cream on exposed skin areas before going into sunlight. Keep out of strong sunlight for two to three days after being affected by the product. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Conditions for Safe Storage, Including any Incompatibilities

Store in a well-ventilated place.
Keep container tightly closed.
Store locked up.
Store and handle in accordance with all current regulations and standards. Label all containers. Keep in a closed, properly labeled container in a cool (shaded), dry, well-ventilated area. Protect from physical damage. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355 Part B).

Incompatible Materials

oxidizing materials

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

Tar, coal, high-temperature	**65996-89-6**
ACGIH:	0.2 mg/m3 TWA as benzene-soluble aerosol (related to Pitch, coal tar, high-temperature)
OSHA (US):	0.2 mg/m3 TWA (benzene soluble fraction) (related to Pitch, coal tar, high-temperature)
Naphthalene	**91-20-3**
ACGIH:	10 ppm TWA
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (US):	10 ppm TWA ; 50 mg/m3 TWA

Benzene	**71-43-2**
ACGIH:	0.5 ppm TWA
	2.5 ppm STEL
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (US):	10 ppm TWA applies to industry segments exempt from the benzene standard at 29 CFR 1910.1028 ; 1 ppm TWA
	5 ppm STEL (See 29 CFR 1910.1028) 15 min ; 0.5 ppm Action Level ; 1 ppm TWA
	5 ppm STEL (see 29 CFR 1910.1028)
	25 ppm Ceiling
Phenol	**108-95-2**
ACGIH:	5 ppm TWA
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (US):	5 ppm TWA ; 19 mg/m3 TWA
	prevent or reduce skin absorption

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)

Tar, coal, high-temperature (65996-89-6)

Medium: urine Time: end of shift at end of workweek Parameter: 1-Hydroxypyrene with hydrolysis (nonquantitative) (related to Pitch, coal tar, high-temperature)

Naphthalene (91-20-3)

Time: end of shift Parameter: 1-Naphthol with hydrolysis plus 2-Naphthol with hydrolysis (nonquantitative, nonspecific)

Benzene (71-43-2)

25 µg/g creatinine Medium: urine Time: end of shift Parameter: S-Phenylmercapturic acid (background); 500 µg/g creatinine Medium: urine Time: end of shift Parameter: t,t-Muconic acid (background)

Phenol (108-95-2)

250 mg/g creatinine Medium: urine Time: end of shift Parameter: Phenol with hydrolysis (background, nonspecific)

Engineering Controls

Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection

ANSI Z87.1-1989 approved safety glasses with side shields. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. At elevated temperatures: A face shield is recommended.

Skin Protection

Wear protective clothing to prevent contact. Wear long sleeved shirt or overalls fastened at wrists and neck, with long legged trousers with trouser legs worn outside over boot tops, boots, socks, and safety hat plus gloves. Use protective skin cream on exposed skin before and during work shift. Protective clothing must be changed when it shows signs of contamination. Remove and launder contaminated clothing separately from other laundry before reuse. When material is at an elevated temperature, wear appropriate heat resistant clothing.

Respiratory Protection
If the applicable TLVs and/or PELs are exceeded, use NIOSH-approved multipurpose air-purifying cartridge respirators, for organic vapors and P-100 particulate.

Glove Recommendations
Wear appropriate chemical resistant gloves. When material is at an elevated temperature, wear appropriate heat resistant gloves.

Protective Materials
protective skin cream, chemical resistant material, heat resistant material

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	black viscous Liquid	**Physical State**	liquid
Odor	aromatic odor	**Color**	black
Odor Threshold	Not available	**pH**	Not applicable
Melting Point	16.6 °F	**Boiling Point**	410 °F
Boiling Point Range	Not available	**Freezing point**	Not available
Evaporation Rate	Not available	**Flammability (solid, gas)**	Not applicable
Autoignition Temperature	Not available	**Flash Point**	>205 °F
Lower Explosive Limit	Not available	**Decomposition temperature**	Not available
Upper Explosive Limit	Not available	**Vapor Pressure**	0.2 - 1 mmHg @ 68 °C
Vapor Density (air=1)	Not available	**Specific Gravity (water=1)**	1.16
Water Solubility	Not available	**Partition coefficient: n-octanol/water**	Not available
Viscosity	>20.5 mm2/s	**Kinematic viscosity**	Not available
Solubility (Other)	Not available	**Density**	Not available
Physical Form	viscous liquid	**Texture**	viscous
Molecular Weight	Not available	**OSHA Flammability Category**	4

Other Information
None known

Section 10 - STABILITY AND REACTIVITY

Reactivity
No reactivity hazard is expected.

Chemical Stability
Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions
Will not polymerize.

Conditions to Avoid
Avoid heat, flames, sparks and other sources of ignition. Avoid contact with incompatible materials. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

Incompatible Materials
oxidizing materials

Hazardous decomposition products
oxides of carbon

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation
respiratory system damage, central nervous system damage, eye damage, blood damage, kidney damage, lung cancer, bladder cancer

Skin Contact
irritation, sensitivity to sunlight, allergic reactions, thermal burns from heated material, eye damage, Reproductive Effects, central nervous system damage, blood damage, kidney damage, nervous system damage, skin cancer, scrotal cancer

Eye Contact
irritation, sensitivity to sunlight, thermal burns from heated material, eye damage

Ingestion
thermal burns from heated material, eye damage, central nervous system damage, blood damage, nervous system damage, kidney damage

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:

Tar, coal, high-temperature (65996-89-6)
Oral LD50 Rat 3300 mg/kg (related to Pitch, coal tar, high-temperature)
Dermal LD50 Rat >5000 mg/kg (no deaths occurred) (related to Pitch, coal tar, high-temperature)

Naphthalene (91-20-3)
Oral LD50 Rat 1110 mg/kg
Dermal LD50 Rabbit 1120 mg/kg
Inhalation LC50 Rat >340 mg/m3 1 h

Phenol (108-95-2)
Oral LD50 Rat 340 mg/kg
Dermal LD50 Rabbit 630 mg/kg

Product Toxicity Data

Acute Toxicity Estimate

Dermal	1174.01 mg/kg
Inhalation - Dust and Mist	2.72 mg/L
Oral	>2000 mg/kg

Immediate Effects

Harmful in contact with skin, toxic if inhaled, skin irritation, eye irritation, thermal burns from heated material, allergic reactions, blood damage, respiratory system damage, kidney damage, nervous system damage, heart damage, eye damage.

Delayed Effects
allergic reactions, mutagenic effects, Reproductive Effects, blood damage, eye damage, respiratory system damage, central nervous system damage, lung cancer, bladder cancer, skin cancer, scrotal cancer

Irritation/Corrosivity Data
Erythema/eschar score: very slight

Respiratory Sensitization
No evidence that the material can lead to respiratory hypersensitivity.

Dermal Sensitization
Component data indicate the substance is sensitizing.

Component Carcinogenicity

Tar, coal, high-temperature	**65996-89-6**
ACGIH:	A1 - Confirmed Human Carcinogen (related to Pitch, coal tar, high-temperature)
IARC:	Supplement 7 [1987] (Group 1 (carcinogenic to humans))
NTP:	Known Human Carcinogen (related to Pitch, coal tar, high-temperature)
NIOSH:	potential occupational carcinogen (related to Pitch, coal tar, high-temperature)

May cause cancer. NOAEL: 36 mg/kg bw/day - oral.

Germ Cell Mutagenicity
Bacterial Reverse Mutation Test – positive. May cause genetic defects.

Tumorigenic Data
No data available

Reproductive Toxicity
Available data characterizes this substance as a reproductive hazard. May damage fertility or the unborn child.

Specific Target Organ Toxicity - Single Exposure
blood, respiratory system, kidneys, nervous system, heart, eyes

Specific Target Organ Toxicity - Repeated Exposure
blood, eyes, respiratory system, central nervous system

Aspiration hazard
Not expected to be an aspiration hazard.

Medical Conditions Aggravated by Exposure
respiratory disorders, skin disorders and allergies, eye disorders, central nervous system disorders (i.e. headache, drowsiness, dizziness, loss of coordination) blood system disorders, metabolic disorders, immune system disorders or allergies

Additional Data
Coal tars are listed in the IARC monographs as carcinogenic to humans (Group 1). IARC's evaluation is based on evidence from the first half of the 20th century that occupational exposures to coal-tar derived products are associated with skin cancer in humans. There are also case reports and a few other studies on occupational exposures to coal-tars that are consistent with this evaluation. Epidemiological studies provide evidence that certain exposures

in the coke production industry are carcinogenic to humans, giving rise to lung cancer possibly from coal-tar fume. Also, there is evidence for the carcinogenicity in experimental animals of coal-tars. Today, with the use of engineering controls and personal protective equipment, occupational exposure to coal tar derived components is expected to be below permissible limits (measured as CTPVs). In addition to containing information about the product as a whole, this data sheet also contains information about individual components of the product. Information of this nature may not have been derived from studies or data relating to this product and/or may have been derived from studies or data that did not involve human exposure and involved animal exposure only. Some polycyclic aromatic hydrocarbons (PAHs), found in coal tar complex substances, have been reported to cause lung and skin cancer in humans under conditions of poor personal hygiene, prolonged/repeated contact, and exposure to sunlight. The National Toxicology Program (NTP) and IARC have independently classified various PAH compounds present in coal tar substances as reasonably anticipated to be human carcinogens (NTP), probably carcinogenic to humans (IARC Group 2A), possibly carcinogenic to humans (IARC Group 2B), and not classifiable as to carcinogenicity to humans (IARC Group 3). The cancers reported in the studies upon which IARC based its conclusions involved lung, skin, liver, stomach, kidney and blood cancers in animals. Based on the results of animal experiments PAHs may cause injury to the liver, kidneys, lungs, blood and lymph systems. Some PAH's have also been associated with impaired fertility, heritable genetic damage and birth defects in mice.

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity
Toxic to aquatic life with long lasting effects.

Component Analysis - Aquatic Toxicity

Tar, coal, high-temperature	**65996-89-6**
Fish:	LC50 96 h Oryzias latipes 7.33 - 235 mg/L [semi-static]
Algae:	EC50 72 h Pseudokirchneriella subcapitata 0.015 mg/L IUCLID
Invertebrate:	LC50 48 h Daphnia magna 4.44 - 11.2 mg/L IUCLID

Fish Toxicity
>250 mg/l 96 hour(s) LL50 Brachydanio rerio (Zebra fish)

Invertebrate Toxicity
2.8 mg/l 48 hour(s) EL50 Daphnia magna.

Algal Toxicity
29 mg/l 72 hour(s) EL50 Desmodesmus subspicatus. 5 mg/l 72 hour(s) NOELR.

Persistence and Degradability
Highly insoluble in water.

Bioaccumulative Potential
This material is believed not to bioaccumulate due to low water solubility. Highly insoluble in water.

Mobility
Highly insoluble in water.

Other Toxicity
No data available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods

Dispose in accordance with all applicable regulations. Based on the results of the Toxicity Characteristic Leaching Procedure (TCLP): Benzene - D018 (toxicity >/= 0.5 ppm).

Component Waste Numbers

The U.S. EPA has not published waste numbers for this product's components.

Section 14 - TRANSPORT INFORMATION

US DOT Information:
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. , (Contains: BENZO(A)PYRENE , BENZO(B)FLUORANTHENE , NAPHTHALENE) RQ
Hazard Class: 9
UN/NA #: UN3082
Packing Group: III
Required Label(s): 9
Marine pollutant
Further information: For International Shipments: RQ Environmentally hazardous substances, liquid, n.o.s. ID Number UN3082 This material contains reportable quantity (RQ) Hazardous Substances.

IATA Information:
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. , (Contains: BENZO(A)PYRENE , BENZO(B)FLUORANTHENE , NAPHTHALENE) RQ
Hazard Class: 9
UN#: UN3082
Packing Group: III
Required Label(s): 9
Marine pollutant
Further information: Passenger & Cargo Aircraft - Ltd. Qty. - (Packing Instruction / Max. Net Qty. per Pkg.): Y964 / 30 kg GPassenger & Cargo Aircraft (Packing Instruction / Max. Net Qty. per Pkg.): 964 / 450 L ERG Code: 9L

TDG Information:
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. , (Contains: BENZO(A)PYRENE , BENZO(B)FLUORANTHENE , NAPHTHALENE) RQ
Hazard Class: 9
UN#: UN3082
Packing Group: III
Required Label(s): 9
Marine pollutant

International Bulk Chemical Code

This material contains one or more of the following chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

Tar, coal, high-temperature	**65996-89-6**
IBC Code:	Category X (molten) (related to Pitch, coal tar, high-temperature)

Further information

STCC Code: 2814137; HAZ STCC Code: 4966312, ERG: 171 US DOT Reportable Quantites BENZO(B)FLUORANTHENE (205-99-2) 1 lbs RQ; 0.454 kg RQ

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

Tar, coal, high-temperature	**65996-89-6**
TSCA 12b:	Section 4 , 1 % de minimus concentration
Naphthalene	**91-20-3**
SARA 313:	0.1 % de minimis concentration
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Phenanthrene	**85-01-8**
SARA 313:	1 % de minimis concentration
CERCLA:	5000 lb final RQ ; 2270 kg final RQ
Fluoranthene	**206-44-0**
SARA 313:	1 % Supplier notification limit
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Anthracene	**120-12-7**
SARA 313:	1 % de minimis concentration
CERCLA:	5000 lb final RQ ; 2270 kg final RQ
Acenaphthene	**83-32-9**
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Benzo(b)fluoranthene	**205-99-2**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	1 lb final RQ ; 0.454 kg final RQ
Dibenzofuran	**132-64-9**
SARA 313:	1 % de minimis concentration
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Benzo[a]pyrene	**50-32-8**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	1 lb final RQ ; 0.454 kg final RQ

Benz[a]anthracene	**56-55-3**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	10 lb final RQ ; 4.54 kg final RQ
Benzo(k)fluoranthene	**207-08-9**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	5000 lb final RQ ; 2270 kg final RQ
Chrysene	**218-01-9**
SARA 313:	1 % Supplier notification limit
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Indeno(1,2,3-cd)pyrene	**193-39-5**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
TOLUENE	**108-88-3**
SARA 313:	1 % de minimis concentration
CERCLA:	1000 lb final RQ ; 454 kg final RQ
Benzene	**71-43-2**
SARA 313:	0.1 % de minimis concentration
CERCLA:	10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)
Phenol	**108-95-2**
SARA 302:	500 lb lower TPQ ; 10000 lb upper TPQ
SARA 313:	1 % de minimis concentration
CERCLA:	1000 lb final RQ ; 454 kg final RQ
SARA 304:	1000 lb EPCRA RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories

Carcinogenicity; Acute toxicity; Reproductive Toxicity; Skin Corrosion/Irritation; Respiratory/Skin Sensitization; Serious Eye Damage/Eye Irritation; Specific Target Organ Toxicity; Germ Cell Mutagenicity

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
Tar, coal, high-temperature	**65996-89-6**	Yes	Yes	Yes	Yes	Yes

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)



WARNING

This product can expose you to chemicals including Benzene , which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Canada Regulations

Canadian WHMIS Ingredient Disclosure List (IDL)

Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL

Tar, coal, high-temperature	**65996-89-6**
	0.1 % (related to Pitch, coal tar, high-temperature)
Naphthalene	**91-20-3**
	1 %
Phenanthrene	**85-01-8**
	1 %
Fluoranthene	**206-44-0**
	1 %
Anthracene	**120-12-7**
	1 %
Acenaphthene	**83-32-9**
	1 %
Benzo(b)fluoranthene	**205-99-2**
	0.1 %
Benzo[a]pyrene	**50-32-8**
	0.1 %

Benz[a]anthracene	**56-55-3**
	0.1 %
Chrysene	**218-01-9**
	0.1 %
Indeno(1,2,3-cd)pyrene	**193-39-5**
	0.1 %
TOLUENE	**108-88-3**
	1 %
Benzene	**71-43-2**
	0.1 %

WHMIS Classification
D2A , D2B

Component Analysis - Inventory
Tar, coal, high-temperature (65996-89-6)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes

The above listed complex substance contains the following constituents (-)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

POLYCYCLIC AROMATIC HYDROCARBONS (Not Available)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Naphthalene (91-20-3)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Phenanthrene (85-01-8)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Fluoranthene (206-44-0)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	NSL	EIN	Yes	No	Yes	Yes	No	No	No	Yes	Yes	No	Yes	Yes

Anthracene (120-12-7)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Acenaphthene (83-32-9)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes

Benzo(b)fluoranthene (205-99-2)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
No	No	EIN	No	No	No	No	No	No	No	No	Yes	No	Yes	Yes

Dibenzofuran (132-64-9)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes

Benzo[a]pyrene (50-32-8)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	No	Yes	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Benz[a]anthracene (56-55-3)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	NSL	EIN	No	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes

Benzo(k)fluoranthene (207-08-9)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
No	No	EIN	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

Chrysene (218-01-9)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	Yes

Indeno(1,2,3-cd)pyrene (193-39-5)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	NSL	EIN	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

TOLUENE (108-88-3)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Benzene (71-43-2)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Phenol (108-95-2)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

U.S. Inventory (TSCA)
Listed on inventory.

Section 16 - OTHER INFORMATION

NFPA Ratings
Health: 2 Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Summary of Changes
Updated: 7/20/2018; SDS SUMMARY OF CHANGES: SECTION 15 - CA Proposition 65

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC – European Commission; EEC - European Economic Community; EIN - European Inventory of (Existing Commercial Chemical Substances); EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; F - Background (for Venezuela Biological Exposure Indices); IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR KECI Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL) , KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX – Mexico; Ne- Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL – Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL- Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH- Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA – Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW – Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information

Disclaimer:
The information set forth in this Safety Data Sheet does not purport to be all-inclusive and should be used only as a guide. While the information and recommendations set forth herein are believed to be accurate, the company makes no warranty regarding such information and recommendations and disclaims all liability from reliance thereon.

SAFETY DATA SHEET

COPPER

Section 1. Identification

GHS product identifier	:	COPPER
Chemical name	:	Mixture
CAS number	:	Mixture
Other means of identification	:	CC01053472
Product type	:	liquid

Relevant identified uses of the substance or mixture and uses advised against

Product use	:	Industrial applications. Plastics.
Supplier's details	:	**POLYONE CORPORATION** ColorMatrix Group Inc. 680 North Rocky River Drive, Berea, Ohio, 44017-1628, USA +1 216 622 0100
Emergency telephone number (with hours of operation)	:	**CHEMTREC 1-800-424-9300 (24hrs for spill, leak, fire, exposure or accident).**

Section 2. Hazards identification

This mixture has not been evaluated as a whole for health effects. Information provided on health effects of this product is based on the individual components. However, some vapors or contaminants may be released upon heating and the end-user (fabricator) must take the necessary precautions (mechanical ventilation, respiratory protection, etc.) to protect employees from exposure. See sections 8 and 11 for special precautions. After handling, always wash hands thoroughly with soap and water.

OSHA/HCS status	:	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	:	SKIN CORROSION/IRRITATION - Category 2

GHS label elements

Hazard pictograms :



Signal word : Warning
Hazard statements : Causes skin irritation.

Precautionary statements

General : Not applicable.
Prevention : Wear protective gloves. Wash hands thoroughly after handling.
Response : IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention.
Storage : Not applicable.
Disposal : Not applicable.
Supplemental label elements : None known.
Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Chemical name : Mixture
Other means of identification : CC01053472

CAS number/other identifiers

Ingredient name	%	CAS number
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	Not available.
Titanium dioxide	5 - 10	13463-67-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	:	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	:	Causes serious eye irritation.
Inhalation	:	No known significant effects or critical hazards.
Skin contact	:	Causes skin irritation.
Ingestion	:	Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact	:	Adverse symptoms may include the following: pain or irritation

watering
redness

Inhalation	:	No specific data.
Skin contact	:	Adverse symptoms may include the following: irritation redness
Ingestion	:	No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	:	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	:	No specific treatment.
Protection of first-aiders	:	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media	:	In case of fire, use water spray (fog), foam, dry chemical or CO_2.
Unsuitable extinguishing media	:	None known.
Specific hazards arising from the chemical	:	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	:	Decomposition products may include the following materials: carbon dioxide carbon monoxide metal oxide/oxides
Special protective actions for fire-fighters	:	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	:	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	:	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	:	If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	:	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill	:	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	:	Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	:	Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene	:	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
Conditions for safe storage, including any incompatibilities	:	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Titanium dioxide	**OSHA PEL 1989 (1989-03-01)** PEL: Permissible Exposure Level 10 mg/m3 Form: Total dust **OSHA PEL (1993-06-30)** PEL: Permissible Exposure Level 15 mg/m3 Form: Total dust **ACGIH TLV (1996-05-18)** TLV-TWA: Threshold Limit Value - Time weighted average PEL: Permissible Exposure Level 10 mg/m3

Appropriate engineering controls	:	Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
Environmental exposure controls	:	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures	:	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated

clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : liquid [liquid]
Color : BROWN
Odor : Faint odor.
Odor threshold : Not available.
pH : Not available.
Melting point : Not available.
Boiling point : Not available.
Flash point : Not available.
Burning time : Not available.

Burning rate	:	Not available.
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	**Lower:** Not available. **Upper:** Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Relative density	:	Not available.
Solubility	:	Not available.
Solubility in water	:	insoluble in water.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	**Dynamic:** Not available. **Kinematic:** Not available.

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	Stable under recommended storage and handling conditions (see Section 7).
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Keep away from extreme heat and oxidizing agents.
Incompatible materials	:	Keep away from strong acids. Oxidizer.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

This mixture has not been evaluated as a whole for health effects. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Titanium dioxide				

	LC50 Inhalation	Rat - Male	6.82 Mg/l	4 h
	LD50 Dermal	Rabbit	> 5,000 mg/kg	-

Conclusion/Summary : Mixture.Not fully tested.

Irritation/Corrosion

Conclusion/Summary
Skin : Mixture.Not fully tested.
Eyes : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Sensitization

Conclusion/Summary
Skin : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Mutagenicity

Conclusion/Summary : Mixture.Not fully tested.

Carcinogenicity

Conclusion/Summary : Mixture.Not fully tested.

Classification

Product/ingredient name	OSHA	IARC	NTP
Titanium dioxide		2B	

Reproductive toxicity

Conclusion/Summary : Mixture.Not fully tested.

Teratogenicity

Conclusion/Summary : Mixture.Not fully tested.

Specific target organ toxicity (single exposure)
Not available.

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard

Product/ingredient name	Result

Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.
Inhalation : No known significant effects or critical hazards.
Skin contact : Causes skin irritation.
Ingestion : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness
Inhalation : No specific data.
Skin contact : Adverse symptoms may include the following:
irritation
redness
Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

Conclusion/Summary : Mixture.Not fully tested.

General : No known significant effects or critical hazards.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (dusts and mists)	7.81 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Titanium dioxide			
	Acute LC50 > 1,000,000 µg/l Marine water	Fish - Mummichog	96 h
	Acute LC50 > 1,000 mg/l Fresh water	Fish - Fathead minnow	96 h
	Acute LC50 13 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute LC50 6.5 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 19.3 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 27.8 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 35.306 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h

Conclusion/Summary : Not available.

Persistence and degradability

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
Titanium dioxide		352.00	low

Mobility in soil

Soil/water partition coefficient (KOC)	:	Not available.
Other adverse effects	:	No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Acute hazardous waste "P" List: Not listed

United States - RCRA Toxic hazardous waste "U" List: Not listed

Section 14. Transport information

U.S. DOT Classification	:	Not regulated for transportation.
ICAO/IATA	:	Not classified as dangerous good under transport regulations.
IMO/IMDG (maritime)	:	Not classified as dangerous good under transport regulations.

Section 15. Regulatory information

U.S. Federal regulations : **United States - TSCA 12(b) - Chemical export notification:** None of the components are listed.
United States - TSCA 4(a) - Final Test Rules: Not listed
United States - TSCA 4(a) - ITC Priority list: Not listed
United States - TSCA 4(a) - Proposed test rules: Not listed

United States - TSCA 4(f) - Priority risk review: Not listed
United States - TSCA 5(a)2 - Final significant new use rules: Not listed
United States - TSCA 5(a)2 - Proposed significant new use rules: Not listed
United States - TSCA 5(e) - Substances consent order: Not listed
United States - TSCA 6 - Final risk management: Not listed
United States - TSCA 6 - Proposed risk management: Not listed
United States - TSCA 8(a) - Chemical risk rules: Not listed
United States - TSCA 8(a) - Dioxin/Furane precusor: Not listed
United States - TSCA 8(a) - Chemical Data Reporting (CDR): Not determined
United States - TSCA 8(a) - Preliminary assessment report (PAIR): Not listed
United States - TSCA 8(c) - Significant adverse reaction (SAR): Not listed
United States - TSCA 8(d) - Health and safety studies: Not listed
United States - EPA Clean water act (CWA) section 307 - Priority pollutants: Not listed
United States - EPA Clean water act (CWA) section 311 - Hazardous substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Flammable substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Toxic substances: Not listed
United States - Department of commerce - Precursor chemical: Not listed

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	:	Not listed
Clean Air Act Section 602 Class I Substances	:	Not listed
Clean Air Act Section 602 Class II Substances	:	Not listed
DEA List I Chemicals (Precursor Chemicals)	:	Not listed
DEA List II Chemicals (Essential Chemicals)	:	Not listed

US. EPA CERCLA Hazardous Substances (40 CFR 302)

not applicable

SARA 311/312

Classification	:	Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Classification
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	AH
Titanium dioxide	5 - 10	CH

SARA 313
Not applicable.

State regulations

Massachusetts : The following components are listed:
Mica
Iron oxide
Titanium dioxide

New York : None of the components are listed.

New Jersey : The following components are listed:
Mica
Iron oxide
Titanium dioxide

Pennsylvania : The following components are listed:
Iron oxide
Titanium dioxide

California Prop. 65
WARNING: This product contains a chemical known to the State of California to cause cancer.

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada inventory : All components are listed or exempted.

International regulations

International lists : **Australia inventory (AICS):** All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.
Malaysia Inventory (EHS Register): Not determined.
EINECS: All components are listed or exempted.
Japan inventory: Not determined.
China inventory (IECSC): All components are listed or exempted.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): Not determined.

Philippines inventory (PICCS): All components are listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals	:	Not listed
Chemical Weapons Convention List Schedule II Chemicals	:	Not listed
Chemical Weapons Convention List Schedule III Chemicals	:	Not listed

Section 16. Other information

History

Date of printing	:	05/21/2015
Date of issue/Date of revision	:	05/18/2015
Date of previous issue	:	10/30/2014
Version	:	1.1
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	:	Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Particularly this information may not be valid for such material used in conjunction with any other materials or in any process, unless specified in the text.

Safety Data Sheet

Revision Date: 01/06/17
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31276 / Dibenzo(a,h)anthracene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	7
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:	Carcinogenicity Category 2
GHS Signal Word:	Warning
GHS Hazard:	Suspected of causing cancer.
GHS Precautions:	
Safety Precautions:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF exposed or concerned: Get medical advice/attention.
Storage:	Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.
Single Exposure Target Organs:	No data available.
Repeated Exposure Target Organs:	No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Dichloromethane	75-09-2	200-838-9	99.900000
dibenz (a,h) anthracene	53-70-3	200-181-8	0.100000

4. FIRST-AID MEASURES

Inhalation:	Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately
Eyes:	Immediately flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention and monitor the eye daily as advised by your physician. Serious harm (damage) may result if treatment is delayed. Continue to flush eyes while awaiting medical attention
Skin Contact:	Wash with soap and water. Remove contaminated clothing, launder immediately, and discard contaminated leather goods. Get medical attention immediately.
Ingestion:	Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS. Never give anything by mouth to an unconscious person

5. FIRE- FIGHTING MEASURES

Extinguishing Media:	Use alcohol resistant foam, carbon dioxide, or dry chemical when fighting fires. Water or foam may cause frothing if liquid is burning but it still may be a useful extinguishing agent if carefully applied to the surface of the fire. Do Not direct a stream of water into the hot burning liquid. Use methods suitable to fight surrounding fire.
Fire and/or Explosion Hazards:	No data.
Fire Fighting Methods and Protection:	Use methods for the surrounding fire.
Hazardous Combustion Products:	Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment:	Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.
Methods for Clean-up:	Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions:	Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area.
Storage Technical Measures and Conditions:	Store in a cool dry place. Isolate from incompatible materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Dichloromethane	75-09-2	2300 ppm IDLH	No data available.	50 ppm TWA	25 ppm TWA; 125 ppm STEL (15 min. TWA)
dibenz (a,h) anthracene	53-70-3	No data available.	No data available.	No data available.	No data available.

Personal Protection:

Engineering Measures:	Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.
Respiratory Protection:	Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying

	liquid, or airborne material. Do not wear contact lenses. Have an eye wash station available.
Skin Protection:	Avoid skin contact by wearing chemically resistant gloves, an apron and other protective equipment depending upon conditions of use. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work.
Medical Conditions Aggravated By Exposure:	Eye disease Skin disease including eczema and sensitization Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	Colorless
Odor:	Strong
Physical State:	No data available.
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	2.93 (air = 1)
Boiling Point:	No data available.
Melting Point:	-96.7 °C
Flash Point:	No data available.
Upper Flammable/Explosive Limit, % in air:	No data available.
Lower Flammable/Explosive Limit, % in air:	No data available.
Autoignition Temperature:	556 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	1.3254 - 1.3258 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	ND
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	0
Molecular Weight:	No data available.

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.Contamination High temperatures
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents Caustics (bases)
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation Absorption Ingestion Skin contact Eye contact
Target Organs Potentially Affected By Exposure:	Skin, Cardiovascular System, Eyes, Liver
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Inhalation may cause severe central nervous system depression (including unconsciousness).
Skin Contact:	Contact causes severe skin irritation and possible burns.
Skin Absorption:	Harmful if absorbed through the skin. May cause severe irritation and systemic damage.
Eye Contact:	Contact with the eyes may cause moderate to severe eye injury. Eye contact may result in tearing and reddening, but not likely to permanently injure eye tissue. Temporary vision impairment (cloudy or blurred vision) is possible.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic

damage upon prolonged and/or repeated exposure (see "Target Organs)

Skin Absorption: Upon prolonged or repeated exposure, harmful if absorbed through the skin. May cause severe irritation and systemic damage

Component Toxicological Data:
NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methane, dichloro-	75-09-2	Inhalation LC50 Rat 53 mg/L 6 h

Component Carcinogenic Data:
OSHA:

Chemical Name	CAS No.	
Methylene chloride	75-09-2	25 ppm TWA (8 hr.); 125 ppm STEL (15 min.); 12.5 ppm Action Level (see 29 CFR 1910.1051); effective date for respiratory protection for certain employers to acheive the 8-hour TWA PEL is August 31, 1998; the start up date to install engineering controls is December 10, 1998.; {OSHA - 29 CFR 1910 Specifically Regulate
Dibenz[a,h]anthracene	53-70-3	Present

ACGIH:

Chemical Name	CAS No.	
Dichloromethane	75-09-2	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
Methylene chloride	75-09-2	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
Dichloromethane	75-09-2	Group 2A
Dibenz[a,h]anthracene	53-70-3	Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife. Keep out of waterways.
Mobility: No data
Persistence: No data
Bioaccumulation: No data
Degradability: No data
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Incinerate spent or discarded material a permitted hazardous waste facility.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Dichloromethane
UN Number: UN1593
Hazard Class: 6.1
Packing Group: III

International:

IATA Proper Shipping Name:	Dichloromethane
UN Number:	UN1593
Hazard Class:	6.1
Packing Group:	III

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Dichloromethane	75-09-2	X	X	-	X
dibenz (a,h) anthracene	53-70-3	X	X	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Dichloromethane Dichloromethane (Methylene chloride)	75-09-2	Prop 65 Cancer
Dibenz[a,h]anthracene	53-70-3	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Dichloromethane	75-09-2	X	X	X	X
dibenz (a,h) anthracene	53-70-3	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 05/15/14

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available.

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/24/2019 Version Number 4 Reviewed on 03/08/2019

*

1 Identification

· **Product identifier**

· **Trade name: Dieldrin**

· **Part number:** PST-400
· **CAS Number:**
60-57-1
· **EC number:**
200-484-5
· **Index number:**
602-049-00-9
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

2 Hazard(s) identification

· **Classification of the substance or mixture**



GHS06 Skull and crossbones

Acute Tox. 3 H301 Toxic if swallowed.
Acute Tox. 1 H310 Fatal in contact with skin.



GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.
STOT RE 1 H372 Causes damage to organs through prolonged or repeated exposure.

· **Label elements**
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**




GHS06 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
dieldrin (ISO)
· **Hazard statements**
Toxic if swallowed.

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 1)

Fatal in contact with skin.
Suspected of causing cancer.
Causes damage to organs through prolonged or repeated exposure.

· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapors/spray.
Do not get in eyes, on skin, or on clothing.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.
If swallowed: Immediately call a poison center/doctor.
Specific treatment (see on this label).
Rinse mouth.
If on skin: Wash with plenty of water.
IF exposed or concerned: Get medical advice/attention.
Get medical advice/attention if you feel unwell.
Take off immediately all contaminated clothing and wash it before reuse.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 4
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = 4
Fire = 0
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
60-57-1 dieldrin (ISO)
· **Identification number(s)**
· **EC number:** 200-484-5
· **Index number:** 602-049-00-9

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 2)

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:** In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Do not induce vomiting; immediately call for medical help.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** Use fire fighting measures that suit the environment.
· **Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures** Mount respiratory protective device.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**
0.3 mg/m³
· **PAC-2:**
6.8 mg/m³
· **PAC-3:**
450 mg/m³

(Contd. on page 4)

(Contd. of page 3)

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Thorough dedusting.
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
· **Information about protection against explosions and fires:** Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Keep receptacle tightly sealed.
· **Specific end use(s)** No further relevant information available.

*

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**
· **Components with limit values that require monitoring at the workplace:**
The following constituent is the only constituent of the product which has a PEL, TLV or other recommended exposure limit.
The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit.
At this time, the remaining constituent has no known exposure limits.
At this time, the other constituents have no known exposure limits.

60-57-1 dieldrin (ISO)	
PEL	Long-term value: 0.25 mg/m³ Skin
REL	Long-term value: 0.25 mg/m³ Skin; See Pocket Guide App. A
TLV	Long-term value: 0.1* mg/m³ Skin;*inhalable fraction and vapor

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.

(Contd. on page 5)

(Contd. of page 4)

· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.
· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours
· **Eye protection:**



Tightly sealed goggles

*

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Solid
Color:	Not determined.
· **Odor:**	Characteristic
· **Odor threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	143-144 °C (289.4-291.2 °F)
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Product is not flammable.
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapor pressure at 20 °C (68 °F):**	0.000001 hPa (0 mm Hg)
· **Density at 20 °C (68 °F):**	1.75 g/cm³ (14.60375 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not applicable.

(Contd. on page 6)

(Contd. of page 5)

· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with Water:**	Insoluble.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
VOC content:	0.00 % 0.0 g/l / 0.00 lb/gal
Solids content:	100.0 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

ATE (Acute Toxicity Estimate)

Oral	LD50	38 mg/kg (mouse)
Dermal	LD50	10 mg/kg (rat)

60-57-1 dieldrin (ISO)

Oral	LD50	38 mg/kg (mouse)
		38 mg/kg (rat)
Dermal	LD50	10 mg/kg (rat)
		250 mg/kg (rabbit)

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:** Danger through skin absorption.

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

3

(Contd. on page 7)

(Contd. of page 6)

· **NTP (National Toxicology Program)**

Substance is not listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**

Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 3 (Assessment by list): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*

14 Transport information

· **UN-Number**
· **DOT, IMDG, IATA** UN2811

· **UN proper shipping name**
· **DOT** Toxic solids, organic, n.o.s. (dieldrin (ISO))
· **IMDG, IATA** TOXIC SOLID, ORGANIC, N.O.S. (dieldrin (ISO))

· **Transport hazard class(es)**

· **DOT, IMDG, IATA**



· **Class** 6.1 Toxic substances

(Contd. on page 8)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 7)

· **Label**	6.1
· **Packing group** · **DOT, IMDG, IATA**	I
· **Environmental hazards:**	Not applicable.
· **Special precautions for user** · **Danger code (Kemler):** · **EMS Number:** · **Stowage Category**	Warning: Toxic substances 66 F-A,S-A B
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 5 kg On cargo aircraft only: 50 kg
· **Hazardous substance:**	1 lbs, 0.454 kg
· **IMDG**	
· **Limited quantities (LQ)**	0
· **Excepted quantities (EQ)**	Code: E5 Maximum net quantity per inner packaging: 1 g Maximum net quantity per outer packaging: 300 g
· **UN "Model Regulation":**	UN 2811 TOXIC SOLID, ORGANIC, N.O.S. (DIELDRIN (ISO)), 6.1, I, ENVIRONMENTALLY HAZARDOUS

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 355 (extremely hazardous substances):**
Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**
Substance is not listed.

· **TSCA (Toxic Substances Control Act):**
Substance is not listed.

· **TSCA new (21st Century Act): (Substances not listed)**
60-57-1 dieldrin (ISO)

· **Proposition 65**

· **Chemicals known to cause cancer:**
Substance is listed.

· **Chemicals known to cause reproductive toxicity for females:**
Substance is not listed.

· **Chemicals known to cause reproductive toxicity for males:**
Substance is not listed.

(Contd. on page 9)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 8)

· **Chemicals known to cause developmental toxicity:**
Substance is not listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
B2

· **TLV (Threshold Limit Value established by ACGIH)**
(A4)

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

*
16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Department issuing SDS:** Document Control / Regulatory
· **Contact:** regulatory@ultrasci.com
· **Date of preparation / last revision** 03/24/2019 / 3
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Acute Tox. 3: Acute toxicity – Category 3
Acute Tox. 1: Acute toxicity – Category 1
Carc. 2: Carcinogenicity – Category 2
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1
· *** Data compared to the previous version altered.**

SAFETY DATA SHEET

Version 5.7
Revision Date 06/03/2016
Print Date 07/04/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Diesel Fuel No. 2

Product Number : UST147
Brand : Sigma-Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336
Specific target organ toxicity - repeated exposure, Oral (Category 2), Liver, Blood, H373
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, H373

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs (Liver, Blood) through prolonged or repeated exposure if swallowed.
H373	May cause damage to organs (Central nervous system) through prolonged or repeated exposure if inhaled.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Hazardous components

Component		Classification	Concentration
Methylene chloride			
CAS-No. EC-No. Index-No.	75-09-2 200-838-9 602-004-00-3	Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; STOT SE 3; STOT RE 2; H315, H319, H335, H336, H351, H373, H373	>= 90 - <= 100 %
Fuels, diesel, no. 2			
CAS-No. EC-No. Index-No.	68476-34-6 270-676-1 649-227-00-2	Flam. Liq. 4; Carc. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H227, H304, H336, H351, H411	>= 0.1 - < 1 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store at Room Temperature.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Potential Occupational Carcinogen See Appendix A		
Methylene chloride	75-09-2	TWA	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		

		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Substance listed; for more information see OSHA document 1910.1052		
		Substance listed; for more information see OSHA document 1910.1052		
		See Table Z-2		
		PEL	25.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		
		STEL	125.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		
		PEL	25 ppm 87 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		see section 5202		
		STEL	125 ppm 435 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		see section 5202		
Fuels, diesel, no. 2	68476-34-6	TWA	100.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		
		TWA	100.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		
		TWA	100 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Methylene chloride	75-09-2	Dichloromethane	0.3000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available

n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: OSHA specifically regulated carcinogen (Methylene chloride)

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1593 Class: 6.1 Packing group: III EMS-No: F-A, S-A

Proper shipping name: DICHLOROMETHANE, SOLUTION

IATA
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H227	Combustible liquid.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs (/$/*_2ORG_REP_ORA/$/) through prolonged or repeated exposure if swallowed.
H411	Toxic to aquatic life with long lasting effects.
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating
Health hazard: 2
Chronic Health Hazard: *

Flammability:	0
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.7 Revision Date: 06/03/2016 Print Date: 07/04/2016

SAFETY DATA SHEET

Creation Date 06-Aug-2010 **Revision Date** 30-Oct-2014 **Revision Number** 2

1. Identification

Product Name **Ethylbenzene**

Cat No. : **AC433800000; AC433800010; AC433801000**

Synonyms Ethylbenzol; Phenylethane

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Acute Inhalation Toxicity - Vapors	Category 4
Carcinogenicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
May be fatal if swallowed and enters airways
Harmful if inhaled
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of causing cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Ethylbenzene	100-41-4	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention. Aspiration into lungs can produce severe lung damage.

Ingestion Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting. Call a physician or Poison Control Center immediately. If vomiting occurs naturally, have victim lean forward.

Most important symptoms/effects Breathing difficulties. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: May cause central nervous system depression

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media Do not use a solid water stream as it may scatter and spread fire

Flash Point 15 °C / 59 °F
Method - No information available

Autoignition Temperature 432 °C / 810 °F
Explosion Limits
Upper 6.8%
Lower 1.2%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge Yes

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Ensure adequate ventilation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Ethylbenzene	TWA: 20 ppm	(Vacated) TWA: 100 ppm (Vacated) TWA: 435 mg/m³ (Vacated) STEL: 125 ppm (Vacated) STEL: 545 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	IDLH: 800 ppm TWA: 100 ppm TWA: 435 mg/m³ STEL: 125 ppm STEL: 545 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Ethylbenzene	TWA: 100 ppm TWA: 434 mg/m³ STEL: 125 ppm STEL: 543 mg/m³	TWA: 100 ppm TWA: 435 mg/m³ STEL: 125 ppm STEL: 545 mg/m³	TWA: 20 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Long sleeved clothing.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-95 °C / -139 °F
Boiling Point/Range	136 °C / 276.8 °F
Flash Point	15 °C / 59 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.8%
Lower	1.2%
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	0.860
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available

Autoignition Temperature	432 °C / 810 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C8 H10
Molecular Weight	106.17

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylbenzene	3500 mg/kg (Rat)	15400 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation May cause eye, skin, and respiratory tract irritation

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Ethylbenzene	100-41-4	Group 2B	Not listed	A3	X	Not listed

IARC: (International Agency for Research on Cancer)
Group 2B - Possibly Carcinogenic to Humans
IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans

ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: May cause central nervous system depression

Endocrine Disruptor Information No information available

Other Adverse Effects See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains. The product contains following substances which are hazardous for the environment. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Ethylbenzene	2.6 - 11.3 mg/L EC50 72 h 438 mg/L EC50 > 96 h 4.6 mg/L EC50 = 72 h 1.7 - 7.6 mg/L EC50 96 h	9.6 mg/L LC50 96 h 9.1 - 15.6 mg/L LC50 96 h 32 mg/L LC50 96 h 7.55 - 11 mg/L LC50 96 h 4.2 mg/L LC50 96 h 11.0 - 18.0 mg/L LC50 96 h	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h	1.8 - 2.4 mg/L EC50 48 h

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Ethylbenzene	3.118

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

TDG

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

IATA

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed The product is classified and labeled

according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Ethylbenzene	X	X	-	202-849-4	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Ethylbenzene	100-41-4	>95	0.1

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Ethylbenzene	X	1000 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Ethylbenzene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Ethylbenzene	1000 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Ethylbenzene	100-41-4	Carcinogen	54 µg/day 41 µg/day	Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethylbenzene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B2 Flammable liquid
D2A Very toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 06-Aug-2010
Revision Date 30-Oct-2014
Print Date 30-Oct-2014
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

1. IDENTIFICATION

Product Identifier: No. 2 Fuel Oil

Synonyms: No. 2 Heating Oil, #2 Fuel Oil, Heating Oil Plus™, Low Sulfur Heating Oil (LSHO), Ultra Low Sulfur Heating Oil (ULSHO)

Intended use of the product: Fuel

Contact:
Global Companies LLC
Water Mill Center
800 South St.
Waltham, MA 02454-9161
www.globalp.com

Contact Information: EMERGENCY TELEPHONE NUMBER (24 hrs.): CHEMTREC (800) 424-9300
COMPANY CONTACT (business hours): 800-542-0778

2. HAZARD IDENTIFICATION

According to OSHA 29 CFR 1910.1200 HCS

Classification of the Substance or Mixture

Classification (GHS-US):

Flam. Liquid	Category 3	H226
Skin Corrosion/Irritation	Category 2	H315
Aspiration Hazard	Category 1	H304
Acute toxicity – Inhalation	Category 4	H332
STOT SE	Category 3	H336
Carcinogenicity	Category 2	H350
Aquatic Chronic	Category 2	H411
Eye damage/Irritation	Category 2	H319

Labeling Elements



Signal Word (GHS-US): **Danger**

Hazard Statements (GHS-US):
H226 – Flammable liquid and vapor.
H315 – Causes Skin irritation.
H304 – May be fatal if swallowed and enters airways.
H332—Harmful if inhaled.
H336 – May cause drowsiness or dizziness.
H350 – May cause cancer.
H411 – Toxic to aquatic life with long lasting effects.
H319 – May cause eye damage/irritation.

Precautionary Statements (GHS-US):
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 - Keep container tightly closed.
P240 – Ground/bond container and receiving equipment.

P241 – Use explosion-proof electrical/ventilating/lighting equipment pursuant to applicable electrical code.
P242 – Use only non-sparking tools.
P243 – Take precautionary measures against static discharge.
P261 – Avoid breathing dust/fume/gas/mist/vapors/spray.
P264 – Wash skin thoroughly after handling.
P271 – Use only outdoors or in a well-ventilated area.
P273 – Avoid release to the environment.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P303+361+353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse with water/shower.
P308+311 - If exposed or concerned: Get medical advice/attention.
P301+310 - If swallowed: Immediately call a poison center/doctor/…
P331 - Do NOT induce vomiting.
P370+P378 – In case of fire use firefighting foam or other appropriate media for Class B fires to extinguish.
P403+235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 – Dispose of contents/container in accordance with local/regional/national/international regulation.

Other information:

NFPA 704
Health: 1
Fire: 2
Reactivity: 0



3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Composition Information
Mixture

Name	Product Identifier (CAS#)	% (w/w)	Classification
No. 2 Fuel Oil	68476-30-2	95-100	Flam Liq. 3, H226; Skin Irrit. 2, H315; Aspiration 1, H304; STOT SE 3, H336; Carc.2. H350; Aquatic chronic 2, H411
Methyl Esters	N/A	0-5	N/A
Naphthalene	91-20-3	0.1	Carc. 2, H351; Acute Tox. 4, H302; Aquatic Acute 1, H400; Aquatic Chronic 1, H411

Additional Formulation Information:
No. 2 Fuel Oil consists of C9+ hydrocarbons resulting from distillation of crude oil.

Low Sulfur Heating Oil typically contains less than 500 ppm of sulfur

Ultra Low Sulfur Heating Oil typically contains less than 15 ppm of sulfur

4. FIRST AID MEASURES

Route	Measures
Inhalation	Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.
Ingestion	Aspiration Hazard: DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Ingestion may cause gastrointestinal disturbances including irritation, nausea, vomiting, and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory failure, and death.
Eye Contact	In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention. In case of contact lenses, remove immediately.
Skin Contact	Remove contaminated clothing and shoes. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and of the area of the body burned.

Most Important Symptoms
Contact with eyes and face may cause irritation. Long-term exposure may cause dermatitis (itching, irritation, pain and swelling).

Inhalation may cause irritation and significant or long term exposure could cause respiratory insufficiency and pulmonary edema.

Ingestion may cause aspiration, gastrointestinal disturbance, and CNS effects.

Immediate Medical Attention and Special Treatment
For contact with skin or eyes, immediately wash or flush contaminated eyes with gently flowing water. If possible, irrigate each eye continuously with 0.9% saline (NS). If ingested, rinse mouth. Do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

If inhaled, administer oxygen or establish a patent airway if breathing is labored. Suction if necessary. Monitor closely, anticipate seizures. Consider orotracheal or nostracheal intubation of airway control if patient is unconscious or is in severe respiratory distress.

Discard any clothing or shoes contaminated as they may be flammable.

5. FIRE-FIGHTING MEASURES

Extinguishing Media
Foam, carbon dioxide, dry chemical are most suitable

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, C02, water spray, firefighting foam, or Halon. Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment.

LARGE FIRES: Foam, carbon dioxide, dry chemical. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific Hazards / Products of Combustion
Moderate fire hazard when exposed to heat or flame with a very low flash point. Product is flammable and easily ignited when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Combustion may produce smoke, carbon monoxide and other products of incomplete combustion.

Special Precautions and Protective Equipment for Firefighters
Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water.

For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

Fighting Equipment/Instructions
Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH- approved pressure-demand self-contained breathing apparatus with full face piece and protective clothing.

Refer to Section 9 for fire properties of this chemical including flash point, auto ignition temperature, and explosive limits.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY SPCC, SPILL CONTINGENCY or EMERGENCY PLAN.

Personal Precautions
Due to high vapor density, flammable / toxic vapors may be present in low lying areas, dikes, pits, drains, or trenches. Vapors may accumulate in low lying areas and reach ignitable concentrations. Ventilate the area. Use of non-sparking tools and intrinsically safe equipment is recommended. Potential for flammable atmosphere should be monitored using a combustible gas indicator positioned downwind of the spill area. Refer to Sections 2 and 7 for further hazard warnings and handling instructions.

Use appropriate personal protective equipment to prevent eye/skin contact and absorption. Use NIOSH approved respiratory protection, if warranted, to prevent exposures above permissible limits. Refer to Section 8. Contaminated clothing should not be near sources of ignition.

Emergency Measures
As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Consider wind direction. Secure all ignition sources (flame, spark, hot work, hot metal, etc.) from area. Evaluate the direction of product travel, diking sewers, etc. to confirm spill areas. Do not touch or walk-through spilled material. For large spills, isolate initial action distance downwind 1,000 ft. (300 m).

Environmental Precautions
Stop the spill to prevent environmental release if it can be done safely. Product is toxic to aquatic life. Take action to isolate environmental receptors including drains, storm sewers and natural water bodies. Keep on impervious surface if at all possible. Use water sparingly to prevent product from spreading. Foam and absorbents may be used to reduce / prevent airborne release.

Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Follow federal, state or local requirements for reporting environmental release where necessary. Refer to Section 15 for further information.

Containment and Clean-Up Methods
Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of firefighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with dry earth, sand or other non-combustible, inert oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container with clean, non-sparking tools for reclamation or disposal. Response and cleanup crews must be properly trained and must utilize proper protective equipment. Refer to Section 8 for appropriate protective equipment.

7. HANDLING AND STORAGE

USE ONLY AS A FUEL.
DO NOT SIPHON BY MOUTH.

Handling Precautions
Handle as a flammable liquid. Keep away from heat, sparks, and open flame. No smoking. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer pursuant to NFPA 70 and API RP 2003 to

reduce the possibility of static-initiated fire or explosion. Follow precautions to prevent static initiated fire.

Use good personal hygiene practices. Use only with protective equipment specified in Section 8. Avoid repeated and/or prolonged skin exposure. Use only outdoors or in well ventilated areas. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API RP 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage
Large quantities of fuel oil are stored in tanks or portable containers at an ambient storage temperature. Separate from incompatible chemicals (Refer to Section 10) by distance or secondary containment. Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers that are clearly labeled. Label all secondary containers that this material is transferred into with the chemical name and associated hazard(s). Empty product containers or vessels may contain flammable vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Storage tanks should have a venting system. If stored in small containers, the area should be well ventilated, away from ignition sources and protected from potential damage or vehicular traffic. Post “No Smoking” signs in product storage areas. This storage area should comply with NFPA 30 “Flammable and Combustible Liquid Code” or applicable building code. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 “Cleaning Mobile Tanks in Flammable and Combustible Liquid Service” and API RP 2015 “Safe Entry and Cleaning of Petroleum Storage Tanks”.

Incompatibles
Keep away from strong oxidizers, ignition sources and heat.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits

Component	CAS #	List	Value
No. 2 Fuel Oil	68476-30-2	ACGIH TLV-TWA	100 mg/m3*
Naphthalene	91-20-3	ACGIH TLV-TWA OSHA PEL ACGIH STEL	10 ppm 10 ppm 15 ppm

*Critical effects; Skin; A3; CNS impairment.

Engineering Controls
Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Intrinsically safe equipment and non-sparking tools shall be used in circumstances where concentrations may exceed lower flammable limits. Grounding and bonding shall be used to prevent accumulation and discharge of static electricity. Emergency shower and eyewash should be provided in proximity to handling areas in the event of exposure to decontaminate.

Personal Protective Equipment

Exposure	Equipment
Eye / Face	Wear appropriate chemical protective glasses or goggles or face shields to prevent skin and eye contact especially caused from splashing.
Skin	Wear appropriate personal protective clothing to prevent skin contact. Gloves constructed of nitrile, neoprene or PVC are recommended when handling this material. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure.

Exposure	Equipment
Respiratory	A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Thermal	Product is stored at ambient temperature. No thermal protection is required except for emergency operations involving actual or potential for fire. Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Value	
Appearance	Clear or straw-colored liquid dyed red for distribution	
Odor	Mild petroleum distillate odor.	
Odor Threshold	<1 ppm	
pH	Not available	
Melting Point	-15 ˚F (-26 ˚C)	
Boiling Point Range	320 to 690 ˚F (160 to 366 ˚C)	
Flash Point	>125.6 ˚F (52 ˚C) PMCC	
Evaporation Rate	Slow, varies with conditions	
Flammability	Flammable liquid	
Flammable Limits	0.6 % - 7.5%	
Vapor Pressure	0.009 psia @ 70 ˚F	
Vapor Density	>1	(air=1)
Specific Gravity	0.81-0.88 @ 60 ˚F (16 ˚C)	(water=1)
Solubility	Insoluble in water; miscible with other petroleum solvents.	
Partition Coefficient (N-octanol/water)	Log Kow range of 3.3 to >.6.0	
Autoignition Temperature	494 ˚F (257 ˚C)	
Decomposition Temperature	When heated it emits acrid smoke and irritating vapors.	
Viscosity	>3 cSt	
Percent Volatiles	95-100	

10. STABILITY AND REACTIVITY

Stability
This is a stable material that is flammable liquid (OSHA/GHS hazard category 3). Stable during transport.

Reactivity
Material is not self-reacting. Flammable concentrations may be present in air. Compound can react with oxidizing materials.

Possibility of Hazardous Reactions
Hazardous polymerization will not occur.

Incompatibility
Keep away from strong oxidizers such as nitric and sulfuric acids.

Conditions to Avoid
Avoid high temperatures, open flames, sparks, static electricity, welding, smoking and other ignition sources.

Hazardous Decomposition Products
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:
Acute Toxicity (Inhalation LC50)

No. 2 Fuel Oil (68476-30-2)
LC50 Inhalation Rat >4.6 mg/l/4h

Acute Toxicity (Dermal LD50)

No. 2 Fuel Oil (68476-30-2)
LD50 Dermal Rabbit >2000 mg/kg

Acute Toxicity (Oral LD50)

No. 2 Fuel Oil (68476-30-2)
LD50 Oral Rat >12000 mg/kg

Acute Toxicity (Oral LD50)

Methyl Esters
LD50 Oral Rat >14400 mg/kg

Skin Corrosion/Irritation: Prolonged and repeated contact may cause skin irritation leading to dermatitis. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

Serious Eye Damage/Irritation: Causes serious eye irritation.

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: OSHA: NO, IARC: Group 3, NTP: NO, ACGIH: NOIC:A3, NIOSH: NO

IARC: Group 3 – Not classifiable as to their carcinogenicity to humans ACGIH: A3 – Confirmed animal carcinogen with unknown relevance to humans

Petroleum middle distillates have been shown to produce skin tumors in laboratory animals following repeated and prolonged exposures. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

This product is similar to Diesel Fuel. IARC classifies whole diesel fuel exhaust particulates (byproduct of combustion of this material) carcinogenic to humans (Group 1) and NIOSH regards diesel fuel exhaust particulate as a potential occupational carcinogen.

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Specific Target Organ Toxicity (Single Exposure): Inhalation exposure may cause drowsiness or dizziness by inhalation exposure.

Aspiration Hazard: The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Potential Health Effects: Vapor irritating to skin, eyes, nose, and throat. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

WARNING: The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

12. ECOLOGICAL INFORMATION

Toxicity
This material is expected to be toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

Data for Component: No. 2 Fuel Oil (68476-30-2)

Material is toxic to aquatic organisms based on an acute basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Material is a long-term aquatic hazard based on a chronic basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Persistence and Degradation: This material is not expected to be readily biodegradable.

Bioaccumulative Potential: Not available

Mobility in Soil: Not available

Other Adverse Effects: None known

Other Information: Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options. May be considered a hazardous waste if disposed. Direct solid waste (landfill) or incineration at a solid waste facility is not permissible. Do not discharge to sanitary or storm sewer. Personnel handling waste containers should follow precautions provided in this document.

Shipping containers must be DOT authorized packages. Follow licensure and regulations for transport of hazardous material and hazardous waste as applicable.

14. TRANSPORT INFORMATION

US DOT

UN Identification Number	NA 1993
Proper Shipping Name	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PGIII
Shipping Label	Combustible liquid
Placard / Bulk Package	Combustible liquid, 1993
Emergency Response Guidebook Guide Number	128

IATA Information

UN Identification Number	UN 1993
Proper Shipping Name	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PGIII
ICAO Label	3
Packing Instructions Cargo	355
Max Quantity Per Package Cargo	220L
Packing Instructions Passenger	344Y
Max Quantity per Package	60L

ICAO

UN Identification Number	UN 1993
Shipping Name / Description	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PG III
IMDG Label	3

IMDG

UN Identification Number	UN 1993
Shipping Name / Description	Heating Oil, Light
Hazard Class and Packing Group	3, PGIII
IMDG Label	3
EmS Number	N/A
Marine Pollutant	Yes

15. REGULATORY INFORMATION

U.S. Federal, State, and Local Regulatory Information
Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning And Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	Yes
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Clean Water Act (Oil Spills)
Any spill or release of this product to “navigable waters” (Essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA Section 103 and SARA Section 304 (Release to the Environment)
The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts this material. This product does not contain any chemicals subject to the reporting requirements of CERCLA Section 103 or SARA 304.

SARA Section 313- Supplier Notification
This product does not contain any chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

EPA Notification (Oil Spills)
If the there is a discharge of more than 1,000-gallons of oil into or upon navigable waters of the United States, or if it is the second spill event of 42 gallons or more of oil into water within a twelve (12) month period, a written report must be submitted to the Regional Administrator of the EPA within sixty days of the event.

Pennsylvania Right to Know Hazardous Substance list:
The following product components are cited in the Pennsylvania Special Hazardous Substance List, and are present at levels which require reporting.

Component	CAS	Amount
No. 2 Fuel Oil	68476-30-2	100%

New Jersey Right to Know Hazardous Substance list:
The following product components are cited in the New Jersey Right to Know Hazardous Substance List, and are present at levels which require reporting.

Component	CAS	Amount
No. 2Fuel Oil	68476-30-2	100%

California Proposition 65 WARNING: This product contains chemicals known to the State of California to cause Cancer or Reproductive Toxicity.

Component	CAS	Amount
Naphthalene	91-20-3	<0.1%

U.S. Toxic Substances Control Act
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

CEPA - Domestic Substances List (DSL)
All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

Canadian Regulatory Information (WHMIS)
Class B3 – Combustible Liquid
Class D2A – Materials causing other toxic effects. (Very Toxic)

16. OTHER INFORMATION

Version	4
Issue Date	May 20, 2016
Prior Issue Date	May 3, 2015

Description of Revisions
Revised to meet Globally Harmonized System for chemical hazard communication requirements pursuant to OSHA regulatory revisions 77 FR 17884, March 26, 2012.

Abbreviations

˚F	Degrees Fahrenheit (temperature)
<	Less than
=	Equal to
>	Greater than
AP	Approximately
C	Centigrade (temperature)
kg	Kilogram
L	Liter
mg	Milligrams
mL	Milliliter
mm^2	Square millimeters
mmHg	Millimeters of mercury (pressure)
N/A	Not applicable
N/D	Not determined
ppm	Parts per million
sec	Second
ug	Micrograms

Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Level
ANSI	American National Standards Institute
API	American Petroleum Institute
CAS	Chemical Abstract Service
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation
EC50	Ecological concentration 50%
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
GHS	Global Harmonized System

HMIS	Hazardous Materials Information System
IARC	International Agency for Research On Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
Koc	Soil Organic Carbon
LC50	Lethal concentration 50%
LD50	Lethal dose 50%
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act Reauthorization Act of 1986 Title III
REL	Recommended Exposure Limit (NIOSH)
RVP	Reid Vapor Pressure
SARA	Superfund Amendments and
SCBA	Self Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
UN	United Nations
UNECE	United Nations Economic Commission for Europe
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

Disclaimer of Expressed and Implied Warranties

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

** End of Safety Data Sheet **

SAFETY DATA SHEET

Version 5.5
Revision Date 05/27/2016
Print Date 07/13/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Indeno[1,2,3-*cd*]pyrene

Product Number : 48499
Brand : Supelco

CAS-No. : 193-39-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 2), H351

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H351 Suspected of causing cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : $C_{22}H_{12}$
Molecular weight : 276.33 g/mol
CAS-No. : 193-39-5
EC-No. : 205-893-2

Hazardous components

Component	Classification	Concentration
Indeno[1,2,3-cd]pyrene		
	Carc. 2; H351	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available

d)	pH	No data available
e)	Melting point/freezing point	163.6 °C (326.5 °F)
f)	Initial boiling point and boiling range	536.0 °C (996.8 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)
NTP:	Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Indeno[1,2,3-cd]pyrene	CAS-No. 193-39-5	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No. 193-39-5	Revision Date 2007-09-28

Indeno[1,2,3-cd]pyrene

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
H351	Suspected of causing cancer.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 05/27/2016 Print Date: 07/13/2017

Iron Filings, 40 mesh

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Iron Filings, 40 mesh**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: **S25369**

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Not classified for physical or health hazards under GHS.

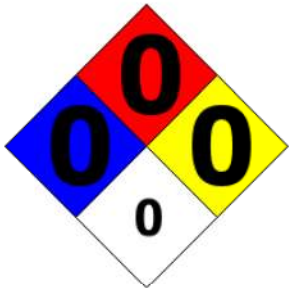
Signal word :Warning

Hazard statements:
Precautionary statements:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Do not eat, drink or smoke when using this product

Combustible Dust Hazard: :
May form combustible dust concentrations in air (during processing).

Other Non-GHS Classification:

WHMIS
NFPA/HMIS



NFPA SCALE (0-4)



HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7439-89-6	Iron	100 %
		Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Loosen clothing as necessary and position individual in a comfortable position.Move exposed to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen.Get medical assistance if cough or other symptoms appear.

After skin contact: Rinse/flush exposed skin gently using soap and water for 15-20 minutes.Seek medical advice if discomfort or irritation persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea,Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition. Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.Thermal decomposition can lead to release of irritating gases and vapors.

Advice for firefighters:

Protective equipment: Use NIOSH-approved respiratory protection/breathing apparatus.

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.Use spark-proof tools and explosion-proof equipment.Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.Avoid inhaling gases, fumes, dust, mist, vapor, and aerosols.Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Use spark-proof tools and explosion-proof equipment.Ensure that air-handling systems are operational.Ensure adequate ventilation.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13. Should not be released into environment.

Methods and material for containment and cleaning up:

Keep in suitable closed containers for disposal.Wear protective eyeware, gloves, and clothing. Refer to Section 8.Always obey local regulations.Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Collect solids in powder form using vacuum with (HEPA filter). Evacuate personnel to safe areas.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Minimize dust generation and accumulation. Follow good hygiene procedures when handling chemical materials. Refer to Section 8.Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Store away from incompatible materials.Protect from freezing and physical damage.Keep away from food and beverages.Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store in cool, dry conditions in well sealed containers. Store with like hazards

SECTION 8 : Exposure controls/personal protection





Control Parameters:	, , OSHA PEL TWA (Total Dust) 15 mg/m3 (50 mppcf*) , , ACGIH TLV TWA (inhalable particles) 10 mg/m3
Appropriate Engineering controls:	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment.Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).Use under a fume hood
Respiratory protection:	Not required under normal conditions of use. Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls.When necessary use NIOSH approved breathing equipment.
Protection of skin:	Select glove material impermeable and resistant to the substance.Select glove material based on rates of diffusion and degradation.Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves.Wear protective clothing.

Eye protection: Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).Safety glasses or goggles are appropriate eye protection.

General hygienic measures: Perform routine housekeeping.Wash hands before breaks and at the end of work.Avoid contact with skin, eyes, and clothing.Before wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Solid	**Explosion limit lower**: **Explosion limit upper**:	Not determined Not determined
Odor:	Not Determined	**Vapor pressure**:	Not determined
Odor threshold:	Not determined	**Vapor density**:	Not determined
pH-value:	Not Determined	**Relative density**:	Not determined
Melting/Freezing point:	Not determined	**Solubilities**:	
Boiling point/Boiling range:	Not determined	**Partition coefficient (n-octanol/water)**:	Not determined
Flash point (closed cup):	Not determined	**Auto/Self-ignition temperature**:	Not determined
Evaporation rate:	Not determined	**Decomposition temperature**:	Not determined
Flammability (solid,gaseous):	Not determined	**Viscosity**:	a. Kinematic:Not determined b. Dynamic: Not determined
Density: Not determined			

SECTION 10 : Stability and reactivity

Reactivity: Nonreactive under normal conditions.
Chemical stability: Stable under normal conditions.
Possible hazardous reactions: None under normal processing
Conditions to avoid: Incompatible Materials.
Incompatible materials: Strong acids.Strong bases.Oxidizing agents.
Hazardous decomposition products:

SECTION 11 : Toxicological information

Acute Toxicity: No additional information.	
Chronic Toxicity: No additional information.	
Corrosion Irritation: No additional information.	
Sensitization:	No additional information.
Single Target Organ (STOT):	No additional information.
Numerical Measures:	No additional information.

Carcinogenicity:	No additional information.
Mutagenicity:	No additional information.
Reproductive Toxicity:	No additional information.

SECTION 12 : Ecological information

Ecotoxicity Persistence and degradability:
Bioaccumulative potential:
Mobility in soil:
Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Contact a licensed professional waste disposal service to dispose of this material.Dispose of empty containers as unused product.Product or containers must not be disposed with household garbage.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11).Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

Not Regulated.

UN proper shipping name

Not Regulated.

Transport hazard class(es)
Packing group:Not Regulated
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

None of the ingredients is listed

SARA Section 313 (Specific toxic chemical listings):

None of the ingredients is listed

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

None of the ingredients is listed

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

None of the ingredients is listed

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation

Effective date : 10.24.2014
Last updated : 03.23.2015

SAFETY DATA SHEET

Isobutylene

Section 1. Identification

GHS product identifier : Isobutylene

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

SDS # : 001031

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

CAS number/other identifiers

CAS number : 115-11-7

Product code : 001031

Ingredient name	%	CAS number
Isobutylene	100	115-11-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Isobutylene	**ACGIH TLV (United States, 3/2015).** TWA: 250 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied compressed gas.]

Color : Colorless.

Molecular weight : 56.12 g/mole

Molecular formula : C4-H8

Boiling/condensation point : -6.9°C (19.6°F)

Melting/freezing point : -140.7°C (-221.3°F)

Critical temperature : 144.75°C (292.6°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -76.1°C (-105°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 9.6%

Vapor pressure : 24.3 (psig)

Vapor density : 1.94 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.6845

Gas Density (lb/ft ^{3}) : 0.1496 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.263 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

SADT : Not available.

Section 9. Physical and chemical properties

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Section 11. Toxicological information

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Isobutylene	2.34	-	low

Section 12. Ecological information

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1055	UN1055	UN1055	UN1055	UN1055
UN proper shipping name	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** 19, T50	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2). **Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden **Special provisions** 29	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act (CAA) 112 regulated flammable substances: isobutylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Isobutylene	100	Yes.	Yes.	No.	No.	No.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

International lists

National inventory

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : This material is listed or exempted.

Malaysia : Not determined.

Section 15. Regulatory information

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Canada

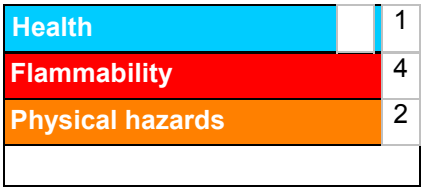
WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Flam. Gas 1, H220 Press. Gas Liq. Gas, H280	Expert judgment Expert judgment

History

Date of printing : 7/11/2016

Date of issue/Date of revision : 7/11/2016

Date of previous issue : No previous validation

Section 16. Other information

Version : 0.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 12-Sep-2014 **Revision Date** 12-Dec-2014 **Revision Number** 1

1. Identification

Product Name **Lead**

Cat No. : **L27-1RL**

Synonyms Lead metal.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Emergency Telephone Number
Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Dusts and Mists	Category 4
Carcinogenicity	Category 1B
Reproductive Toxicity	Category 1A
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Harmful if swallowed
Harmful if inhaled
May cause drowsiness or dizziness
May cause cancer
May damage the unborn child. Suspected of damaging fertility
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
Other hazards
WARNING! This product contains a chemical known in the State of California to cause cancer. WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Lead	7439-92-1	> 99

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes.

Inhalation Move to fresh air.

Ingestion Do not induce vomiting.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available

Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up No information available.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Lead	TWA: 0.05 mg/m³	TWA: 50 µg/m³	IDLH: 100 mg/m³ TWA: 0.050 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Lead	TWA: 0.05 mg/m³	TWA: 0.15 mg/m³	TWA: 0.05 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment
Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Light blue
Odor	Odorless
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	327.4 °C / 621.3 °F
Boiling Point/Range	1740 °C / 3164 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1.3 mmHg @ 970 °C
Vapor Density	No information available
Relative Density	11.3
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	Pb
Molecular Weight	207.19

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	None under normal use conditions
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products	No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	No information available
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Lead	7439-92-1	Group 2B	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

(Bad file name)

Ecotoxicity

.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Lead	Not listed	1.32 mg/L LC50 96 h 1.17 mg/L LC50 96 h 0.44 mg/L LC50 96 h	Not listed	600 µg/L EC50 = 48 h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Lead	X	X	-	231-100-4	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Lead	7439-92-1	> 99	0.1

SARA 311/312 Hazardous Categorization

Acute Health Hazard Yes
Chronic Health Hazard Yes
Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Lead	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Lead	X		-

OSHA Occupational Safety and Health Administration
Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Lead	30 µg/m³ Action Level 50 µg/m³ TWA	-

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Lead	10 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Lead	7439-92-1	Carcinogen Developmental Female Reproductive Male Reproductive	15 µg/day	Developmental Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Lead	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2A Very toxic materials
D1B Toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 12-Sep-2014
Revision Date 12-Dec-2014
Print Date 12-Dec-2014
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Creation Date 17-Jan-2011 **Revision Date** 03-Aug-2015 **Revision Number** 3

1. Identification

Product Name **Magnesium**

Cat No. : **AC191080000; AC191080025; AC191080100; AC191085000**

Synonyms Magnesium metal (ribbons/turnings)

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 1
Self-heating substances and mixtures	Category 2
Substances/mixtures which, in contact with water, emit flammable gases	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Self-heating in large quantities; may catch fire
In contact with water releases flammable gas



Precautionary Statements
Prevention
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Wear protective gloves/protective clothing/eye protection/face protection
Keep cool. Protect from sunlight
Keep away from any possible contact with water, because of violent reaction and possible flash fire
Handle under inert gas. Protect from moisture
Skin
Brush off loose particles from skin. Immerse in cool water/wrap with wet bandages
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Maintain air gap between stacks/pallets
Store away from other materials
Store in a dry place. Store in a closed container
Store bulk masses at temperatures not exceeding manufacturer recommendations
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
May form combustible dust concentrations in air

3. Composition / information on ingredients

Component	CAS-No	Weight %
Magnesium	7439-95-4	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration.

Ingestion Do not induce vomiting. Get medical attention.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical. approved class D extinguishers. clay. sodium carbonate. Do not use a solid water stream as it may scatter and spread fire.

Unsuitable Extinguishing Media No information available

Flash Point 500 °C / 932 °F
Method - No information available

Autoignition Temperature 472.8 °C / 883 °F
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture in air. Water reactive. Produce flammable gases on contact with water. Flammable.

Hazardous Combustion Products
Magnesium oxides
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
0	4	2	W

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Remove all sources of ignition.

Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation. Remove all sources of ignition. Ground and bond containers when transferring material. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Use explosion-proof equipment. Use only non-sparking tools. Wash hands before breaks and immediately after handling the product. Ensure adequate ventilation. Wear personal protective equipment. Avoid dust formation.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Never allow product to get in contact with water during storage. Store under an inert atmosphere.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	7
Melting Point/Range	651 °C / 1203.8 °F
Boiling Point/Range	1107 °C / 2024.6 °F
Flash Point	500 °C / 932 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	negligible
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	472.8 °C / 883 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Mg
Molecular Weight	24.3

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions. Air sensitive. Water reactive.

Conditions to Avoid Protect from water. Exposure to air. Incompatible products. Exposure to moist air or water.

Incompatible Materials Acids, Strong oxidizing agents, Halogens, Acid chlorides

Hazardous Decomposition Products Magnesium oxides

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Magnesium	230 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation May cause irritation

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Magnesium	7439-95-4	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects,both acute and delayed	No information available
Endocrine Disruptor Information	No information available
Other Adverse Effects	See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability	Insoluble in water
Bioaccumulation/ Accumulation	No information available.
Mobility	Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

TDG

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

IATA

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

IMDG/IMO

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Magnesium	X	X	-	231-104-6	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Magnesium	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class	B6 Reactive flammable material B4 Flammable solid F Dangerously reactive material



16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	17-Jan-2011
Revision Date	03-Aug-2015
Print Date	03-Aug-2015
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 4.6
Revision Date 10/09/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Manganese

Product Number : 266167
Brand : Aldrich

CAS-No. : 7439-96-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram none

Signal word none

Hazard statement(s)
H401 Toxic to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Mn
Molecular weight : 54.94 g/mol
CAS-No. : 7439-96-5
EC-No. : 231-105-1

Hazardous components

Component	Classification	Concentration
Manganese		
	Aquatic Acute 2; H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Manganese/manganese oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Moisture sensitive. Handle and store under inert gas.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC)		
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) varies		
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		

		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment varies		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment varies		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: chips Colour: grey, brown, silver
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,244 °C (2,271 °F) - lit.
f)	Initial boiling point and boiling range	1,962 °C (3,564 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	7.3 g/mL at 25 °C (77 °F)
n)	Water solubility	0.0007 g/l at 20 °C (68 °F) - slightly soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Avoid moisture.

10.5 Incompatible materials
acids, Halogens, Bases, Phosphorus, Sulphur oxides, Hydrogen peroxide, Oxidizing agents, Nitric acid, Sodium Hydroxide, Carbon dioxide (CO_2), Nitryl Flouride, Steam

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 420)

LC50 Inhalation - Rat - male and female - 4 h - > 5.14 mg/l
(OECD Test Guideline 403)

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 72 h
(OECD Test Guideline 405)

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	semi-static test NOEC - Oncorhynchus mykiss (rainbow trout) - 3.6 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Immobilization NOEC - Daphnia magna (Water flea) - 1.6 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Growth inhibition EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - 4.5 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	Respiration inhibition EC50 - Sludge Treatment - 1,000 mg/l - 3 h (OECD Test Guideline 209)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
H401	Toxic to aquatic life.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 10/09/2015 Print Date: 05/01/2016

Safety Data Sheet
Mercury (Metallic)

SDS Revision Date: **05/01/2015**

1. Identification

1.1. Product identifier

Product Identity	Mercury (Metallic)
Alternate Names	Quicksilver; Hydrargyrum; Liquid Silver

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use	See Technical Data Sheet.
Application Method	See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name	WM Mercury Waste Inc. 21211 Durand Avenue Union Grove, WI 53182
Emergency	
CHEMTREC (USA)	(800) 424-9300
Customer Service: WM Mercury Waste Inc.	(800) 741-3343

2. Hazard(s) identification

2.1. Classification of the substance or mixture

Acute Tox. 2;H330	Fatal if inhaled.
Repr. 1B;H360D	May damage the unborn child.
STOT RE 1;H372	Causes damage to organs through prolonged or repeated exposure. Specific Target Organs: (Central Nervous System)
Aquatic Chronic 1;H410	Very toxic to aquatic life with long lasting effects.

2.2. Label elements

Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.



Danger

H330 Fatal if inhaled.

H360D May damage the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

SDS Revision Date: **05/01/2015**

[Prevention]:

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P260 Do not breathe mist / vapors / spray.

P264 Wash thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P281 Use personal protective equipment as required.

P284 Wear respiratory protection.

[Response]:

P304+340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P308+313 IF exposed or concerned: Get medical advice / attention.

P310 Immediately call a POISON CENTER or doctor / physician.

P314 Get Medical advice / attention if you feel unwell.

P320 Specific treatment is urgent (see information on this label).

P391 Collect spillage.

[Storage]:

P403+233 Store in a well ventilated place. Keep container tightly closed.

P405 Store locked up.

[Disposal]:

P501 Dispose of contents / container in accordance with local / national regulations.

3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

Ingredient/Chemical Designations	Weight %	GHS Classification	Notes
Mercury **CAS Number: 0007439-97-6**	**100**	**Repr. 1B;H360D** **Acute tox. 2;H330** **STOT RE 1;H372** **Aquatic Acute 1;H400** **Aquatic Chronic 1;H410**	**[1][2]**

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

[1] Substance classified with a health or environmental hazard.

[2] Substance with a workplace exposure limit.

[3] PBT-substance or vPvB-substance.

*The full texts of the phrases are shown in Section 16.

4. First aid measures

4.1. Description of first aid measures

General In all cases of doubt, or when symptoms persist, seek medical attention.
Never give anything by mouth to an unconscious person.

Inhalation Remove to fresh air, keep patient warm and at rest. If breathing is irregular or stopped, give artificial respiration. If unconscious place in the recovery position and obtain immediate medical attention. Give nothing by mouth.

Eyes Irrigate copiously with clean water for at least 15 minutes, holding the eyelids apart and seek medical attention.

Skin Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser.

Ingestion If swallowed, wash out mouth with water, obtain immediate medical attention. Keep at rest. Do NOT induce vomiting.

4.2. Most important symptoms and effects, both acute and delayed

Overview **Eye:** Contact with eyes may cause severe irritation, and possible eye burns. Vapors may cause eye irritation.
Skin: May cause skin irritation. May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, and personality changes.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause effects similar to those for inhalation exposure.
Inhalation: Causes respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. May cause severe respiratory tract irritation.
Chronic: Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, and personality changes.

Notes to Physician: Treat symptomatically and supportively.
Antidote: The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel. The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. See section 2 for further details.

Inhalation Fatal if inhaled.

5. Fire-fighting measures

5.1. Extinguishing media

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition: Mercury/mercury oxides.

Do not breathe mist / vapors / spray.

5.3. Advice for fire-fighters

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Combustion generates toxic fumes.

ERG Guide No. 172

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Put on appropriate personal protective equipment (see section 8).

6.2. Environmental precautions

Do not allow spills to enter drains or waterways.

Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

6.3. Methods and material for containment and cleaning up

Vacuum or sweep up material and place into a suitable disposal container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section).

7. Handling and storage

7.1. Precautions for safe handling

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid breathing dust, vapor, mist, or gas. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

See section 2 for further details. - [Prevention]:

7.2. Conditions for safe storage, including any incompatibilities

Handle containers carefully to prevent damage and spillage.

Incompatible materials: Acetylene, ammonia, boron phosphodiiodide, chlorine, chlorine dioxide, methyl azide, sodium carbide, halogens, strong oxidizers.

Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Poison room locked.

See section 2 for further details. - [Storage]:

7.3. Specific end use(s)

No data available.

SDS Revision Date: **05/01/2015**

8. Exposure controls and personal protection

8.1. Control parameters

Exposure

CAS No.	Ingredient	Source	Value
0007439-97-6	Mercury	OSHA	TWA 0.1 mg/m3
		ACGIH	Alkyl compounds TWA: 0.01 mg/m3 STEL 0.03 mg/m3 Skin Aryl compounds TWA: 0.05 mg/m3 C 0.1 mg/m3 Skin Elemental/Inorganic 0.025mg/m3 Skin
		NIOSH	No Established Limit
		Supplier	No Established Limit

Carcinogen Data

CAS No.	Ingredient	Source	Value
0007439-97-6	Mercury	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: Yes; Group 4: No;

8.2. Exposure controls

Respiratory Follow the OSHA respirator regulations found in 29CFR §1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Eyes Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin Wear appropriate protective clothing to prevent skin exposure. Wear appropriate gloves to prevent skin exposure.

Engineering Controls Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits suitable respiratory protection must be worn.

Other Work Practices Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

See section 2 for further details. - [Prevention]:

9. Physical and chemical properties

Appearance	Silver Liquid
Odor	Odorless
Odor threshold	Not Measured
pH	Not Applicable
Melting point / freezing point	-38.87 deg C

SDS Revision Date: **05/01/2015**

Initial boiling point and boiling range	356.5 deg C @ 760.00mmHg
Flash Point	Not Measured
Evaporation rate (Ether = 1)	Not Available
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	**Lower Explosive Limit:** Not Measured **Upper Explosive Limit:** Not Measured
Vapor pressure (Pa)	0.002 mmHg @ 25C
Vapor Density	7 (Air=1)
Specific Gravity	13.5400g/cm3 (Water=1)
Solubility in Water	Insoluble
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature	Not Measured
Decomposition temperature	Not Available
Viscosity (cSt)	1.554 cP 20.00
Molecular Formula	Hg
Molecular Weight	200.59

9.2. Other information

No other relevant information.

10. Stability and reactivity

10.1. Reactivity

Hazardous Polymerization will not occur.

10.2. Chemical stability

Stable under normal circumstances.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

High temperatures, incompatible materials, metals.

10.5. Incompatible materials

Acetylene, ammonia, boron phosphodiiodide, chlorine, chlorine dioxide, methyl azide, sodium carbide, halogens, strong oxidizers.

10.6. Hazardous decomposition products

Mercury/mercury oxides.

11. Toxicological information

Acute toxicity

Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LC50, mg/L/4hr	Inhalation Dust/Mist LC50, mg/L/4hr	Inhalation Gas LC50, ppm

SDS Revision Date: **05/01/2015**

Mercury - (7439-97-6)	37.00, Rat - Category: 2	No data available	No data available	No data available	No data available

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification	Category	Hazard Description
Acute toxicity (oral)	2	Fatal if swallowed.
Acute toxicity (dermal)	---	Not Applicable
Acute toxicity (inhalation)	2	Fatal if inhaled.
Skin corrosion/irritation	---	Not Applicable
Serious eye damage/irritation	---	Not Applicable
Respiratory sensitization	---	Not Applicable
Skin sensitization	---	Not Applicable
Germ cell mutagenicity	---	Not Applicable
Carcinogenicity	---	Not Applicable
Reproductive toxicity	1B	May damage the unborn child.
STOT-single exposure	---	Not Applicable
STOT-repeated exposure	1	Causes damage to organs through prolonged or repeated exposure.
Aspiration hazard	---	Not Applicable

12. Ecological information

12.1. Toxicity

Very toxic to aquatic life with long lasting effects.

No additional information provided for this product. See Section 3 for chemical specific data.

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Mercury - (7439-97-6)	Not Available	0.0052, Daphnia magna	Not Available

12.2. Persistence and degradability

There is no data available on the preparation itself.

12.3. Bioaccumulative potential

Not Measured

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

SDS Revision Date: **05/01/2015**

This product contains no PBT/vPvB chemicals.

12.6. Other adverse effects

No data available.

13. Disposal considerations

13.1. Waste treatment methods

Observe all federal, state and local regulations when disposing of this substance.

14. Transport information

	DOT (Domestic Surface Transportation)	IMO / IMDG (Ocean Transportation)	ICAO/IATA
14.1. UN number	UN2809	UN2809	UN2809
14.2. UN proper shipping name	UN2809, Mercury, 8, III	Mercury	Mercury
14.3. Transport hazard class(es)	**DOT Hazard Class:** 8 (6.1)	**IMDG:** 8 **Sub Class:** 6.1	**Air Class:** 8
14.4. Packing group	III	III	III

14.5. Environmental hazards

IMDG Marine Pollutant: Yes (Mercury)

14.6. Special precautions for user

No further information

15. Regulatory information

Regulatory Overview The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented.

Toxic Substance Control Act (TSCA) All components of this material are either listed or exempt from listing on the TSCA Inventory.

WHMIS Classification D1A

US EPA Tier II Hazards

Fire: No
Sudden Release of Pressure: No
Reactive: No
Immediate (Acute): Yes
Delayed (Chronic): Yes

EPCRA 311/312 Chemicals and RQs (lbs):

Mercury (1.00)

EPCRA 302 Extremely Hazardous:

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

SDS Revision Date: **05/01/2015**

EPCRA 313 Toxic Chemicals:

Mercury

Proposition 65 - Carcinogens (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Developmental Toxins (>0.0%):
Mercury

Proposition 65 - Female Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Male Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

New Jersey RTK Substances (>1%):

Mercury

Pennsylvania RTK Substances (>1%):

Mercury

16. Other information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases appearing in section 3 is:

H330 Fatal if inhaled.

H360D May damage the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall WM Mercury Waste Inc. be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages.

End of Document

Safety Data Sheet

Material Name: Hess 10W30 Motor Oil

SDS No. 8957
US GHS

Synonyms: Valvoline Product Code 52670413

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Skin Corrosion/Irritation – Category 2
Specific Target Organ Toxicity – Category 3 (narcosis)
Carcinogenicity - Category 1B

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

WARNING

Hazard Statements

Causes skin irritation.
May cause cancer.
May cause drowsiness or dizziness.

Precautionary Statements

Prevention

Wash hands and forearms thoroughly after handling.
Wear protective gloves/protective clothing/eye protection.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing fume/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.

Response

If on skin: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.
If exposed or concerned: Get medical advice/attention.
If inhaled: Remove person to fresh air and keep in a position comfortable for breathing. Call poison center or doctor if you feel unwell.

Storage

Store locked up.
Store in a well-ventilated place.
Keep container tightly closed.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
64742-65-0	Petroleum distillates, solvent dewaxed heavy paraffinic	83-93

Petroleum-based lubricating oil with detergent/dispersant engine oil package with zinc compounds.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

If symptoms develop, move individual away from exposure and into fresh air. Flush eyes gently with water while holding eyelids apart. If symptoms persist or there is visual difficulty, seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

First Aid: Ingestion

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

First Aid: Notes to Physician

Acute aspiration of large amounts of oil-laden material may produce a serious aspiration hazard. Patients who aspirate these oils should be followed for the development of long-term sequelae. Repeated aspiration of mineral oil can produce chronic inflammation of the lungs (i.e. lipoid pneumonia) that may progress to pulmonary fibrosis. Symptoms are often subtle and radiological changes appear worse than clinical abnormalities. Occasionally, persistent cough, irritation of the upper respiratory tract, shortness of breath with exertion, fever, and bloody sputum occur. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.
Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. No special fire hazards are known to be associated with this product. Dense smoke may be generated while burning.

Hazardous Combustion Products

May form: carbon dioxide and carbon monoxide, oxides of sulfur, nitrogen and phosphorous, various hydrocarbons.

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or gaseous extinguishing agent.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

SMALL SPILL: Absorb liquid on vermiculite, floor absorbent or other absorbent material. Persons not wearing proper personal protective equipment should be excluded from area of spill.

LARGE SPILL: Prevent run-off to sewers, streams, or other bodies of water. If run-off occurs, notify authorities as required, that a spill has occurred. Persons not wearing proper personal protective equipment should be excluded from area of spill until clean-up has been completed.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks."

Incompatibilities

Avoid contact with: acids, halogens, strong oxidizing agents.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

ACGIH, OSHA, and NIOSH have not developed exposure limits for any of this product's components.

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Not normally required. However, wear resistant gloves such as nitrile rubber to prevent irritation which may result from prolonged or repeated skin contact with product.

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

To prevent repeated or prolonged skin contact, wear impervious clothing and boots. Wear normal work clothing covering arms and legs.

Hygiene Measures

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Dry, clear and bright	**Odor:**	None
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	ND	**Vapor Density:**	ND
Boiling Point:	>425 °F (218.3°C) @ 760.00 mmHg	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	0.881 @ 60°F (16°C)
Evaporation Rate:	Slower than ethyl ether	**VOC:**	ND
Viscosity:	<= 3300.0 cps @ -20°C; 10.0 - 11.0 cst @ 100°C	**Octanol/H2O Coeff.:**	ND
Flash Point:	430 °F (221.1 °C)	**Flash Point Method:**	COC
Upper Flammability Limit (UFL):	ND	**Lower Flammability Limit (LFL):**	ND
Burning Rate:	ND	**Auto Ignition:**	ND

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

None

Incompatible Products

Avoid contact with: acids, halogens, strong oxidizing agents.

Hazardous Decomposition Products

May form: aldehydes, carbon dioxide and carbon monoxide, hydrogen sulfide, oxides of sulfur, nitrogen and phosphorus, toxic fumes, various hydrocarbons.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if large amounts are swallowed.

B: Component Analysis - LD50/LC50

Petroleum distillates, solvent dewaxed heavy paraffinic (64742-65-0)

Inhalation LC50 Rat >4.7 mg/L 4 h; Oral LD50 Rat >5000 mg/kg; Dermal LD50 Rabbit >5000 mg/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

May cause mild skin irritation. Prolonged or repeated contact may dry the skin. Symptoms include redness, burning, drying and cracking of the skin, and skin burns. Additional symptoms of skin contact include: acne. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

May cause mild eye irritation. Symptoms include stinging, tearing, and redness.

Potential Health Effects: Ingestion

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful.

Potential Health Effects: Inhalation

It is possible to breathe this material under certain conditions of handling and use (for example, during heating, spraying, or stirring). Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful. Symptoms usually occur at air concentrations higher than the recommended exposure limits.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This product is not reported to have any mutagenic effects.

Carcinogenicity

A: General Product Information

May cause cancer.

Used motor oil has been shown to cause skin cancer in laboratory animal continually exposed by repeated applications.

B: Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity repeat exposure effects.

Aspiration Respiratory Organs Hazard

Acute aspiration of large amounts of oil-laden material may produce a serious aspiration hazard.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Petroleum distillates, solvent dewaxed heavy paraffinic (64742-65-0)

Test & Species	Conditions
96 Hr LC50 Oncorhynchus mykiss	>5000 mg/L
48 Hr EC50 Daphnia magna	>1000 mg/L

Persistence/Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT Information

Shipping Name: Not Regulated

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	--	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

ZINC C1-C14 ALKYLDITHIOPHOSPHATE (CAS No. 68649-42-3)

State Regulations

Component Analysis - State

None of this product's components are listed on the state lists from CA, MA, MN, NJ, PA, or RI.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Petroleum distillates, solvent dewaxed heavy paraffinic	64742-65-0	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	1
Fire	1
Reactivity	0



HMIS® Hazard Rating

Health	1*	Slight
Fire	1	Slight
Physical	0	Minimal
		*Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 27-Sep-2010 **Revision Date** 12-Oct-2015 **Revision Number** 3

1. Identification

Product Name **Naphthalene**

Cat No. : **N7-500**

Synonyms Tar camphor; Naphthalin; Coal tar camphor

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Emergency Telephone Number
Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 2
Acute oral toxicity	Category 4
Carcinogenicity	Category 1B
Target Organs - Liver, Kidney.	

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Harmful if swallowed
May cause cancer



Precautionary Statements
Prevention

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment

Response

IF exposed or concerned: Get medical attention/advice

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Ingestion

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth

Fire

In case of fire: Use CO2, dry chemical, or foam for extinction

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Very toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Naphthalene	91-20-3	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms/effects . Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media No information available

Flash Point 78 °C / 172.4 °F
Method - No information available

Autoignition Temperature	Not applicable 526 °C / 978.8 °F
Explosion Limits	
Upper	5.9 vol %
Lower	0.9 vol %
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material. Containers may explode when heated. Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	2	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal. Remove all sources of ignition.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation. Avoid ingestion and inhalation. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Keep away from open flames, hot surfaces and sources of ignition.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Naphthalene	TWA: 10 ppm Skin	(Vacated) TWA: 10 ppm (Vacated) TWA: 50 mg/m³ (Vacated) STEL: 15 ppm (Vacated) STEL: 75 mg/m³ TWA: 10 ppm TWA: 50 mg/m³	IDLH: 250 ppm TWA: 10 ppm TWA: 50 mg/m³ STEL: 15 ppm STEL: 75 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Naphthalene	TWA: 10 ppm TWA: 52 mg/m³ STEL: 15 ppm STEL: 79 mg/m³	TWA: 10 ppm TWA: 50 mg/m³ STEL: 15 ppm STEL: 75 mg/m³	TWA: 10 ppm STEL: 15 ppm Skin

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Long sleeved clothing.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	White
Odor	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	79 - 82 °C / 174.2 - 179.6 °F
Boiling Point/Range	218 °C / 424.4 °F
Flash Point	78 °C / 172.4 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	5.9 vol %
Lower	0.9 vol %
Vapor Pressure	0.08 mbar @ 20 °C
Vapor Density	Not applicable
Specific Gravity	0.990
Solubility	slightly soluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable 526 °C / 978.8 °F
Decomposition Temperature	540 °C
Viscosity	Not applicable
Molecular Formula	C10H8
Molecular Weight	128.17

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Naphthalene	LD50 = 490 mg/kg (Rat) LD50 = 1110 mg/kg (Rat)	LD50 > 20 g/kg (Rabbit) LD50 = 1120 mg/kg (Rabbit)	LC50 > 340 mg/m³ (Rat) 1 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Naphthalene	91-20-3	Group 2B	Reasonably Anticipated	A3	X	Not listed

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity Teratogenic effects have occurred in experimental animals.

STOT - single exposure None known

STOT - repeated exposure Liver Kidney

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Naphthalene	EC50: = 0.4 mg/L, 72h (Skeletonema costatum)	LC50 96 h 1-6.5 mg/L (Pimephales promelas)	EC50 = 0.93 mg/L 30 min EC50 > 20 mg/L 18 h	EC50: 1.09 - 3.4 mg/L, 48h Static (Daphnia magna) EC50: = 1.96 mg/L, 48h Flow through (Daphnia magna) LC50: = 2.16 mg/L, 48h (Daphnia magna)

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Naphthalene	3.3

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Naphthalene - 91-20-3	U165	-

14. Transport information

DOT
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

TDG
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

IATA
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

IMDG/IMO
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Naphthalene	X	X	-	202-049-5	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Naphthalene	91-20-3	>95	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Naphthalene	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Naphthalene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Naphthalene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Naphthalene	91-20-3	Carcinogen	5.8 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Naphthalene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Moderate risk, Grade 2

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class
B3 Combustible liquid
D1B Toxic materials
D2A Very toxic materials



16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 27-Sep-2010
Revision Date 12-Oct-2015
Print Date 12-Oct-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 4.7
Revision Date 12/28/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Nickel

Product Number : 268259
Brand : Aldrich
Index-No. : 028-002-00-7

CAS-No. : 7440-02-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ni
Molecular weight	:	58.69 g/mol
CAS-No.	:	7440-02-0
EC-No.	:	231-111-4
Index-No.	:	028-002-00-7

Hazardous components

Component	Classification	Concentration
Nickel		
	Skin Sens. 1; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nickel/nickel oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Nickel	7440-02-0	TWA	1.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	1.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Foil Colour: white, silver, metallic
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,453 °C (2,647 °F) - lit.
f)	Initial boiling point and boiling range	2,732 °C (4,950 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	1 hPa (1 mmHg) at 1,810 °C (3,290 °F)
l)	Vapour density	No data available
m)	Relative density	8.9 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
acids, Oxidizing agents, Sulphur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminium, Fluorine, Ammonia

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
May cause sensitisation by skin contact.

Germ cell mutagenicity
No data available

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
NTP:	Reasonably anticipated to be a human carcinogen (Nickel)
	Reasonably anticipated to be a human carcinogen (Nickel)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: QR5950000

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 1.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1 mg/l - 48 h

12.2 Persistence and degradability
Not applicable

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Nickel	7440-02-0	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 12/28/2015 Print Date: 05/01/2016

Oxygen Release Compound (ORC®)
MATERIAL SAFETY DATA SHEET (MSDS)

Last Revised: **March 27, 2013**

Section 1 - Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Phone: **949.366.8000**
Fax: **949.366.8090**
E-mail: **info@regenesis.com**

Chemical Description:	**A mixture of Magnesium Peroxide (MgO_2), Magnesium Oxide (MgO), and Magnesium Hydroxide [$Mg(OH)_2$]**
Chemical Family:	**Inorganic Chemical**
Trade Name:	**Oxygen Release Compound (ORC®)**
Product Use:	**Used to remediate contaminated soil and groundwater (environmental applications)**

Section 2 – Chemical Identification

CAS#	Chemical
14452-57-4	**Magnesium Peroxide (MgO_2)**
1309-48-4	**Magnesium Oxide (MgO)**
1309-42-8	**Magnesium Hydroxide [$Mg(OH)_2$]**
7758-11-4	**Dipotassium Phosphate (HK_2O_4P)**
7778-77-0	**Monopotassium Phosphate (H_2KO_4P)**
Assay:	**25-35% Magnesium Peroxide (MgO_2)**

Section 3 - Physical Data	
Melting Point:	**Not Determined (ND)**
Boiling Point:	**ND**
Flash Point:	**Not Applicable (NA)**
Self-Ignition Temperature:	**NA**
Thermal Decomposition:	**Spontaneous Combustion possible at ≈ 150°C**
Density:	**0.6 – 0.8 g/cc**
Solubility:	**Reacts with Water**
pH:	**Approximately 10 in saturated solution**
Appearance:	**White Powder**
Odor:	**None**
Vapor Pressure:	**None**
Hazardous Decomposition Products:	**Not Known**
Hazardous Reactions:	**Hazardous Polymerization will not occur**
Further Information:	**Non-combustible, but will support combustion**

Section 4 – Reactivity Data	
Stability:	**Product is stable unless heated above 150 °C. Magnesium Peroxide reacts with water to slowly release oxygen. Reaction by product is Magnesium Hydroxide**
Conditions to Avoid:	**Heat above 150 °C. Open Flames.**
Incompatibility:	**Strong Acids. Strong Chemical Agents.**
Hazardous Polymerization:	**None known.**

Section 5 - Regulations

Permissible Exposure Limits in Air	**Not Established. Should be treated as a nuisance dust.**

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	**Keep in tightly closed container. Keep away from combustible material.**
Handling:	**Use only in well ventilated areas.**

Personal Protective Equipment (PPE)

Respiratory Protection:	**Recommended (HEPA Filters)**
Hand Protection:	**Wear suitable gloves.**
Eye Protection:	**Use chemical safety goggles.**
Other:	**NA**
Industrial Hygiene:	**Avoid contact with skin and eyes**
Protection Against Fire & Explosion:	**NA**
Disposal:	**Dispose via sanitary landfill per state/local authority**
Further Information:	**Not flammable, but may intensify a fire**
After Spillage/Leakage/Gas Leakage:	**Collect in suitable containers. Wash remainder with copious quantities of water.**
Extinguishing Media:	**NA**
Suitable:	**Carbon Dioxide, dry chemicals, foam**
Further Information:	**Self contained breathing apparatus or approved gas mask should be worn due to small particle size. Use extinguishing media appropriate for surrounding fire.**
First Aid:	**After contact with skin, wash immediately with plenty of water and soap. In case of contact with eyes, rinse immediately with plenty of water and seek medical attention.**

Section 7 – Information on Toxicology

Toxicity Data:	**Not Available**

Section 8 – Information on Ecology

Water Pollution Hazard Raging (WGK):	**0**

Section 9 – Further Information

After the reaction of magnesium peroxide with water to form oxygen, the resulting material, magnesium hydroxide, is mildly basic. The amounts of magnesium oxide (magnesia) and magnesium hydroxide in the initial product have an effect similar to lime, but with lower alkalinity.

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available.

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/23/2019 Version Number 2 Reviewed on 03/23/2019

*
1 Identification

· **Product identifier**

· **Trade name: Perfluorooctanoic Acid (PFOA)**

· **Part number:** N-1588
· **CAS Number:**
335-67-1
· **EC number:**
206-397-9
· **Index number:**
607-704-00-2
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

*
2 Hazard(s) identification

· **Classification of the substance or mixture**


GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.
Repr. 1B H360 May damage fertility or the unborn child.
STOT RE 1 H372 Causes damage to the liver through prolonged or repeated exposure.


GHS05 Corrosion

Eye Dam. 1 H318 Causes serious eye damage.


GHS07

Acute Tox. 4 H302 Harmful if swallowed.
Acute Tox. 4 H332 Harmful if inhaled.

· **Label elements**
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/23/2019 Version Number 2 Reviewed on 03/23/2019

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 1)

· **Hazard pictograms**



GHS05 GHS07 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
perfluorooctanoic acid (PFOA)
· **Hazard statements**
Harmful if swallowed or if inhaled.
Causes serious eye damage.
Suspected of causing cancer.
May damage fertility or the unborn child.
Causes damage to the liver through prolonged or repeated exposure.
· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.
If swallowed: Call a poison center/doctor if you feel unwell.
Rinse mouth.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.
Continue rinsing.
Immediately call a poison center/doctor.
IF exposed or concerned: Get medical advice/attention.
Get medical advice/attention if you feel unwell.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 3
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = *3
Fire = 0
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 2)

· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
335-67-1 perfluorooctanoic acid (PFOA)
· **Identification number(s)**
· **EC number:** 206-397-9
· **Index number:** 607-704-00-2

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
· **After inhalation:**
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Generally the product does not irritate the skin.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Immediately call a doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** Use fire fighting measures that suit the environment.
· **Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Use neutralizing agent.
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.

(Contd. on page 4)

(Contd. of page 3)

· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**
1.1 mg/m³

· **PAC-2:**
12 mg/m³

· **PAC-3:**
75 mg/m³

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Thorough dedusting.
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
· **Information about protection against explosions and fires:** Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Keep receptacle tightly sealed.
· **Specific end use(s)** No further relevant information available.

*
8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**
· **Components with limit values that require monitoring at the workplace:** Not required.
· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes.
Avoid contact with the eyes and skin.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.

(Contd. on page 5)

(Contd. of page 4)

· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.
· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours
· **Eye protection:**



Tightly sealed goggles

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Solid
Color:	Not determined.
· **Odor:**	Characteristic
· **Odor threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	55-56 °C (131-132.8 °F)
Boiling point/Boiling range:	190 °C (374 °F)
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Product is not flammable.
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapor pressure at 20 °C (68 °F):**	0.69 hPa (0.5 mm Hg)
· **Density at 20 °C (68 °F):**	0.9 g/cm³ (7.5105 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not applicable.

(Contd. on page 6)

(Contd. of page 5)

· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with Water at 20 °C (68 °F):**	3.4 g/l
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
VOC content:	0.00 % 0.0 g/l / 0.00 lb/gal
Solids content:	100.0 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

ATE (Acute Toxicity Estimate)

Oral	LD50	500 mg/kg
Inhalative	LC50/4 h	1.5 mg/L

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** Strong irritant with the danger of severe eye injury.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

2B

· **NTP (National Toxicology Program)**

Substance is not listed.

(Contd. on page 7)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 6)

· **OSHA-Ca (Occupational Safety & Health Administration)**

Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (Assessment by list): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Must not reach bodies of water or drainage ditch undiluted or unneutralized.
Danger to drinking water if even small quantities leak into the ground.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **UN-Number**	
· **DOT, IMDG, IATA**	UN3261
· **UN proper shipping name**	
· **DOT**	Corrosive solid, acidic, organic, n.o.s. (perfluorooctanoic acid (PFOA))
· **IMDG, IATA**	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (perfluorooctanoic acid (PFOA))

(Contd. on page 8)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 7)

· **Transport hazard class(es)**

· **IATA**



· **Class**	8 Corrosive substances
· **Label**	8
· **Environmental hazards:**	Not applicable.
· **Special precautions for user**	Warning: Corrosive substances
· **Danger code (Kemler):**	80
· **EMS Number:**	F-A,S-B
· **Segregation groups**	Acids
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 25 kg On cargo aircraft only: 100 kg
· **IMDG**	
· **Limited quantities (LQ)**	5 kg
· **Excepted quantities (EQ)**	Code: E1 Maximum net quantity per inner packaging: 30 g Maximum net quantity per outer packaging: 1000 g
· **UN "Model Regulation":**	UN 3261 CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (PERFLUOROOCTANOIC ACID (PFOA)), 8, III

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**

· **Sara**

· **Section 355 (extremely hazardous substances):**

Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**

Substance is not listed.

· **TSCA (Toxic Substances Control Act):**

Substance is listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**

Substance is not listed.

· **Chemicals known to cause reproductive toxicity for females:**

Substance is not listed.

(Contd. on page 9)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 8)

· **Chemicals known to cause reproductive toxicity for males:**
Substance is not listed.

· **Chemicals known to cause developmental toxicity:**
Substance is listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
Substance is not listed.

· **TLV (Threshold Limit Value established by ACGIH)**
Substance is not listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is not listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

*
16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Date of preparation / last revision** 03/23/2019 / 1

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Acute Tox. 4: Acute toxicity – Category 4
Eye Dam. 1: Serious eye damage/eye irritation – Category 1
Carc. 2: Carcinogenicity – Category 2
Repr. 1B: Reproductive toxicity – Category 1B
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1

· *** Data compared to the previous version altered.**

Safety Data Sheet
acc. to OSHA HCS

Printing date 04/01/2019 Version Number 2 Reviewed on 04/01/2019

*
1 Identification

· **Product identifier**

· **Trade name: PFOA/PFOS Standard (1X1 mL)**

· **Part number:** PFM-100-1
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

*
2 Hazard(s) identification

· **Classification of the substance or mixture**


GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.


GHS06 Skull and crossbones

Acute Tox. 3 H331 Toxic if inhaled.


GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.
Repr. 1B H360 May damage fertility or the unborn child.
STOT SE 1 H370 Causes damage to organs.

· **Label elements**
· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**


GHS02 GHS06 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
methanol
perfluorooctanoic acid (PFOA)
perfluorooctane sulfonic acid (PFOS)

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Trade name: PFOA/PFOS Standard (1X1 mL)

(Contd. of page 1)

· **Hazard statements**
Highly flammable liquid and vapor.
Toxic if inhaled.
Suspected of causing cancer.
May damage fertility or the unborn child.
Causes damage to organs.
· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF exposed or concerned: Get medical advice/attention.
Specific treatment (see on this label).
In case of fire: Use for extinction: CO2, powder or water spray.
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 1
Fire = 3
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = *1
Fire = 3
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** Mixture of the substances listed below with nonhazardous additions.

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Printing date 04/01/2019 Version Number 2 Reviewed on 04/01/2019

Trade name: PFOA/PFOS Standard (1X1 mL)

(Contd. of page 2)

· **Dangerous components:**		
67-56-1	methanol	99.747%
335-67-1	perfluorooctanoic acid (PFOA)	0.126%
1763-23-1	perfluorooctane sulfonic acid (PFOS)	0.126%

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing have been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:**
Supply fresh air or oxygen; call for doctor.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** If symptoms persist consult doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

(Contd. on page 4)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 3)

· **Protective Action Criteria for Chemicals**

· **PAC-1:**		
67-56-1	methanol	530 ppm
335-67-1	perfluorooctanoic acid (PFOA)	1.1 mg/m³

· **PAC-2:**		
67-56-1	methanol	2,100 ppm
335-67-1	perfluorooctanoic acid (PFOA)	12 mg/m³

· **PAC-3:**		
67-56-1	methanol	7200* ppm
335-67-1	perfluorooctanoic acid (PFOA)	75 mg/m³

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
Prevent formation of aerosols.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Protect against electrostatic charges.
Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** Store in a cool location.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep receptacle tightly sealed.
Store in cool, dry conditions in well sealed receptacles.
· **Specific end use(s)** No further relevant information available.

*
8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
67-56-1 methanol	
PEL	Long-term value: 260 mg/m³, 200 ppm
REL	Short-term value: 325 mg/m³, 250 ppm Long-term value: 260 mg/m³, 200 ppm Skin
TLV	Short-term value: 328 mg/m³, 250 ppm Long-term value: 262 mg/m³, 200 ppm Skin; BEI

(Contd. on page 5)

Safety Data Sheet
acc. to OSHA HCS

Trade name: PFOA/PFOS Standard (1X1 mL)

(Contd. of page 4)

· **Ingredients with biological limit values:**

67-56-1 methanol

BEI	15 mg/L Medium: urine Time: end of shift Parameter: Methanol (background, nonspecific)

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.
· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.
· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours
· **Eye protection:**



Tightly sealed goggles

9 Physical and chemical properties

· **Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**

Form:	Fluid
Color:	Colorless
· **Odor:**	Alcohol-like
· **Odor threshold:**	Not determined.
· **pH-value:**	Not determined.

(Contd. on page 6)

(Contd. of page 5)

· **Change in condition**	
Melting point/Melting range:	-98 °C (-144.4 °F)
Boiling point/Boiling range:	64.7 °C (148.5 °F)
· **Flash point:**	9 °C (48.2 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Ignition temperature:**	455 °C (851 °F)
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product is not explosive. However, formation of explosive air/vapor mixtures are possible.
· **Explosion limits:**	
Lower:	5.5 Vol %
Upper:	44 Vol %
· **Vapor pressure at 20 °C (68 °F):**	100 hPa (75 mm Hg)
· **Density at 20 °C (68 °F):**	0.8007 g/cm³ (6.68184 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not determined.
· **Evaporation rate**	Not determined.
· **Solubility in / Miscibility with**	
Water:	Not miscible or difficult to mix.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not determined.
Kinematic:	Not determined.
· **Solvent content:**	
Organic solvents:	99.7 %
VOC content:	99.75 % 798.7 g/l / 6.67 lb/gal
Solids content:	0.3 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

(Contd. on page 7)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 6)

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**		
ATE (Acute Toxicity Estimate)		
Inhalative	LC50/4 h	3.01 mg/L

67-56-1 methanol		
Oral	LD50	5,628 mg/kg (rat)
Dermal	LD50	15,800 mg/kg (rabbit)
1763-23-1 perfluorooctane sulfonic acid (PFOS)		
Oral	LD50	154 mg/kg (rat)

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Toxic

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**		
335-67-1	perfluorooctanoic acid (PFOA)	2B

· **NTP (National Toxicology Program)**
None of the ingredients is listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

(Contd. on page 8)

Safety Data Sheet
acc. to OSHA HCS

Trade name: PFOA/PFOS Standard (1X1 mL)

(Contd. of page 7)

· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*
14 Transport information

· **Not Regulated, De minimus Quantities**	-
· **UN-Number** · **DOT, IMDG, IATA**	UN1230
· **UN proper shipping name** · **DOT** · **IMDG, IATA**	Methanol solution METHANOL solution
· **Transport hazard class(es)**	
· **DOT**	
· **Class** · **Label**	3 Flammable liquids 3, 6.1
· **IMDG**	
· **Class** · **Label**	3 Flammable liquids 3/6.1
· **IATA**	
· **Class** · **Label**	3 Flammable liquids 3 (6.1)
· **Packing group** · **DOT, IMDG, IATA**	II
· **Environmental hazards:**	Not applicable.

(Contd. on page 9)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 8)

· **Special precautions for user**	Warning: Flammable liquids
· **Danger code (Kemler):**	336
· **EMS Number:**	F-E,S-D
· **Stowage Category**	B
· **Stowage Code**	SW2 Clear of living quarters.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 1 L On cargo aircraft only: 60 L
· **IMDG**	
· **Limited quantities (LQ)**	1L
· **Excepted quantities (EQ)**	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· **UN "Model Regulation":**	UN 1230 METHANOL SOLUTION, 3 (6.1), II

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 355 (extremely hazardous substances):**
None of the ingredients is listed.

· **Section 313 (Specific toxic chemical listings):**

67-56-1	methanol

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **TSCA new (21st Century Act): (Substances not listed)**

1763-23-1	perfluorooctane sulfonic acid (PFOS)

· **Proposition 65**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.

· **Chemicals known to cause developmental toxicity:**
All ingredients are listed.

(Contd. on page 10)

Safety Data Sheet
acc. to OSHA HCS

Trade name: PFOA/PFOS Standard (1X1 mL)

(Contd. of page 9)

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**

None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**

None of the ingredients is listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

None of the ingredients is listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Date of preparation / last revision** 04/01/2019 / 1

· **Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Flam. Liq. 2: Flammable liquids – Category 2
Acute Tox. 3: Acute toxicity – Category 3
Carc. 2: Carcinogenicity – Category 2
Repr. 1B: Reproductive toxicity – Category 1B
STOT SE 1: Specific target organ toxicity (single exposure) – Category 1

· *** Data compared to the previous version altered.**

SAFETY DATA SHEET

Section 1. Identification

CHS Inc.
P.O. Box 64089
Mail station 525
St. Paul, MN 55164-0089

Transportation Emergency (CHEMTREC) : **1-800-424-9300**
Technical Information : **1-651-355-8443**
SDS Information : **1-651-355-8445**

Product name	:	Regular, Midgrade & Premium Unleaded Gasoline	**SDS no.**	:	0147- M6A0
Common name	:	Unleaded Gasoline, Premium Unleaded Gasoline	**Revision date**	:	11/15/2013
Chemical name	:	Light Petroleum Distillate	**Chemical formula**	:	Mixture
Chemical family	:	Mixed Petroleum Hydrocarbon			

Relevant identified uses of the substance or mixture and uses advised against

Not available.

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture :
FLAMMABLE LIQUIDS - Category 1
SKIN CORROSION/IRRITATION - Category 2
GERM CELL MUTAGENICITY - Category 1B
CARCINOGENICITY - Category 1A
TOXIC TO REPRODUCTION (Fertility) - Category 2
TOXIC TO REPRODUCTION (Unborn child) - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1
ASPIRATION HAZARD - Category 1
AQUATIC HAZARD (ACUTE) - Category 3
AQUATIC HAZARD (LONG-TERM) - Category 3

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements :
Extremely flammable liquid and vapor.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
Suspected of damaging fertility or the unborn child.
May be fatal if swallowed and enters airways.
May cause drowsiness and dizziness.
Causes damage to organs through prolonged or repeated exposure.
Harmful to aquatic life with long lasting effects.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Hazardous Material Information System (U.S.A.)	**Health :**	2 *	**Flammability :**	4	**Physical hazards :**	0
National Fire Protection Association (U.S.A.)	**Health :**	2	**Flammability :**	4	**Instability :**	0

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Chemical name : Light Petroleum Distillate

Other means of identification : Unleaded Gasoline, Premium Unleaded Gasoline

Ingredient name	%	CAS number
Toluene	10 - 30	108-88-3
Xylene	10 - 30	1330-20-7
Tert-butyl methyl ether	10 - 30	1634-04-4
Benzene	1 - 5	71-43-2
1,2,4-Trimethylbenzene	1 - 5	95-63-6
Ethylbenzene	1 - 5	100-41-4
n-Hexane	1 - 5	110-54-3
Butyl ethyl ether	0.1 - 1	628-81-9
Naphthalene	0.1 - 1	91-20-3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : If material comes in contact with the eyes, immediately wash the eyes with large amounts of water for 15 minutes, occasionally lifting the lower and upper lids. Get medical attention.

Inhalation : If person breathes in large amounts of material, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the person warm and at rest. Get medical attention as soon as possible.

Skin contact : If the material comes in contact with the skin, wash the contaminated skin with soap and water promptly. If the material penetrates through clothing, remove the clothing and wash the skin with soap and water promptly. If irritation persists after washing, get medical attention immediately.

Ingestion : If material has been swallowed, do not induce vomiting. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following: pain or irritation, watering, redness.

Inhalation : Adverse symptoms may include the following: respiratory tract irritation, coughing.

Skin contact : Adverse symptoms may include the following: irritation, redness.

Ingestion : No known significant effects or critical hazards.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet or water-based fire extinguishers.

Specific hazards arising from the chemical : Highly volatile material. Flowing gasoline can be ignited by self-generated static electricity; containers should be bonded and grounded. Vapors may travel along the ground to a source of ignition (pilot light, heater, electric motor) some distance away. Containers, drums (even empty) can explode when heat (welding, cutting, etc.) is applied.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Water may be ineffective on flames, but should be used to keep fire-exposed containers cool. Large fires, such as tank fires, should be fought with caution. If possible, pump the contents from the tank and keep adjoining structures cool and protect personnel. Avoid spreading burning liquid with water used for cooling purposes. Do not flush down public sewers. The use of a self-contained breathing apparatus and protective clothing is recommended for fire fighters. Avoid inhalation of vapors.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Keep unnecessary and unprotected personnel from entering. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Methods and materials for containment and cleaning up

Spill : Contain with dikes or absorbent to prevent migration to sewers/streams. Take up small spill with dry chemical absorbent; large spills may require pump or vacuum prior to absorbent. May require excavation of severely contaminated soil.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking.

Conditions for safe storage, including any incompatibilities : Do not store above the following temperature: 113°C (235.4°F). Odorous and toxic fumes may form from the decomposition of this product if stored at excessive temperatures for extended periods of time. Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Toluene	**NIOSH REL (United States, 6/2009).** STEL: 560 mg/m³ 15 minutes. STEL: 150 ppm 15 minutes. TWA: 375 mg/m³ 10 hours. TWA: 100 ppm 10 hours. **OSHA PEL Z2 (United States, 11/2006).** AMP: 500 ppm 10 minutes. CEIL: 300 ppm TWA: 200 ppm 8 hours. **ACGIH TLV (United States, 3/2012).** TWA: 20 ppm 8 hours.
Xylene	**ACGIH TLV (United States, 3/2012).** STEL: 651 mg/m³ 15 minutes. STEL: 150 ppm 15 minutes. TWA: 434 mg/m³ 8 hours. TWA: 100 ppm 8 hours. **OSHA PEL (United States, 6/2010).** TWA: 100 ppm 8 hours.

	TWA: 435 mg/m³ 8 hours.
Tert-butyl methyl ether	**ACGIH TLV (United States, 1/2005).** TWA: 50 ppm 8 hours. Form: All forms. **ACGIH TLV (United States, 2/2010).** TWA: 50 ppm 8 hours.
Benzene	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** STEL: 8 mg/m³ 15 minutes. STEL: 2.5 ppm 15 minutes. TWA: 1.6 mg/m³ 8 hours. TWA: 0.5 ppm 8 hours. **NIOSH REL (United States, 6/2009).** STEL: 1 ppm 15 minutes. TWA: 0.1 ppm 10 hours. **OSHA PEL (United States, 6/2010).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. **OSHA PEL Z2 (United States, 11/2006).** AMP: 50 ppm 10 minutes. CEIL: 25 ppm TWA: 10 ppm 8 hours.
1,2,4-Trimethylbenzene	**ACGIH TLV (United States, 3/2012).** TWA: 123 mg/m³ 8 hours. TWA: 25 ppm 8 hours. **NIOSH REL (United States, 1/2013).** TWA: 125 mg/m³ 10 hours. TWA: 25 ppm 10 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 25 ppm 8 hours. TWA: 125 mg/m³ 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2012).** TWA: 20 ppm 8 hours. **NIOSH REL (United States, 6/2009).** STEL: 545 mg/m³ 15 minutes. STEL: 125 ppm 15 minutes. TWA: 435 mg/m³ 10 hours. TWA: 100 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 435 mg/m³ 8 hours. TWA: 100 ppm 8 hours.
n-Hexane	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** TWA: 50 ppm 8 hours. **NIOSH REL (United States, 6/2009).** TWA: 180 mg/m³ 10 hours. TWA: 50 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 1800 mg/m³ 8 hours. TWA: 500 ppm 8 hours.
Naphthalene	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** STEL: 79 mg/m³ 15 minutes. STEL: 15 ppm 15 minutes. TWA: 52 mg/m³ 8 hours. TWA: 10 ppm 8 hours. **NIOSH REL (United States, 1/2013).** STEL: 75 mg/m³ 15 minutes. STEL: 15 ppm 15 minutes. TWA: 50 mg/m³ 10 hours. TWA: 10 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 50 mg/m³ 8 hours. TWA: 10 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Recommended: Splash goggles and a face shield, where splash hazard exists.

Skin protection

Hand protection : 4 - 8 hours (breakthrough time): Nitrile gloves.

Body protection : Recommended: Long sleeved coveralls.

Other skin protection : Recommended: Impervious boots.

Respiratory protection : If ventilation is inadequate, use a NIOSH-certified respirator with an organic vapor cartridge and P95 particulate filter.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Reddish golden brown.

Odor : Gasoline

Odor threshold : 10 ppm

pH : Not available.

Melting point : Not available.

Boiling point : 26.66°C (80°F)

Flash point : Closed cup: -40°C (-40°F) [Pensky-Martens.]

Flammability : Not available.

Lower and upper explosive (flammable) limits : Lower: 1.4%
Upper: 7.6%

Relative density : 0.72

Evaporation rate : Slower.

Solubility : Insoluble in the following materials: cold water and hot water.

Solubility in water : Negligible.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : 257.22 to 454.44°C (495 to 850°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not available.

Vapor pressure : 53.3 kPa (400 mm Hg) (68°F)

Vapor density : 4 [Air = 1]

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Toluene	LC50 Inhalation Vapor	Rat	49 g/m³	4 hours
	LD50 Oral	Rat	636 mg/kg	-
Xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
Tert-butyl methyl ether	LC50 Inhalation Gas.	Rat	23576 ppm	4 hours
	LC50 Inhalation Vapor	Rat	41000 mg/m³	4 hours
	LD50 Oral	Rat	>4 g/kg	-
Benzene	LD50 Oral	Rat	930 mg/kg	-
1,2,4-Trimethylbenzene	LC50 Inhalation Vapor	Rat	18000 mg/m³	4 hours
	LD50 Oral	Rat	5 g/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
n-Hexane	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
	LD50 Oral	Rat	15840 mg/kg	-
Butyl ethyl ether	LD50 Oral	Rat	1870 mg/kg	-
Naphthalene	LD50 Dermal	Rabbit	>20 g/kg	-
	LD50 Oral	Rat	490 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Toluene	Eyes - Mild irritant	Rabbit	-	0.5 minutes 100 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Eyes - Mild irritant	Rabbit	-	870 µg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 mg	-
	Skin - Mild irritant	Pig	-	24 hours 250 µL	-
	Skin - Mild irritant	Rabbit	-	435 mg	-
	Skin - Moderate irritant	Rabbit	-	500 mg	-
Xylene	Eyes - Mild irritant	Rabbit	-	87 mg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 mg	-
	Skin - Mild irritant	Rat	-	8 hours 60 µL	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 mg	-
	Skin - Moderate irritant	Rabbit	-	100%	-
Benzene	Eyes - Moderate irritant	Rabbit	-	88 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 mg	-
	Skin - Mild irritant	Rat	-	8 hours 60 µL	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 mg	-
Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 mg	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 mg	-
n-Hexane	Eyes - Mild irritant	Rabbit	-	10 mg	-
Naphthalene	Skin - Mild irritant	Rabbit	-	495 mg	-
	Skin - Severe irritant	Rabbit	-	24 hours 0.05 mL	-

Sensitization

Skin : There is no data available.

Respiratory : There is no data available.

Mutagenicity

There is no data available.

Carcinogenicity

There is no data available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Toluene	-	3	-
Xylene	-	3	-
Tert-butyl methyl ether	-	3	-
Benzene	+	1	Known to be a human carcinogen.
Ethylbenzene	-	2B	-
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

There is no data available.

Teratogenicity

There is no data available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Toluene	Category 3	Not applicable.	Narcotic effects
1,2,4-Trimethylbenzene	Category 3	Not applicable.	Respiratory tract irritation
n-Hexane	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Toluene	Category 2	Not determined	Not determined
Benzene	Category 1	Not determined	Not determined
n-Hexane	Category 2	Not determined	Not determined

Aspiration hazard

Name	Result
Toluene	ASPIRATION HAZARD - Category 1
Benzene	ASPIRATION HAZARD - Category 1
n-Hexane	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Dermal contact. Eye contact. Inhalation. Ingestion.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Toluene	Acute EC50 433 ppm Marine water	Algae - Skeletonema costatum	96 hours
	Acute EC50 12500 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 11600 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus - Adult	48 hours
	Acute EC50 6000 µg/l Fresh water	Daphnia - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	Acute LC50 5500 µg/l Fresh water	Fish - Oncorhynchus kisutch - Fry	96 hours
	Chronic NOEC 500000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Daphnia - Daphnia magna	21 days
Xylene	Acute IC50 10 mg/L	Algae	72 hours
	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Tert-butyl methyl ether	Acute LC50 672000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Benzene	Acute EC50 29000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1360000 µg/l Fresh water	Algae - Scenedesmus abundans	96 hours
	Acute EC50 9230 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 21000 µg/l Marine water	Crustaceans - Artemia salina - Nauplii	48 hours
	Acute LC50 5.28 ul/L Fresh water	Fish - Oncorhynchus gorbuscha - Fry	96 hours
	Chronic NOEC 1.5 to 5.4 ul/L Marine water	Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)	4 weeks
1,2,4-Trimethylbenzene	Acute LC50 4910 µg/l Marine water	Crustaceans - Elasmopus pectenicrus - Adult	48 hours
	Acute LC50 22.4 mg/L Fresh water	Fish - Tilapia zillii	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 2970 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 5200 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
n-Hexane	Acute LC50 113000 µg/l Fresh water	Fish - Oreochromis mossambicus	96 hours
Naphthalene	Acute EC50 1600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours

Persistence and degradability

There is no data available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Toluene	2.73	90	low
Xylene	3.12	8.1 to 25.9	low
Tert-butyl methyl ether	1.04	1.5	low
Benzene	2.13	11	low
1,2,4-Trimethylbenzene	3.63	243	low
Ethylbenzene	3.6	-	low
n-Hexane	4	501.187	high
Butyl ethyl ether	2.03	-	low
Naphthalene	3.4	36.5 to 168	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : There is no data available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Section 14. Transport information

DOT IDENTIFICATION NUMBER UN1203 **DOT proper shipping name** GASOLINE (Toluene, Xylene) RQ (Benzene, Xylene)

DOT Hazard Class(es) 3 **PG** I **DOT EMER. RESPONSE GUIDE NO.** 128

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) PAIR**: Naphthalene
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Water Act (CWA) 307: Toluene; Benzene; Ethylbenzene; Naphthalene
Clean Water Act (CWA) 311: Toluene; Xylene; Benzene; Ethylbenzene; Naphthalene

Clean Air Act Section 602 Class I Substances : Not listed
Clean Air Act Section 602 Class II Substances : Not listed
Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Listed

DEA List I Chemicals (Precursor Chemicals) : Not listed
DEA List II Chemicals (Essential Chemicals) : Listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Toluene	10 - 30	Yes.	No.	No.	Yes.	Yes.
Xylene	10 - 30	Yes.	No.	No.	Yes.	No.
Tert-butyl methyl ether	10 - 30	Yes.	No.	No.	Yes.	No.
Benzene	1 - 5	Yes.	No.	No.	Yes.	Yes.
1,2,4-Trimethylbenzene	1 - 5	Yes.	No.	No.	Yes.	No.
Ethylbenzene	1 - 5	Yes.	No.	No.	Yes.	Yes.
n-Hexane	1 - 5	Yes.	No.	No.	Yes.	Yes.
Butyl ethyl ether	0.1 - 1	Yes.	No.	No.	Yes.	No.
Naphthalene	0.1 - 1	No.	No.	No.	Yes.	Yes.

SARA 313 : This product (does/not) contain toxic chemicals subject to the reporting requirements of SARA Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372.

Product name	CAS number	%
Toluene	108-88-3	Up to 18.1
Xylene	1330-20-7	Up to 15.3
Benzene	71-43-2	Up to 5.3
1,2,4-Trimethylbenzene	95-63-6	Up to 4.8
Ethylbenzene	100-41-4	Up to 2.6
n-Hexane	110-54-3	Up to 4
Naphthalene	91-20-3	Up to 1

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether

New York : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; Ethylbenzene; n-Hexane; Naphthalene

New Jersey : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether; Naphthalene

Pennsylvania : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether; Naphthalene

California Prop. 65 : **WARNING:** This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Toluene	No.	Yes.	No.	7000 µg/day (ingestion) 13000 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Naphthalene	Yes.	No.	Yes.	No.

Section 16. Other information

Revision date : 11/15/2013 **Supersedes** : 01/23/2013

Revised Section(s) : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16. **Prepared by** : KMK Regulatory Services Inc.

Notice to reader
THE INFORMATION CONTAINED IN THIS SDS RELATES ONLY TO THE SPECIFIC MATERIAL IDENTIFIED. IT DOES NOT COVER USE OF THAT MATERIAL IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PARTICULAR PROCESS. IN COMPLIANCE WITH 29 C.F.R. 1910.1200(g), CHS HAS PREPARED THIS SDS IN SEGMENTS, WITH THE INTENT THAT THOSE SEGMENTS BE READ TOGETHER AS A WHOLE WITHOUT TEXTUAL OMISSIONS OR ALTERATIONS. CHS BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE, BUT MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESS OR IMPLIED, ABOUT THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THE INFORMATION OR ABOUT THE FITNESS OF CONTENTS HEREIN FOR EITHER GENERAL OR PARTICULAR PURPOSES. PERSONS REVIEWING THIS SDS SHOULD MAKE THEIR OWN DETERMINATION AS TO THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATIONS.

CENEX®
OUR ENERGY COMES THROUGH®

A BRAND OF CHS®

SAFETY DATA SHEET

SILVER

Section 1. Identification

GHS product identifier	:	SILVER
Chemical name	:	Mixture
CAS number	:	Mixture
Other means of identification	:	CC01054908
Product type	:	liquid

Relevant identified uses of the substance or mixture and uses advised against

Product use	:	Industrial applications. Plastics.
Supplier's details	:	**POLYONE CORPORATION** ColorMatrix Group Inc. 680 North Rocky River Drive, Berea, Ohio, 44017-1628, USA +1 216 622 0100
Emergency telephone number (with hours of operation)	:	**CHEMTREC 1-800-424-9300 (24hrs for spill, leak, fire, exposure or accident).**

Section 2. Hazards identification

This mixture has not been evaluated as a whole for health effects. Information provided on health effects of this product is based on the individual components. However, some vapors or contaminants may be released upon heating and the end-user (fabricator) must take the necessary precautions (mechanical ventilation, respiratory protection, etc.) to protect employees from exposure. See sections 8 and 11 for special precautions. After handling, always wash hands thoroughly with soap and water.

OSHA/HCS status	:	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	:	SKIN CORROSION/IRRITATION - Category 2

GHS label elements

Hazard pictograms :



Signal word : Warning
Hazard statements : Causes skin irritation.

Precautionary statements

General : Not applicable.
Prevention : Wear protective gloves. Wash hands thoroughly after handling.
Response : IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention.
Storage : Not applicable.
Disposal : Not applicable.
Supplemental label elements : None known.
Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Chemical name : Mixture
Other means of identification : CC01054908

CAS number/other identifiers

Ingredient name	%	CAS number
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	Not available.
Titanium dioxide	10 - 30	13463-67-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	:	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	:	Causes serious eye irritation.
Inhalation	:	No known significant effects or critical hazards.
Skin contact	:	Causes skin irritation.
Ingestion	:	Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact	:	Adverse symptoms may include the following: pain or irritation

watering
redness

Inhalation	:	No specific data.
Skin contact	:	Adverse symptoms may include the following: irritation redness
Ingestion	:	No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	:	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	:	No specific treatment.
Protection of first-aiders	:	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media	:	In case of fire, use water spray (fog), foam, dry chemical or CO_2.
Unsuitable extinguishing media	:	None known.
Specific hazards arising from the chemical	:	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	:	Decomposition products may include the following materials: carbon dioxide carbon monoxide metal oxide/oxides
Special protective actions for fire-fighters	:	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	:	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	:	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	:	If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	:	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill	:	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	:	Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	:	Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene	:	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
Conditions for safe storage, including any incompatibilities	:	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Titanium dioxide	**OSHA PEL 1989 (1989-03-01)** PEL: Permissible Exposure Level 10 mg/m3 Form: Total dust **OSHA PEL (1993-06-30)** PEL: Permissible Exposure Level 15 mg/m3 Form: Total dust **ACGIH TLV (1996-05-18)** TLV-TWA: Threshold Limit Value - Time weighted average PEL: Permissible Exposure Level 10 mg/m3

Appropriate engineering controls	:	Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
Environmental exposure controls	:	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures	:	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated

clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : liquid [liquid]
Color : SILVER
Odor : Faint odor.
Odor threshold : Not available.
pH : Not available.
Melting point : Not available.
Boiling point : Not available.
Flash point : Not available.
Burning time : Not available.

Burning rate	:	Not available.
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	**Lower:** Not available. **Upper:** Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Relative density	:	Not available.
Solubility	:	Not available.
Solubility in water	:	insoluble in water.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	**Dynamic:** Not available. **Kinematic:** Not available.

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	Stable under recommended storage and handling conditions (see Section 7).
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Keep away from extreme heat and oxidizing agents.
Incompatible materials	:	Keep away from strong acids. Oxidizer.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

This mixture has not been evaluated as a whole for health effects. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Titanium dioxide				

	LC50 Inhalation	Rat - Male	6.82 Mg/l	4 h
	LD50 Dermal	Rabbit	> 5,000 mg/kg	-

Conclusion/Summary : Mixture.Not fully tested.

Irritation/Corrosion

Conclusion/Summary
Skin : Mixture.Not fully tested.
Eyes : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Sensitization

Conclusion/Summary
Skin : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Mutagenicity

Conclusion/Summary : Mixture.Not fully tested.

Carcinogenicity

Conclusion/Summary : Mixture.Not fully tested.

Classification

Product/ingredient name	OSHA	IARC	NTP
Titanium dioxide		2B	

Reproductive toxicity

Conclusion/Summary : Mixture.Not fully tested.

Teratogenicity

Conclusion/Summary : Mixture.Not fully tested.

Specific target organ toxicity (single exposure)
Not available.

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard

Product/ingredient name	Result

Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.
Inhalation : No known significant effects or critical hazards.
Skin contact : Causes skin irritation.
Ingestion : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness
Inhalation : No specific data.
Skin contact : Adverse symptoms may include the following:
irritation
redness
Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

Conclusion/Summary : Mixture.Not fully tested.

General : No known significant effects or critical hazards.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (dusts and mists)	8.073 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Titanium dioxide			
	Acute LC50 > 1,000,000 µg/l Marine water	Fish - Mummichog	96 h
	Acute LC50 > 1,000 mg/l Fresh water	Fish - Fathead minnow	96 h
	Acute LC50 13 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute LC50 6.5 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 19.3 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 27.8 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 35.306 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h

Conclusion/Summary : Not available.

Persistence and degradability

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
Titanium dioxide		352.00	low

Mobility in soil

Soil/water partition coefficient (KOC)	:	Not available.
Other adverse effects	:	No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Acute hazardous waste "P" List: Not listed

United States - RCRA Toxic hazardous waste "U" List: Not listed

Section 14. Transport information

U.S. DOT Classification	:	Not regulated for transportation.
ICAO/IATA	:	Not classified as dangerous good under transport regulations.
IMO/IMDG (maritime)	:	Not classified as dangerous good under transport regulations.

Section 15. Regulatory information

U.S. Federal regulations : **United States - TSCA 12(b) - Chemical export notification:** None of the components are listed.
United States - TSCA 4(a) - Final Test Rules: Not listed
United States - TSCA 4(a) - ITC Priority list: Not listed
United States - TSCA 4(a) - Proposed test rules: Not listed

United States - TSCA 4(f) - Priority risk review: Not listed
United States - TSCA 5(a)2 - Final significant new use rules: Not listed
United States - TSCA 5(a)2 - Proposed significant new use rules: Not listed
United States - TSCA 5(e) - Substances consent order: Not listed
United States - TSCA 6 - Final risk management: Not listed
United States - TSCA 6 - Proposed risk management: Not listed
United States - TSCA 8(a) - Chemical risk rules: Not listed
United States - TSCA 8(a) - Dioxin/Furane precusor: Not listed
United States - TSCA 8(a) - Chemical Data Reporting (CDR): Not determined
United States - TSCA 8(a) - Preliminary assessment report (PAIR): Not listed
United States - TSCA 8(c) - Significant adverse reaction (SAR): Not listed
United States - TSCA 8(d) - Health and safety studies: Not listed
United States - EPA Clean water act (CWA) section 307 - Priority pollutants: Listed **Chromium (III) oxide**

United States - EPA Clean water act (CWA) section 311 - Hazardous substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Flammable substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Toxic substances: Not listed
United States - Department of commerce - Precursor chemical: Not listed

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	:	Not listed
Clean Air Act Section 602 Class I Substances	:	Not listed
Clean Air Act Section 602 Class II Substances	:	Not listed
DEA List I Chemicals (Precursor Chemicals)	:	Not listed
DEA List II Chemicals (Essential Chemicals)	:	Not listed

US. EPA CERCLA Hazardous Substances (40 CFR 302)

not applicable

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Classification
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	AH
Titanium dioxide	10 - 30	CH

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Aluminum	7429-90-5	1 - 5
Supplier notification	Aluminum	7429-90-5	1 - 5

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed:
Mica
Titanium dioxide
Aluminum

New York : None of the components are listed.

New Jersey : The following components are listed:
Mica
Titanium dioxide
Aluminum

Pennsylvania : The following components are listed:
Titanium dioxide
Aluminum

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada inventory : All components are listed or exempted.

International regulations

International lists	:	**Australia inventory (AICS):** Not determined. **Taiwan inventory (CSNN):** Not determined. **Malaysia Inventory (EHS Register):** Not determined. **EINECS:** All components are listed or exempted. **Japan inventory:** Not determined. **China inventory (IECSC):** All components are listed or exempted. **Korea inventory:** All components are listed or exempted. **New Zealand Inventory of Chemicals (NZIoC):** Not determined. **Philippines inventory (PICCS):** All components are listed or exempted.
Chemical Weapons Convention List Schedule I Chemicals	:	Not listed
Chemical Weapons Convention List Schedule II Chemicals	:	Not listed
Chemical Weapons Convention List Schedule III Chemicals	:	Not listed

Section 16. Other information

History

Date of printing	:	06/04/2015
Date of issue/Date of revision	:	06/03/2015
Date of previous issue	:	11/20/2014
Version	:	1.1
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	:	Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution.

Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Particularly this information may not be valid for such material used in conjunction with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

1. Identification

Product identifier: Trichloroethylene

Other means of identification
Product No.: 9464, 8600, 9458, 9454

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	
	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard Classification

Health Hazards

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2A
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1B
Specific Target Organ Toxicity - Single Exposure	Category 3

Environmental Hazards

Chronic hazards to the aquatic environment	Category 3

Label Elements

Hazard Symbol:



Signal Word: Danger

Hazard Statement: May cause cancer.
Suspected of causing genetic defects.
Causes serious eye irritation.
Causes skin irritation.
Harmful to aquatic life with long lasting effects.

Precautionary Statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid release to the environment.

Response: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse. Call a POISON CENTER or doctor/physician if you feel unwell. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
TRICHLOROETHYLENE		79-01-6	99 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Rinse mouth. Get medical attention if symptoms occur. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention if symptoms persist. If breathing stops, provide artificial respiration.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation persists after washing. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if irritation persists after washing.

Most important symptoms/effects, acute and delayed

Symptoms: Irritating to eyes, respiratory system and skin.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical: Contact with metals may evolve flammable hydrogen gas. Fire may produce irritating, corrosive and/or toxic gases.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Keep unauthorized personnel away. Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental Precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling: Use personal protective equipment as required. Do not breathe mist or vapor. Do not taste or swallow. Do not eat, drink or smoke when using the product. Use only with adequate ventilation. Wash hands thoroughly after handling. See Section 8 of the MSDS for Personal Protective Equipment. Avoid contact with eyes. Avoid contact with skin. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing dust/fume/gas/mist/vapors/spray. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities: Store locked up. Keep in a cool, well-ventilated place. Store in a dry place.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	Type	Exposure Limit Values	Source
TRICHLOROETHYLENE	TWA	10 ppm	US. ACGIH Threshold Limit Values (2011)
	STEL	25 ppm	US. ACGIH Threshold Limit Values (2011)
	REL	25 ppm	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	TWA	50 ppm 270 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	200 ppm 1,080 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	100 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	Ceiling	200 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	MAX. CONC	300 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	AN ESL	54 µg/m3	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (12 2010)

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
TRICHLOROETHYLENE (Trichloroacetic acid: Sampling time: End of shift at end of work week.)	15 mg/l (Urine)	ACGIH BEL (03 2013)
TRICHLOROETHYLENE (Trichloroethanol, without hydrolysis: Sampling time: End of shift at end of work week.)	0.5 mg/l (Blood)	ACGIH BEL (03 2013)

Appropriate Engineering Controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin Protection

Hand Protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory Protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Observe good industrial hygiene practices. Wash hands before breaks and immediately after handling the product. Do not eat, drink or smoke when using the product. Wash contaminated clothing before reuse.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Ether-like odor
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	-84.7 °C
Initial boiling point and boiling range:	87.2 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	10.5 %(V) 90 %(V)
Flammability limit - lower (%):	8 %(V) 12.5 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	9.2 kPa (25 °C)
Vapor density:	4.53 AIR=1
Relative density:	1.47 (20 °C)
Solubility(ies)	
Solubility in water:	1 g/l (20 °C)
Solubility (other):	acetone: Soluble ethanol: Soluble
Partition coefficient (n-octanol/water):	2.61
Auto-ignition temperature:	420 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.

Other information

Molecular weight:	131.39 g/mol (C_2HCl_3)

10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.

Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur.
Conditions to Avoid:	Heat, sparks, flames. Light. Moisture. Contact with incompatible materials.
Incompatible Materials:	Strong oxidizing agents. Alkalies. Caustics. Chemically active metals.
Hazardous Decomposition Products:	By heating and fire, toxic vapors/gases may be formed. Oxides of Carbon. Phosgene.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	May be harmful if swallowed.
Inhalation:	May be harmful if inhaled.
Skin Contact:	Causes skin irritation.
Eye contact:	Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 4,920 mg/kg

Dermal
Product: No data available.

Inhalation
Product: LC 50 (Rat, 4 h): 12000 ppm

Repeated Dose Toxicity
Product: No data available.

Skin Corrosion/Irritation
Product: Causes skin irritation.

Serious Eye Damage/Eye Irritation
Product: Causes serious eye irritation.

Respiratory or Skin Sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: May cause cancer.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

TRICHLOROETHYLENE	Overall evaluation: 1. Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

TRICHLOROETHYLENE	Reasonably Anticipated to be a Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: Suspected of causing genetic defects.

In vivo
Product: Suspected of causing genetic defects.

Reproductive Toxicity
Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure
Product: May cause respiratory irritation. May cause drowsiness or dizziness.

Specific Target Organ Toxicity - Repeated Exposure
Product: No data available.

Aspiration Hazard
Product: Not classified

Other Effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE — LC 50 (Fathead minnow (Pimephales promelas), 96 h): 31.4 - 71.8 mg/l Mortality
LC 50 (Bluegill (Lepomis macrochirus), 96 h): 39 - 54 mg/l Mortality
EC 50 (Fathead minnow (Pimephales promelas), 96 h): 18.4 - 28.5 mg/l Intoxication

Aquatic Invertebrates
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE — LC 50 (Water flea (Daphnia magna), 48 h): 12 - 26 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation
Product: There are no data on the degradability of this product.

BOD/COD Ratio
Product: No data available.

Bioaccumulative Potential
Bioconcentration Factor (BCF)
Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)
Product: Log Kow: 2.61

Mobility in Soil: The product is water soluble and may spread in water systems.

Other Adverse Effects: Harmful to aquatic life with long lasting effects.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated Packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN Number:	UN 1710
UN Proper Shipping Name:	Trichloroethylene
Transport Hazard Class(es)	
Class(es):	6.1
Label(s):	6.1
Packing Group:	III
Marine Pollutant:	No

IMDG

UN Number:	UN 1710
UN Proper Shipping Name:	TRICHLOROETHYLENE
Transport Hazard Class(es)	
Class(es):	6.1
Label(s):	6.1
EmS No.:	F-A, S-A
Packing Group:	III
Marine Pollutant:	No

IATA

UN Number:	UN 1710
Proper Shipping Name:	Trichloroethylene
Transport Hazard Class(es):	
Class(es):	6.1
Label(s):	6.1
Marine Pollutant:	No
Packing Group:	III

15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

X	Acute (Immediate)	X	Chronic (Delayed)		Fire		Reactive		Pressure Generating

SARA 302 Extremely Hazardous Substance
None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

Chemical Identity	RQ
TRICHLOROETHYLENE	100 lbs.

SARA 311/312 Hazardous Chemical

Chemical Identity	Threshold Planning Quantity
TRICHLOROETHYLENE	500 lbs

SARA 313 (TRI Reporting)

Chemical Identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
TRICHLOROETHYLENE	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65
TRICHLOROETHYLENE Carcinogenic.
TRICHLOROETHYLENE Male reproductive toxin.
TRICHLOROETHYLENE Developmental toxin.

US. New Jersey Worker and Community Right-to-Know Act
TRICHLOROETHYLENE Listed

US. Massachusetts RTK - Substance List
TRICHLOROETHYLENE Listed

US. Pennsylvania RTK - Hazardous Substances
TRICHLOROETHYLENE Listed

US. Rhode Island RTK
TRICHLOROETHYLENE Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	Not in compliance with the inventory.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan ISHL Listing:	On or in compliance with the inventory
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue Date:	01-08-2015
Revision Date:	No data available.
Version #:	1.1
Further Information:	No data available.

Disclaimer:

THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED “AS IS,” AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION<(>,<)> WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.

SAFETY DATA SHEET

Creation Date 10-Dec-2009 **Revision Date** 06-Nov-2015 **Revision Number** 2

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **AC167890000; AC167890010; AC167890025; AC167890100; AC167891000; AC167895000**

Synonyms Perchloroethylene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. . May cause allergic skin reaction. Inhalation of high vapor

concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products
Chlorine Hydrogen chloride gas Phosgene
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing.

Environmental Precautions Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Use only under a chemical fume hood. Wear personal protective equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m^3 Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Tetrachloroethylene	TWA: 25 ppm TWA: 170 mg/m³ STEL: 100 ppm STEL: 685 mg/m³	TWA: 100 ppm TWA: 670 mg/m³ TWA: 200 ppm TWA: 1250 mg/m³ STEL: 200 ppm STEL: 1340 mg/m³	TWA: 25 ppm STEL: 100 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C2 Cl4
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines

Hazardous Decomposition Products Chlorine, Hydrogen chloride gas, Phosgene

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization May cause sensitization by skin contact

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)

STOT - repeated exposure Kidney Liver Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest

pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

Other Adverse Effects Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.88

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No	UN1897
Proper Shipping Name	TETRACHLOROETHYLENE
Hazard Class	6.1
Packing Group	III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Tetrachloroethylene	127-18-4	>95	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Tetrachloroethylene	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Tetrachloroethylene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Tetrachloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant Y
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D1B Toxic materials
D2A Very toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 10-Dec-2009
Revision Date 06-Nov-2015
Print Date 06-Nov-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

1. Identification

Product identifier: TOLUENE

Other means of identification
Product No.: 9457, 4483, V560, 8604, 9476, 9466, 9460, 9456, 9364, 9351, 9336, 8608

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Physical hazards

Flammable liquids	Category 2

Health hazards

Acute toxicity (Oral)	Category 4
Acute toxicity (Inhalation - vapor)	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Toxic to reproduction	Category 2
Specific target organ toxicity - single exposure	Category 3
Specific target organ toxicity - repeated exposure	Category 2
Aspiration hazard	Category 1

Environmental hazards

Acute hazards to the aquatic environment	Category 2

Label elements

Hazard symbol:



Signal word: Danger

Hazard statement:
Highly flammable liquid and vapor.
Harmful if swallowed or if inhaled.
Causes skin irritation.
Causes serious eye irritation.
Suspected of damaging fertility or the unborn child.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
May cause damage to organs through prolonged or repeated exposure.
Toxic to aquatic life.

Precautionary statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment.

Response: In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction. IF exposed or concerned: Get medical advice/attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting.

Storage: Store locked up. Store in a well-ventilated place. Keep cool. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.

3. Composition/information on ingredients

Substances

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
TOLUENE		108-88-3	99 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Call a physician or poison control center immediately. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention immediately.

Skin contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Most important symptoms/effects, acute and delayed

Symptoms: Harmful if swallowed. May be fatal if swallowed. Harmful if inhaled. Irritating to eyes, respiratory system and skin.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Specific hazards arising from the chemical: Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Prevent buildup of vapors or gases to explosive concentrations.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out. Water may be ineffective in fighting the fire. Fight fire from a protected location. Move containers from fire area if you can do so without risk.

Special protective equipment for fire-fighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Keep upwind. Use personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. See Section 8 of the MSDS for Personal Protective Equipment.
Methods and material for containment and cleaning up:	Eliminate all ignition sources if safe to do so. Take precautionary measures against static discharges. Stop leak if possible without any risk. Use only non-sparking tools. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.
Notification Procedures:	Prevent entry into waterways, sewer, basements or confined areas. Inform authorities if large amounts are involved.
Environmental precautions:	Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling:	DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Wear protective gloves/protective clothing/eye protection/face protection. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Wash hands thoroughly after handling.
Conditions for safe storage, including any incompatibilities:	Keep away from food, drink and animal feeding stuffs. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values		Source
TOLUENE	TWA	20 ppm		US. ACGIH Threshold Limit Values (2011)
	STEL	150 ppm	560 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	REL	100 ppm	375 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	TWA	100 ppm	375 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	150 ppm	560 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	200 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	Ceiling	300 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	MAX. CONC	500 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)

Biological limit values

Chemical identity	Exposure Limit values	Source
TOLUENE (o-Cresol, with hydrolysis: Sampling time: End of shift.)	0.3 mg/g (Creatinine in urine)	ACGIH BEL (2011)
TOLUENE (toluene: Sampling time: Prior to last shift of work week.)	0.02 mg/l (Blood)	ACGIH BEL (2011)
TOLUENE (toluene: Sampling time: End of shift.)	0.03 mg/l (Urine)	ACGIH BEL (2011)

Appropriate engineering controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area. Use explosion-proof ventilation equipment.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Sweet aromatic odor
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	-94.9 °C
Initial boiling point and boiling range:	110 °C
Flash Point:	4 °C (Closed Cup)
Evaporation rate:	2.24 (butyl acetate=1)
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	7.1 %(V)
Flammability limit - lower (%):	1.1 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	3.8 kPa (25 °C)
Vapor density:	3.1 AIR=1
Relative density:	0.86 (20 °C)
Solubility(ies)	
Solubility in water:	0.7 g/l (23.3 °C)
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	2.73
Auto-ignition temperature:	480 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.

Other information

Molecular weight:	92.14 g/mol (C7H8)

10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of normal use.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Heat, sparks, flames.
Incompatible materials:	Strong oxidizing agents. Chlorine.
Hazardous decomposition products:	Thermal decomposition may release oxides of carbon.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Harmful if swallowed.
Inhalation:	Harmful if inhaled. May cause irritation to the mucous membranes and upper respiratory tract.

Skin contact: Causes skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 636 mg/kg

Dermal
Product: LD 50 (Rabbit): 12,124 mg/kg

Inhalation
Product: LC 50 (Mouse, 24 h): 400 mg/l
LC 50 (Rat, 4 h): 8,000 mg/l

Repeated dose toxicity
Product: No data available.

Skin corrosion/irritation
Product: Causes skin irritation.

Serious eye damage/eye irritation
Product: Causes serious eye irritation.

Respiratory or skin sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ cell mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: May damage fertility or the unborn child.

Specific target organ toxicity - single exposure
Product: Narcotic effect. Respiratory tract irritation.

Specific target organ toxicity - repeated exposure
Product: Peripheral nervous system Central nervous system. Kidneys. auditory organs

Aspiration hazard
Product: May be fatal if swallowed and enters airways.

Other effects: No data available.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: No data available.

Specified substance(s):

TOLUENE — LC 50 (Fathead minnow (Pimephales promelas), 96 h): 12.6 mg/l Mortality
LC 50 (Coho salmon,silver salmon (Oncorhynchus kisutch), 96 h): 5.5 mg/l Mortality

Aquatic invertebrates

Product: No data available.

Specified substance(s):

TOLUENE — EC 50 (Brine shrimp (Artemia sp.), 24 h): 22.1 - 54.1 mg/l Intoxication
EC 50 (Water flea (Daphnia magna), 48 h): 5.46 - 9.83 mg/l Intoxication

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and degradability

Biodegradation

Product: Expected to be readily biodegradable.

BOD/COD ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration factor (BCF)

Product: Bioaccumulation is unlikely to be significant because of the low water solubility of this product.

Partition coefficient n-octanol / water (log Kow)

Product: Log Kow: 2.73

Mobility in soil: The product is insoluble in water and will spread on the water surface.

Other adverse effects: Toxic to aquatic organisms.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number:	UN 1294
UN proper shipping name:	Toluene
Transport hazard class(es)	
Class(es):	3
Label(s):	3
Packing group:	II
Marine Pollutant:	No

IMDG

UN number:	UN 1294
UN proper shipping name:	TOLUENE
Transport hazard class(es)	
Class(es):	3
Label(s):	3
EmS No.:	F-E, S-D
Packing group:	II
Marine Pollutant:	No

IATA

UN number:	UN 1294
Proper Shipping Name:	Toluene
Transport hazard class(es):	
Class(es):	3
Label(s):	3
Marine Pollutant:	No
Packing group:	II

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

TOLUENE Reportable quantity: 1000 lbs.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

[X] Acute (Immediate) [X] Chronic (Delayed) [X] Fire [ ] Reactive [ ] Pressure Generating

SARA 302 Extremely hazardous substance

None present or none present in regulated quantities.

SARA 304 Emergency release notification

Chemical identity	RQ
TOLUENE	1000 lbs.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
TOLUENE	500 lbs

SARA 313 (TRI reporting)

Chemical identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
TOLUENE	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

TOLUENE Reportable quantity: 1000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

US state regulations

US. California Proposition 65

TOLUENE Developmental toxin.
TOLUENE Female reproductive toxin.

US. New Jersey Worker and Community Right-to-Know Act

TOLUENE Listed

US. Massachusetts RTK - Substance List

TOLUENE Listed

US. Pennsylvania RTK - Hazardous Substances

TOLUENE Listed

US. Rhode Island RTK

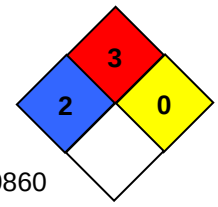
TOLUENE Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EU EINECS List:	On or in compliance with the inventory
EU ELINCS List:	Not in compliance with the inventory.
Japan (ENCS) List:	On or in compliance with the inventory
EU No Longer Polymers List:	Not in compliance with the inventory.
China Inv. Existing Chemical Substances:	On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Switzerland Consolidated Inventory:	Not in compliance with the inventory.
Japan ISHL Listing:	On or in compliance with the inventory
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Flammability
Health

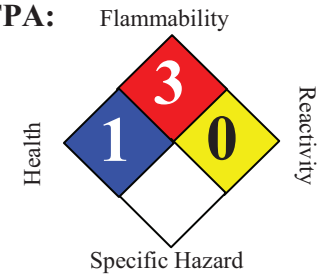

Reactivity
Special hazard.

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date:	06-12-2014
Revision date:	No data available.
Version #:	1.0
Further information:	No data available.
Disclaimer:	THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED “AS IS,” AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION<(>,<)> WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.

Safety Data Sheet
Gasoline, Unleaded

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Gasoline, Unleaded			
Synonyms	:	Blend of Highly Flammable Petroleum Distillates, Regular, Mid-Grade, Premium, 888100008809			
SDS Number	:	888100008809	**Version**	:	1.1
Product Use Description	:	Fuel			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications :
Flammable Liquid – Category 1 or 2 depending on formulation.
Aspiration Hazard – Category 1
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Skin Irritation – Category 2
Eye Irritation – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms :



Signal Word : **Danger**

Hazard Statements

Extremely flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing blood cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by repeated and prolonged inhalation or skin contact. Causes eye irritation. Can be absorbed through skin.
May cause drowsiness or dizziness. Extreme exposure such as intentional inhalation may cause unconsciousness, asphyxiation and death.
Repeated or prolonged skin contact can cause irritation and dermatitis.

Harmful to aquatic life.

Precautionary statements

Prevention : Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response : In case of fire: Use dry chemical, CO2, water spray or fire fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage : Store in a well ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers. Some containers not approved for gasoline may dissolve and release flammable gasoline liquid and vapors.

Disposal : Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Gasoline, natural; Low boiling point naphtha	8006-61-9	10 - 30%
Toluene	108-88-3	10 - 30%
Xylene	1330-20-7	10 - 30%
Ethanol; ethyl alcohol	64-17-5	0-8.2%
Trimethylbenzene	25551-13-7	1 - 5%
Isopentane; 2-methylbutane	78-78-4	1 - 5%

Naphthalene	91-20-3	1 - 5%
Benzene	71-43-2	Less than 1.3%
Pentane	109-66-0	1 - 5%
Cyclohexane	110-82-7	1 - 5%
Ethylbenzene	100-41-4	1 - 5%
Butane	106-97-8	1 - 20%
Heptane [and isomers]	142-82-5	0.5 - 0.75%
N-hexane	110-54-3	0.5 - 0.75%

SECTION 4. FIRST AID MEASURES

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Contaminated leather, particularly footwear, must be discarded. Note that contaminated clothing may be a fire hazard. Seek medical advice if symptoms persist or develop.

Eye contact : Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Obtain medical attention.

Notes to physician : Symptoms: Dizziness, Discomfort, Headache, Nausea, Kidney disorders, Liver disorders. Aspiration may cause pulmonary edema and pneumonitis. Swallowing gasoline is more likely to be fatal for small children than adults, even if aspiration does not occur.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray or fire fighting foam. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers. Keep containers and surroundings cool with water spray.

Specific hazards during fire fighting : Extremely flammable liquid and vapor. This material is combustible/flammable and is sensitive to fire, heat, and static discharge.

Special protective equipment for fire-fighters : Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Further information	:	Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam. Exposure to decomposition products may be a hazard to health. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Evacuate personnel to safe areas. Ventilate the area. Remove all sources of ignition. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).
Environmental precautions	:	Discharge into the environment must be avoided. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	:	Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling :

Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:

(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators.

(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).

(3) Storage tank level floats must be effectively bonded.

For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Reports suggest that government-mandated ethanol, if present, may not be compatible with fiberglass gasoline tanks. Ethanol may dissolve fiberglass resin, causing engine damage and possibly allow leakage of explosive gasoline.

Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

No decomposition if stored and applied as directed. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Store only in containers approved and labeled for gasoline.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Ethanol; Ethyl alcohol	64-17-5	PEL	1,000 ppm 1,900 mg/m3
	Naphthalene	91-20-3	PEL	10 ppm 50 mg/m3
	Cyclohexane	110-82-7	PEL	300 ppm 1,050 mg/m3
	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Heptane [and isomers]	142-82-5	PEL	500 ppm 2,000 mg/m3
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
ACGIH	Toluene	108-88-3	TWA	50 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Ethanol; Ethyl alcohol	64-17-5	TWA	1,000 ppm
	Trimethylbenzene	25551-13-7	TWA	25 ppm
	Isopentane; 2-Methylbutane	78-78-4	TWA	600 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Pentane	109-66-0	TWA	600 ppm
	Cyclohexane	110-82-7	TWA	100 ppm
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Heptane [and isomers]	142-82-5	TWA	400 ppm
		142-82-5	STEL	500 ppm

	N-hexane	110-54-3	TWA	50 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Ensure that eyewash stations and safety showers are close to the workstation location.

Hand protection : Gloves constructed of nitrile or neoprene are recommended. Consult manufacturer specifications for further information.

Skin and body protection : If needed to prevent skin contact, chemical protective clothing such as of DuPont TyChem®, Saranex or equivalent recommended based on degree of exposure. Flame resistant clothing such as Nomex ® is recommended in areas where material is stored or handled.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Work / Hygiene practices : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Clear to straw colored liquid

Odor : Characteristic hydrocarbon-like

Odor threshold 0.5 - 1.1 ppm

pH : Not applicable

Melting point/freezing point About -101°C (-150°F)

Initial boiling point & range Boiling point varies: 30 – 200°C (85 – 392°F)

Flash point < -21°C (-5.8°F)

Evaporation rate : Higher initially and declining as lighter components evaporate

Flammability (solid, gas) : Flammable vapor released by liquid

Upper explosive limit	7.6 %(V)
Lower explosive limit	1.3 %(V)
Vapor pressure	345 - 1,034 hPa at 37.8 °C (100.0 °F)
Vapor density (air = 1)	Approximately 3 to 4
Relative density (water = 1)	0.8 g/mL
Solubility (in water)	Negligible
Partition coefficient (n-octanol/water)	2 – 7 as log Pow
Auto-ignition temperature	Approximately 250°C (480°F)
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	0.64 to 0.88 mm²/s range reported for gasoline
Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature)	: Hydrocarbon liquids without static dissipater additive may have conductivity below 1 picoSiemens per meter (pS/m). The highest electro-static ignition risks are associated with "ultra-low conductivities" below 5 pS/m. See Section 7 for sources of information on defining safe loading and handling procedures for low conductivity products.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, alkaline products and strong acids. Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.
Conditions to avoid	: Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	: Ignition and burning can release carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

SECTION 11. TOXICOLOGICAL INFORMATION

Skin contact	: Irritating to skin. Can be partially absorbed through skin.
Eye contact	: Irritating to eyes.
Ingestion	: Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Inhalation and further information

Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, over excitation. Exposure to very high levels can result in unconsciousness and death.

Repeated over-exposure may cause liver and kidney injuries.
Components of the product may affect the nervous system.

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.
This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

Component:

Gasoline, natural; Low boiling point naphtha	8006-61-9	Acute oral toxicity: LD50 rat Dose: 18.8 mg/kg Acute inhalation toxicity: LC50 rat Dose: 20.7 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Moderate eye irritation
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation

		Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethanol; Ethyl alcohol	64-17-5	Acute oral toxicity: LD50 rat Dose: 6,200 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 19,999 mg/kg Acute inhalation toxicity: LC50 rat Dose: 8,001 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may cause skin irritation and/or dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h

		Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	:	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	:	Benzene (CAS-No.: 71-43-2)
CA Prop 65	:	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3)

Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h
Ethanol; Ethyl alcohol	64-17-5	Toxicity to fish: LC50 Species: Leuciscus idus (Golden orfe) Dose: 8,140 mg/l Exposure time: 48 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9,268 - 14,221 mg/l Exposure time: 48 h
Isopentane; 2-Methylbutane	78-78-4	Toxicity to fish: LC50 Species: Oncorhynchus mykiss (rainbow trout) Dose: 3.1 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.3 mg/l Exposure time: 96 h
Naphthalene	91-20-3	Toxicity to algae: EC50 Species: Dose: 33 mg/l Exposure time: 24 h
Pentane	109-66-0	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9.74 mg/l Exposure time: 48 h
Cyclohexane	110-82-7	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 3.78 mg/l Exposure time: 48 h

Heptane [and isomers]	142-82-5	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 4 mg/l Exposure time: 24 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 1.5 mg/l Exposure time: 48 h
N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: Petrol
UN-No.	: 1203
Class	: 3
Packing group	: II

TDG

Proper shipping name	: Gasoline
UN-No.	: UN1203
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3

Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	353
Packing instruction (passenger aircraft)	:	Y341

IMDG-Code

UN-No.	:	UN 1203
Description of the goods	:	Gasoline
Class	:	3
Packaging group	:	II
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : Flammable liquid
Highly toxic by ingestion
Moderate skin irritant
Severe eye irritant
Carcinogen

TSCA Status : On TSCA Inventory

DSL Status : . All components are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 08/09/2012

6, 8, 10, 12, 14, 16, 64, 68, 91, 112, 306, 1092, 1106, 1500, 1570, 1571, 1651, 1652, 1654, 1700, 1701, 1702, 1710, 1711, 1714, 1726, 1729, 1730, 1732, 1733, 1826, 1848, 1880, 1950

SAFETY DATA SHEET

Vinyl Chloride

Section 1. Identification

GHS product identifier : Vinyl Chloride

Chemical name : vinyl chloride

Other means of identification : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

SDS # : 001067

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (liver) - Category 2

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite
May displace oxygen and cause rapid suffocation.
May cause cancer.
May cause damage to organs through prolonged or repeated exposure. (liver)

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not breathe gas.

Section 2. Hazards identification

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Store locked up. Protect from sunlight. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : vinyl chloride

Other means of identification : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro-(vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

Product code : 001067

CAS number/other identifiers

CAS number : 75-01-4

Ingredient name	%	CAS number
vinyl chloride	100	75-01-4

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Section 4. First aid measures

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Section 6. Accidental release measures

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Do not breathe gas. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Store locked up. Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
vinyl chloride	**ACGIH TLV (United States, 3/2017).** TWA: 1 ppm 8 hours. **OSHA PEL (United States, 6/2016).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Section 8. Exposure controls/personal protection

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [COLORLESS GAS OR LIQUID (BELOW 7 F) WITH A PLEASANT ODOR AT HIGH CONCENTRATIONS. [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -153.8°C (-244.8°F)

Boiling point : -13.4°C (7.9°F)

Critical temperature : 158.45°C (317.2°F)

Flash point : Closed cup: -78°C (-108.4°F)
Open cup: -78°C (-108.4°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 3.8%
Upper: 29.3%

Section 9. Physical and chemical properties

Vapor pressure : Not available.

Vapor density : 2.2 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.25

Gas Density (lb/ft ^{3}) : 0.16129 (21.1°C / 70 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 1.1 g/l

Partition coefficient: n-octanol/water : 1.38

Auto-ignition temperature : 472°C (881.6°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 62.5 g/mole

Aerosol product

Heat of combustion : -18924336 J/kg

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Section 11. Toxicological information

Classification

Product/ingredient name	OSHA	IARC	NTP
vinyl chloride	+	1	Known to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
vinyl chloride	Category 2	Not determined	liver

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 11. Toxicological information

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
vinyl chloride	1.38	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Vinyl chloride; Ethene, chloro-	75-01-4	Listed	U043

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1086	UN1086	UN1086	UN1086	UN1086
UN proper shipping name	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED

Section 14. Transport information

Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Reportable quantity** 1 lbs / 0.454 kg. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.
Limited quantity Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions 21, B44, T50

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Road or Rail Index Forbidden

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined
Clean Water Act (CWA) 307: vinyl chloride
Clean Air Act (CAA) 112 regulated flammable substances: vinyl chloride

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

Section 15. Regulatory information

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	vinyl chloride	75-01-4	100
Supplier notification	vinyl chloride	75-01-4	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

⚠ **WARNING**: This product can expose you to Vinyl chloride, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Ingredient name	No significant risk level	Maximum acceptable dosage level
Vinyl chloride	Yes.	-

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : **Japan inventory (ENCS)**: This material is listed or exempted.
Japan inventory (ISHL): This material is listed or exempted.

Malaysia : This material is listed or exempted.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Thailand : Not determined.

Turkey : This material is listed or exempted.

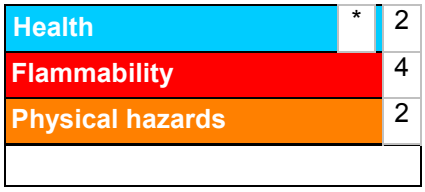
Section 15. Regulatory information

United States : This material is listed or exempted.

Viet Nam : Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 1	Expert judgment
GASES UNDER PRESSURE - Liquefied gas	Expert judgment
CARCINOGENICITY - Category 1	Expert judgment
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (liver) - Category 2	Expert judgment

History

Date of printing : 7/9/2018

Date of issue/Date of revision : 7/9/2018

Date of previous issue : 10/11/2016

Version : 0.02

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Section 16. Other information

References : Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET

Creation Date 13-Feb-2015 **Revision Date** 21-Feb-2014 **Revision Number** 3

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identification

Product Description: Xylene
Cat No. : **6601, 6615, 6655, 9900-5, 9900-55, 6601E**
Synonyms Dimethylbenzene; Methyltoluene
Molecular Formula C8H10

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Laboratory chemicals.
Uses advised against No Information available

1.3. Details of the supplier of the safety data sheet

Company
Richard Allan Scientific
A Subsidiary of Thermo Fisher Scientific
4481 Campus Drive
Kalamazoo, MI 49008
Tel: (800) 522-7270
E-mail address begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Flammable liquids	Category 3

Health hazards

Aspiration Toxicity	Category 1
Acute dermal toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/irritation	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2

Environmental hazards
Based on available data, the classification criteria are not met

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Symbol(s) Xn - Harmful
R-phrase(s) R10 - Flammable
R38 - Irritating to skin
R20/21 - Harmful by inhalation and in contact with skin

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16.

2.2. Label elements



Signal Word **Danger**

Hazard Statements

H226 - Flammable liquid and vapor
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H304 - May be fatal if swallowed and enters airways
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary Statements

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P280 - Wear protective gloves/ protective clothing
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P312 - Call a POISON CENTER or doctor/ physician if you feel unwell
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician
P331 - Do NOT induce vomiting
P362 - Take off contaminated clothing and wash before reuse
P260 - Do not breathe dust/fume/gas/mist/vapors/spray

2.3. Other hazards

No information available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008	DSD Classification - 67/548/EEC
Ethylbenzene	100-41-4	EEC No. 202-849-4	10 - 15	Flam. Liq. 2 (H225) Acute Tox. 4 (H332) Asp. Tox. 1 (H304) STOT RE 2 (H373) Aquatic Chronic 3 (H412)	F; R11 Xn; R20-48/20 R65
Xylenes (o-, m-, p- isomers)	1330-20-7	EEC No. 215-535-7	85	Acute Tox. 4 (H312) Acute Tox. 4 (H332) Skin Irrit. 2 (H315) Flam. Liq. 3 (H226)	R10 Xn; R20/21 Xi; R38
Toluene	108-88-3	EEC No. 203-625-9	0 - 0.5	Skin Irrit. 2 (H315) Repr. 2 (H361d) STOT SE 3 (H336) STOT RE 2 (H373) Asp. Tox. 1 (H304) Flam. Liq. 2 (H225)	F; R11 Xi; R38 Xn; R48/20-65 Repr.Cat.3; R63 R67
Benzene	71-43-2	EEC No. 200-753-7	0 - 0.01	Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Muta. 1B (H340) Carc. 1A (H350) STOT RE 1 (H372)	F; R11 Xi; R36/38 Carc.Cat.1; R45 Muta.Cat.2; R46 T; R48/23/24/25

				Asp. Tox. 1 (H304) Flam. Liq. 2 (H225)	Xn; R65

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice If symptoms persist, call a physician. Show this safety data sheet to the doctor in attendance.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required. Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required. Call a physician immediately. SPEEDY ACTION IS CRITICAL, GET MEDICAL AID IMMEDIATELY. If symptoms persist, call a physician. If skin irritation persists, call a physician. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately. Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Consult a physician.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required. Immediate medical attention is not required. Move to fresh air in case of accidental inhalation of vapors. If symptoms persist, call a physician.

Protection of First-aiders Use personal protective equipment.

4.2. Most important symptoms and effects, both acute and delayed

Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Extinguishing media which must not be used for safety reasons
No information available.

5.2. Special hazards arising from the substance or mixture

Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrocarbons, Aldehydes.

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Do not get in eyes, on skin, or on clothing. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

6.2. Environmental precautions

Should not be released into the environment. See Section 12 for additional ecological information. Do not flush into surface water or sanitary sewer system. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.

6.3. Methods and material for containment and cleaning up

Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Use only under a chemical fume hood. Wear personal protective equipment. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Do not ingest. Pay attention to flashback. No information available. Do not take internally.

7.2. Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area. Keep containers tightly closed in a cool, well-ventilated place. Keep in properly labeled containers.

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits

Component	European Union	The United Kingdom	France	Belgium	Spain
Ethylbenzene	TWA: 100 ppm 8 hr TWA: 442 mg/m³ 8 hr STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min Possibility of significant uptake through the skin	STEL: 125 ppm 15 min STEL: 552 mg/m³ 15 min TWA: 100 ppm 8 hr TWA: 441 mg/m³ 8 hr Skin	TWA / VME: 20 ppm (8 heures). restrictive limit TWA / VME: 88.4 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 442	TWA: 100 ppm 8 uren TWA: 442 mg/m³ 8 uren STEL: 125 ppm 15 minuten STEL: 551 mg/m³ 15 minuten Huid	STEL / VLA-EC: 200 ppm (15 minutos). STEL / VLA-EC: 884 mg/m³ (15 minutos). TWA / VLA-ED: 100 ppm (8 horas) TWA / VLA-ED: 441 mg/m³ (8 horas) Piel

			mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau		
Xylenes (o-, m-, p-isomers)	TWA: 50 ppm 8 hr TWA: 221 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Possibility of significant uptake through the skin	STEL: 100 ppm 15 min STEL: 441 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 220 mg/m³ 8 hr Skin	TWA / VME: 50 ppm (8 heures). restrictive limit TWA / VME: 221 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 442 mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau	TWA: 50 ppm 8 uren TWA: 221 mg/m³ 8 uren STEL: 100 ppm 15 minuten STEL: 442 mg/m³ 15 minuten Huid	STEL / VLA-EC: 100 ppm (15 minutos). STEL / VLA-EC: 442 mg/m³ (15 minutos). TWA / VLA-ED: 50 ppm (8 horas) TWA / VLA-ED: 221 mg/m³ (8 horas) Piel
Toluene	TWA: 50 ppm 8 hr TWA: 192 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min Skin	STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 191 mg/m³ 8 hr Skin	TWA / VME: 20 ppm (8 heures). restrictive limit TWA / VME: 76.8 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 384 mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau	TWA: 20 ppm 8 uren TWA: 77 mg/m³ 8 uren STEL: 100 ppm 15 minuten STEL: 384 mg/m³ 15 minuten Huid	STEL / VLA-EC: 100 ppm (15 minutos). STEL / VLA-EC: 384 mg/m³ (15 minutos). TWA / VLA-ED: 50 ppm (8 horas) TWA / VLA-ED: 192 mg/m³ (8 horas) Piel
Benzene	TWA: 1 ppm 8 hr measured or calculated in relation to a reference period of eight hours TWA: 3.25 mg/m³ 8 hr measured or calculated in relation to a reference period of eight hours Substantial contribution to the total body burden via dermal exposure possible	STEL: 3 ppm 15 min STEL: 9.75 mg/m³ 15 min TWA: 1 ppm 8 hr TWA: 3.25 mg/m³ 8 hr Carc. Skin	TWA / VME: 1 ppm (8 heures). restrictive limit TWA / VME: 3.25 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 1500 mg/m³. Peau	TWA: 1 ppm 8 uren TWA: 3.25 mg/m³ 8 uren Huid	TWA / VLA-ED: 1 ppm (8 horas) TWA / VLA-ED: 3.25 mg/m³ (8 horas) Piel

Component	Italy	Germany	Portugal	The Netherlands	Finland
Ethylbenzene	TWA: 100 ppm 8 ore. TWA: 442 mg/m³ 8 ore. STEL: 200 ppm 15 minuti. Breve termine STEL: 884 mg/m³ 15 minuti. Breve termine Pelle	TWA: 20 ppm (8 Stunden). AGW - exposure factor 2 TWA: 88 mg/m³ (8 Stunden). AGW - exposure factor 2 TWA: 20 ppm (8 Stunden). MAK TWA: 88 mg/m³ (8 Stunden). MAK Höhepunkt: 40 ppm Höhepunkt: 176 mg/m³ Haut	STEL: 200 ppm 15 minutos STEL: 884 mg/m³ 15 minutos TWA: 100 ppm 8 horas TWA: 442 mg/m³ 8 horas Pele	huid STEL: 430 mg/m³ 15 minuten TWA: 215 mg/m³ 8 uren	TWA: 50 ppm 8 tunteina TWA: 220 mg/m³ 8 tunteina STEL: 200 ppm 15 minuutteina STEL: 880 mg/m³ 15 minuutteina Iho
Xylenes (o-, m-, p-isomers)	TWA: 50 ppm 8 ore. pure TWA: 221 mg/m³ 8 ore. pure STEL: 100 ppm 15 minuti. Breve termine pure STEL: 442 mg/m³ 15 minuti. Breve termine pure Pelle	TWA: 100 ppm (8 Stunden). AGW - exposure factor 2 TWA: 440 mg/m³ (8 Stunden). AGW - exposure factor 2 TWA: 100 ppm (8 Stunden). MAK all isomers TWA: 440 mg/m³ (8 Stunden). MAK all isomers	STEL: 100 ppm 15 minutos STEL: 442 mg/m³ 15 minutos TWA: 50 ppm 8 horas TWA: 221 mg/m³ 8 horas Pele	huid STEL: 442 mg/m³ 15 minuten TWA: 210 mg/m³ 8 uren	TWA: 50 ppm 8 tunteina TWA: 220 mg/m³ 8 tunteina STEL: 100 ppm 15 minuutteina STEL: 440 mg/m³ 15 minuutteina Iho

		Höhepunkt: 200 ppm Höhepunkt: 880 mg/m³ Haut Haut all isomers			
Toluene	TWA: 50 ppm 8 ore. TWA: 192 mg/m³ 8 ore. Pelle	TWA: 50 ppm (8 Stunden). AGW - exposure factor 4 TWA: 190 mg/m³ (8 Stunden). AGW - exposure factor 4 TWA: 50 ppm (8 Stunden). MAK TWA: 190 mg/m³ (8 Stunden). MAK Höhepunkt: 200 ppm Höhepunkt: 760 mg/m³ Haut	STEL: 100 ppm 15 minutos STEL: 384 mg/m³ 15 minutos TWA: 50 ppm 8 horas TWA: 192 mg/m³ 8 horas Pele	STEL: 384 mg/m³ 15 minuten TWA: 150 mg/m³ 8 uren	TWA: 25 ppm 8 tunteina TWA: 81 mg/m³ 8 tunteina STEL: 100 ppm 15 minuutteina STEL: 380 mg/m³ 15 minuutteina Iho
Benzene	TWA: 1 ppm 8 ore. TWA: 3.25 mg/m³ 8 ore. Pelle	Haut	STEL: 2.5 ppm 15 minutos TWA: 0.5 ppm 8 horas Pele	huid TWA: 3.25 mg/m³ 8 uren	TWA: 1 ppm 8 tunteina TWA: 3.25 mg/m³ 8 tunteina Iho

Component	Austria	Denmark	Switzerland	Poland	Norway
Ethylbenzene	Haut MAK-KZW: 200 ppm 15 Minuten MAK-KZW: 880 mg/m³ 15 Minuten MAK-TMW: 100 ppm 8 Stunden MAK-TMW: 440 mg/m³ 8 Stunden	TWA: 50 ppm 8 timer TWA: 217 mg/m³ 8 timer Hud	Haut/Peau STEL: 50 ppm 15 Minuten STEL: 220 mg/m³ 15 Minuten TWA: 50 ppm 8 Stunden TWA: 220 mg/m³ 8 Stunden	STEL: 400 mg/m³ 15 minutach TWA: 200 mg/m³ 8 godzinach	TWA: 5 ppm 8 timer TWA: 20 mg/m³ 8 timer STEL: 10 ppm 15 minutter. STEL: 30 mg/m³ 15 minutter. Hud
Xylenes (o-, m-, p-isomers)	Haut MAK-KZW: 100 ppm 15 Minuten MAK-KZW: 442 mg/m³ 15 Minuten MAK-TMW: 50 ppm 8 Stunden MAK-TMW: 221 mg/m³ 8 Stunden	TWA: 25 ppm 8 timer TWA: 109 mg/m³ 8 timer Hud	Haut/Peau STEL: 200 ppm 15 Minuten STEL: 870 mg/m³ 15 Minuten TWA: 100 ppm 8 Stunden TWA: 435 mg/m³ 8 Stunden	TWA: 100 mg/m³ 8 godzinach	TWA: 25 ppm 8 timer TWA: 108 mg/m³ 8 timer STEL: 37.5 ppm 15 minutter. STEL: 135 mg/m³ 15 minutter. Hud
Toluene	Haut MAK-KZW: 100 ppm 15 Minuten MAK-KZW: 380 mg/m³ 15 Minuten MAK-TMW: 50 ppm 8 Stunden MAK-TMW: 190 mg/m³ 8 Stunden	TWA: 25 ppm 8 timer TWA: 94 mg/m³ 8 timer Hud	Haut/Peau STEL: 200 ppm 15 Minuten STEL: 760 mg/m³ 15 Minuten TWA: 50 ppm 8 Stunden TWA: 190 mg/m³ 8 Stunden	STEL: 200 mg/m³ 15 minutach TWA: 100 mg/m³ 8 godzinach	TWA: 25 ppm 8 timer TWA: 94 mg/m³ 8 timer STEL: 37.5 ppm 15 minutter. STEL: 141 mg/m³ 15 minutter. Hud
Benzene	TRK-KZW: 4 ppm 15 Minuten TRK-KZW: 12.8 mg/m³ 15 Minuten Haut TRK-TMW: 1 ppm TRK-TMW: 3.2 mg/m³	TWA: 0.5 ppm 8 timer TWA: 1.6 mg/m³ 8 timer Hud	Haut/Peau TWA: 0.5 ppm 8 Stunden TWA: 1.6 mg/m³ 8 Stunden	TWA: 1.6 mg/m³ 8 godzinach	TWA: 1 ppm 8 timer TWA: 3 mg/m³ 8 timer STEL: 3 ppm 15 minutter. STEL: 6 mg/m³ 15 minutter.

Component	Bulgaria	Croatia	Ireland	Cyprus	Czech Republic
Ethylbenzene	TWA: 435 mg/m³ STEL : 545 mg/m³ Skin notation	kože TWA-GVI: 100 ppm 8 satima. TWA-GVI: 442 mg/m³ 8 satima. STEL-KGVI: 200 ppm 15 minutama. STEL-KGVI: 884 mg/m³ 15 minutama.	TWA: 100 ppm 8 hr. TWA: 442 mg/m³ 8 hr. STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min Skin	Skin-potential for cutaneous absorption STEL: 200 ppm STEL: 884 mg/m³ TWA: 100 ppm TWA: 442 mg/m³	TWA: 200 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 500 mg/m³
Xylenes (o-, m-, p-	TWA: 50 ppm	kože	TWA: 50 ppm 8 hr.	Skin-potential for	TWA: 200 mg/m³ 8

isomers)	TWA: 221.0 mg/m³ STEL : 100 ppm STEL : 442 mg/m³ Skin notation	TWA-GVI: 50 ppm 8 satima. TWA-GVI: 221 mg/m³ 8 satima. STEL-KGVI: 100 ppm 15 minutama. STEL-KGVI: 442 mg/m³ 15 minutama.	TWA: 221 mg/m³ 8 hr. STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Skin	cutaneous absorption STEL: 100 ppm STEL: 442 mg/m³ TWA: 50 ppm TWA: 221 mg/m³	hodinách. Potential for cutaneous absorption Ceiling: 400 mg/m³
Toluene	TWA: 50 ppm TWA: 192.0 mg/m³ STEL : 100 ppm STEL : 384.0 mg/m³ Skin notation	kože TWA-GVI: 50 ppm 8 satima. TWA-GVI: 192 mg/m³ 8 satima. STEL-KGVI: 100 ppm 15 minutama. STEL-KGVI: 384 mg/m³ 15 minutama.	TWA: 50 ppm 8 hr. TWA: 192 mg/m³ 8 hr. STEL: 384 mg/m³ 15 min STEL: 100 ppm 15 min Skin	Skin-potential for cutaneous absorption STEL: 100 ppm STEL: 384 mg/m³ TWA: 50 ppm TWA: 192 mg/m³	TWA: 200 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 500 mg/m³
Benzene	TWA: 3.25 mg/m³ Skin notation	kože TWA-GVI: 1 ppm 8 satima. TWA-GVI: 3.25 mg/m³ 8 satima.	TWA: 1 ppm 8 hr. TWA: 3 mg/m³ 8 hr. STEL: 3 ppm 15 min STEL: 9 mg/m³ 15 min Skin	Skin-potential for cutaneous absorption TWA: 1 ppm TWA: 3.25 mg/m³	TWA: 3 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 10 mg/m³

Component	Estonia	Gibraltar	Greece	Hungary	Iceland
Ethylbenzene	Nahk TWA: 100 ppm 8 tundides. TWA: 442 mg/m³ 8 tundides. STEL: 200 ppm 15 minutites. STEL: 884 mg/m³ 15 minutites. Ceiling: 0.01 ppm 5 min	Skin notation TWA: 100 ppm 8 hr TWA: 442 mg/m³ 8 hr STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min	STEL: 125 ppm STEL: 545 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	STEL: 884 mg/m³ 15 percekben. CK TWA: 442 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 200 ppm STEL: 884 mg/m³ TWA: 50 ppm 8 klukkustundum. TWA: 200 mg/m³ 8 klukkustundum. Skin notation Ceiling: 100 ppm Ceiling: 400 mg/m³
Xylenes (o-, m-, p-isomers)	Nahk TWA: 50 ppm 8 tundides. TWA: 221 mg/m³ 8 tundides. STEL: 100 ppm 15 minutites. STEL: 442 mg/m³ 15 minutites.	Skin notation TWA: 50 ppm 8 hr pure TWA: 221 mg/m³ 8 hr pure STEL: 100 ppm 15 min pure STEL: 442 mg/m³ 15 min pure	skin - potential for cutaneous absorption STEL: 150 ppm STEL: 650 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	STEL: 442 mg/m³ 15 percekben. CK TWA: 221 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 100 ppm STEL: 442 mg/m³ TWA: 25 ppm 8 klukkustundum. TWA: 109 mg/m³ 8 klukkustundum. Skin notation Ceiling: 50 ppm Ceiling: 218 mg/m³
Toluene	Nahk TWA: 50 ppm 8 tundides. TWA: 192 mg/m³ 8 tundides. STEL: 100 ppm 15 minutites. STEL: 384 mg/m³ 15 minutites.	Skin notation TWA: 50 ppm 8 hr TWA: 192 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min	skin - potential for cutaneous absorption STEL: 100 ppm STEL: 384 mg/m³ TWA: 50 ppm TWA: 192 mg/m³	STEL: 380 mg/m³ 15 percekben. CK TWA: 190 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 50 ppm STEL: 188 mg/m³ TWA: 25 ppm 8 klukkustundum. TWA: 94 mg/m³ 8 klukkustundum. Skin notation Ceiling: 50 ppm Ceiling: 188 mg/m³
Benzene	Nahk TWA: 0.5 ppm 8 tundides. TWA: 1.5 mg/m³ 8 tundides. STEL: 3 ppm 15 minutites. STEL: 9 mg/m³ 15 minutites.		skin - potential for cutaneous absorption TWA: 1.0 ppm TWA: 3.19 mg/m³	lehetséges borön keresztüli felszívódás Ceiling: 3 mg/m³ MK	TWA: 0.5 ppm 8 klukkustundum. TWA: 1.6 mg/m³ 8 klukkustundum. Skin notation Ceiling: 1 ppm Ceiling: 3.2 mg/m³

Component	Latvia	Lithuania	Luxembourg	Malta	Romania
Ethylbenzene	skin - potential for cutaneous exposure STEL: 200 ppm STEL: 884 mg/m³ TWA: 100 ppm	TWA: 100 ppm IPRD TWA: 442 mg/m³ IPRD Oda STEL: 200 ppm STEL: 884 mg/m³	Possibility of significant uptake through the skin TWA: 100 ppm 8 Stunden TWA: 442 mg/m³ 8	possibility of significant uptake through the skin TWA: 100 ppm TWA: 442 mg/m³ STEL: 200 ppm 15	Skin notation TWA: 100 ppm 8 ore TWA: 442 mg/m³ 8 ore STEL: 200 ppm 15 minute

	TWA: 442 mg/m³		Stunden STEL: 200 ppm 15 Minuten STEL: 884 mg/m³ 15 Minuten	minuti STEL: 884 mg/m³ 15 minuti	STEL: 884 mg/m³ 15 minute
Xylenes (o-, m-, p-isomers)	skin - potential for cutaneous exposure STEL: 100 ppm STEL: 442 mg/m³ TWA: 50 ppm TWA: 221 mg/m³	TWA: 50 ppm IPRD TWA: 200 mg/m³ IPRD Oda STEL: 100 ppm STEL: 450 mg/m³	TWA: 50 ppm 8 Stunden TWA: 221 mg/m³ 8 Stunden STEL: 100 ppm 15 Minuten STEL: 442 mg/m³ 15 Minuten	possibility of significant uptake through the skin TWA: 50 ppm TWA: 221 mg/m³ STEL: 100 ppm 15 minuti STEL: 442 mg/m³ 15 minuti	Skin notation TWA: 50 ppm 8 ore TWA: 221 mg/m³ 8 ore STEL: 100 ppm 15 minute STEL: 442 mg/m³ 15 minute
Toluene	skin - potential for cutaneous exposure STEL: 40 ppm STEL: 150 mg/m³ TWA: 14 ppm TWA: 50 mg/m³	TWA: 50 ppm IPRD TWA: 192 mg/m³ IPRD Oda STEL: 100 ppm STEL: 384 mg/m³	Possibility of significant uptake through the skin TWA: 50 ppm 8 Stunden TWA: 192 mg/m³ 8 Stunden STEL: 100 ppm 15 Minuten STEL: 384 mg/m³ 15 Minuten	possibility of significant uptake through the skin TWA: 50 ppm TWA: 192 mg/m³ STEL: 100 ppm 15 minuti STEL: 384 mg/m³ 15 minuti	Skin notation TWA: 50 ppm 8 ore TWA: 192 mg/m³ 8 ore STEL: 100 ppm 15 minute STEL: 384 mg/m³ 15 minute
Benzene	skin - potential for cutaneous exposure TWA: 1 ppm TWA: 3.25 mg/m³	TWA: 1 ppm IPRD TWA: 3.25 mg/m³ IPRD Oda STEL: 6 ppm STEL: 19 mg/m³	TWA: 1 ppm 8 Stunden TWA: 3.25 mg/m³ 8 Stunden		Skin notation TWA: 1 ppm 8 ore TWA: 3.25 mg/m³ 8 ore

Component	Russia	Slovak Republic	Slovenia	Sweden	Turkey
Ethylbenzene	TWA: 50 mg/m³ STEL: 150 mg/m³ vapor	Ceiling: 884 mg/m³ Potential for cutaneous absorption TWA: 100 ppm TWA: 442 mg/m³	TWA: 100 ppm 8 urah TWA: 442 mg/m³ 8 urah Koža STEL: 200 ppm 15 minutah STEL: 884 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 450 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 200 mg/m³ 8 timmar.	Deri TWA: 100 ppm 8 saat TWA: 442 mg/m³ 8 saat STEL: 200 ppm 15 dakika STEL: 884 mg/m³ 15 dakika
Xylenes (o-, m-, p-isomers)	TWA: 50 mg/m³ 2-,3- and 4- isomers STEL: 150 mg/m³ vapor	Ceiling: 442 mg/m³ Potential for cutaneous absorption TWA: 50 ppm TWA: 221 mg/m³	TWA: 50 ppm 8 urah TWA: 221 mg/m³ 8 urah Koža STEL: 100 ppm 15 minutah STEL: 442 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 442 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 221 mg/m³ 8 timmar. Hud	Deri TWA: 50 ppm 8 saat TWA: 221 mg/m³ 8 saat STEL: 100 ppm 15 dakika STEL: 442 mg/m³ 15 dakika
Toluene	TWA: 50 mg/m³ STEL: 150 mg/m³ vapor	Ceiling: 384 mg/m³ Potential for cutaneous absorption TWA: 50 ppm TWA: 192 mg/m³	TWA: 50 ppm 8 urah TWA: 192 mg/m³ 8 urah Koža STEL: 200 ppm 15 minutah STEL: 384 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 384 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 192 mg/m³ 8 timmar. Hud	Deri TWA: 50 ppm 8 saat TWA: 192 mg/m³ 8 saat STEL: 100 ppm 15 dakika STEL: 384 mg/m³ 15 dakika
Benzene	TWA: 5 mg/m³ Skin notation STEL: 15 mg/m³ vapor	TWA: 1.0 ppm 8 hodinách TWA: 3.25 mg/m³ 8 hodinách Potential for cutaneous absorption STEL: 5.0 ppm 15 minútach STEL: 16.25 mg/m³ 15 minútach	TWA: 1 ppm 8 urah TWA: 3.25 mg/m³ 8 urah Koža STEL: 4 ppm 15 minutah STEL: 13 mg/m³ 15 minutah	STV: 3 ppm 15 minuter STV: 9 mg/m³ 15 minuter LLV: 0.5 ppm 8 timmar. LLV: 1.5 mg/m³ 8 timmar. Hud	

Biological limit values

Component	European Union	United Kingdom	France	Spain	Germany
Ethylbenzene			Mandelic acid: 1500	Mandelic acid plus	Mandelic acid plus

			mg/g creatinine urine end of shift at end of workweek	Phenylglyoxylic acid: 700 mg/g Creatinine urine end of workweek	Phenylglyoxylic acid: 300 mg/g urine (end of shift)
Xylenes (o-, m-, p-isomers)		Methyl hippuric acid: 650 mmol/mol creatinine urine Post shift	Methylhippuric acid: 1500 mg/g creatinine urine end of shift	Methylhippuric acids: 1 g/g Creatinine urine end of shift	Xylene: 1.5 mg/L whole blood (end of shift all isomers) Methylhippuric(tolur-)acid: 2000 mg/L urine (end of shift all isomers)
Toluene			Toluene: 1 mg/L blood end of shift Hippuric acid: 2500 mg/g creatinine urine end of shift	o-Cresol: 0.5 mg/L urine end of shift Hippuric acid: 1.6 g/g Creatinine urine end of shift Toluene: 0.05 mg/L blood start of last shift of workweek	Toluene: 600 µg/L whole blood (end of shift) o-Cresol: 1.5 mg/L urine (end of several shifts after hydrolysis; for long-term exposures)
Benzene			Muconic acid: 5 mg/L urine end of shift	S-Phenylmercapturic acid: 0.045 mg/g urine end of exposure or end of shift trans,trans-Muconic acid: 2 mg/L urine end of exposure or end of shift Total benzene: 5 µg/L blood end of exposure or end of shift	

Component	Italy	Finland	Denmark	Bulgaria	Romania
Ethylbenzene		Mandelic acid: 5.2 mmol/L urine end of shift at end of workweek.		Mandelic acid and Phenylglyoxylic acid - together: 2000 mg/g Creatinine urine at the end of exposure or end of shift Possible significant absorption through the skin	Mandelic acid: 1.5 g/g Creatinine urine end of work week
Xylenes (o-, m-, p-isomers)		Methylhippuric acid: 5.0 mmol/L urine end of shift.			Methylhippuric acid: 3 g/L urine end of shift
Toluene		Toluene concentrated: 500 nmol/L blood prior to shift.		Hippuric acid: 1.6 mmol/mmol Creatinine urine at the end of exposure or end of shift	Hippuric acid: 2 g/L urine end of shift o-Cresol: 3 mg/L urine end of shift
Benzene				Trans, trans-Muconic acid: 2.0 mg/L urine at the end of exposure or end of shift Possible significant absorption through the skin S-Phenyl Mercapturic acid: 0.045 mg/g Creatinine urine at the end of exposure or end of shift Possible significant absorption through the skin	S-Phenylmercapturic acid: 25 µg/g Creatinine urine end of shift total Phenols: 50 mg/L urine end of shift

Component	Gibraltar	Latvia	Slovak Republic	Luxembourg	Turkey
Ethylbenzene			2 and 4-Ethylphenol: 12 mg/L urine end of exposure or work shift also after all work shifts for long-term exposure Mandelic acid and phenylglycolic acid: 1600 mg/L urine end of exposure or work shift		

			also after all work shifts for long-term exposure		
Xylenes (o-, m-, p-isomers)			Xylene: 1.5 mg/L blood end of exposure or work shift all isomers Methylhippuric acid: 2000 mg/L urine end of exposure or work shift		
Toluene		Hippuric acid: 1.6 g/g Creatinine urine end of shift Toluene: 0.05 mg/l blood end of shift	Toluene: 600 µg/L blood end of exposure or work shift o-Cresol: 1.5 mg/L urine after all work shifts for long-term exposure o-Cresol: 1.5 mg/L urine end of exposure or work shift Hippuric acid: 1600 mg/g creatinine end of exposure or work shift		
Benzene		Phenol: 25 µg/g Creatinine urine end of shift			

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.

Derived No Effect Level (DNEL) No information available

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				
Inhalation				

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Engineering Measures
Use only under a chemical fume hood. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment

Eye Protection Safety glasses with side-shields (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Disposable gloves	See manufacturers recommendations	-	EN 374	(minimum requirement)

Skin and body protection Long sleeved clothing Apron Impervious gloves

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)
Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use

	appropriate certified respirators. To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly
Large scale/emergency use	In case of insufficient ventilation wear suitable respiratory equipment
Small scale/Laboratory use	Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. When RPE is used a face piece Fit Test should be conducted
Hygiene Measures	When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing.
Environmental exposure controls	No information available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Clear, Colorless	
Physical State	Liquid	
Odor	aromatic	
Odor Threshold	No data available	
pH	No data available	
Melting Point/Range	-47.2 °C / -53 °F	
Softening Point	No data available	
Boiling Point/Range	136.7 - 143.3 °C / 278 - 290 °F	
Flash Point	27.7 °C / 82 °F	**Method -** No information available
Evaporation Rate	No information available	
Flammability (solid,gas)	No information available	
Explosion Limits	**Lower** 1.1 vol % **Upper** 7.0 vol %	
Vapor Pressure	9 mmHg @ 25 °C	
Vapor Density	3.66 (Air = 1.0)	(Air = 1.0)
Specific Gravity / Density	No data available 0.87	
Bulk Density	No data available	
Water Solubility	No information available	
Solubility in other solvents	No information available	

Partition Coefficient (n-octanol/water)

Component	**log Pow**
Ethylbenzene	3.118
Xylenes (o-, m-, p- isomers)	3.15
Toluene	2.65
Benzene	1.83

Autoignition Temperature	527 °C / 980.6 °F
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Formula	C8H10
Molecular Weight	106.17

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

None known, based on information available

10.2. Chemical stability

Stable under normal conditions

10.3. Possibility of hazardous reactions

Hazardous Polymerization Hazardous polymerization does not occur.
Hazardous Reactions No information available.

10.4. Conditions to avoid

Incompatible products. Heat, flames and sparks.

10.5. Incompatible materials

Strong oxidizing agents. Strong acids.

10.6. Hazardous decomposition products

Carbon monoxide (CO). Carbon dioxide (CO_2). Hydrocarbons. Aldehydes.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information No acute toxicity information is available for this product

(a) acute toxicity;
Oral No data available
Dermal No data available
Inhalation No data available

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylbenzene	3500 mg/kg (Rat)	15400 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h
Xylenes (o-, m-, p- isomers)	3500 mg/kg (Rat)	4350 mg/kg (Rabbit) 1700 mg/kg (Rabbit)	29.08 mg/L [MOE Risk Assessment Vol.1, 2002]
Toluene	> 5000 mg/kg (Rat)	12000 mg/kg (Rabbit)	26700 ppm (Rat) 1 h
Benzene	810 mg/kg (Rat) 1800 mg/kg (Rat)	8200 mg/kg (Rabbit)	44.66 mg/L (Rat) 4 h

(b) skin corrosion/irritation; No data available

(c) serious eye damage/irritation; No data available

(d) respiratory or skin sensitization;
Respiratory No data available
Skin No data available

(e) germ cell mutagenicity; No data available

(f) carcinogenicity; No data available

The table below indicates whether each agency has listed any ingredient as a carcinogen

Component	EU	UK	Germany	IARC
Ethylbenzene				Group 2B
Benzene	Carc Cat. 1A		Cat. 1	Group 1

(g) reproductive toxicity; No data available
Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.
Developmental Effects Developmental effects have occurred in experimental animals.
Teratogenicity Teratogenic effects have occurred in experimental animals.

(h) STOT-single exposure; No data available

(i) STOT-repeated exposure; No data available

Target Organs Eyes, Skin, Central nervous system (CNS), Liver, Kidney, Respiratory system.

(j) aspiration hazard; No data available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects Do not empty into drains.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Ethylbenzene	9.6 mg/L LC50 96 h 9.1 - 15.6 mg/L LC50 96 h 32 mg/L LC50 96 h 7.55 - 11 mg/L LC50 96 h 4.2 mg/L LC50 96 h 11.0 - 18.0 mg/L LC50 96 h	1.8 - 2.4 mg/L EC50 48 h	2.6 - 11.3 mg/L EC50 72 h 438 mg/L EC50 > 96 h 4.6 mg/L EC50 = 72 h 1.7 - 7.6 mg/L EC50 96 h	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h
Xylenes (o-, m-, p- isomers)	30.26 - 40.75 mg/L LC50 96 h 780 mg/L LC50 96 h 23.53 - 29.97 mg/L LC50 96 h 7.711 - 9.591 mg/L LC50 96 h 19 mg/L LC50 96 h 13.1 - 16.5 mg/L LC50 96 h 13.5 - 17.3 mg/L LC50 96 h 2.661 - 4.093 mg/L LC50 96 h 13.4 mg/L LC50 96 h	0.6 mg/L LC50 = 48 h 3.82 mg/L EC50 = 48 h		EC50 = 0.0084 mg/L 24 h
Toluene	50-70 mg/L LC50 96 h 5-7 mg/L LC50 96 h 15-19 mg/L LC50 96 h 28 mg/L LC50 96 h 12 mg/L LC50 96 h	11.5 mg/L EC50 = 48 h 5.46 - 9.83 mg/L EC50 48 h	12.5 mg/L EC50 = 72 h 433 mg/L EC50 > 96 h	EC50 = 19.7 mg/L 30 min
Benzene	70000 - 142000 µg/L LC50 96 h 22330 - 41160 µg/L LC50 96 h 28.6 mg/L LC50 96 h 22.49 mg/L LC50 96 h 5.3 mg/L LC50 96 h 10.7 - 14.7 mg/L LC50 96 h	10 mg/L EC50 = 48 h 8.76 - 15.6 mg/L EC50 48 h	29 mg/L EC50 = 72 h	

12.2. Persistence and degradability No information available

Component	Degradability
Toluene 108-88-3 (0 - 0.5)	86% (20d)

12.3. Bioaccumulative potential No information available

Component	log Pow	Bioconcentration factor (BCF)
Ethylbenzene	3.118	15
Xylenes (o-, m-, p- isomers)	3.15	0.6 - 15
Toluene	2.65	90
Benzene	1.83	3.5 - 4.4

12.4. Mobility in soil .

12.5. Results of PBT and vPvB assessment No data available for assessment.

12.6. Other adverse effects

Endocrine Disruptor Information	This product does not contain any known or suspected endocrine disruptors
Persistent Organic Pollutant	This product does not contain any known or suspected substance
Ozone Depletion Potential	This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products	Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.
Contaminated Packaging	Empty remaining contents. Dispose of in accordance with local regulations. Do not re-use empty containers.
European Waste Catalogue (EWC)	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Other Information	Waste codes should be assigned by the user based on the application for which the product was used.

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

ADR

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

IATA

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

14.5. Environmental hazards	No hazards identified
14.6. Special precautions for user	No special precautions required
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories Australia X = listed China Canada The product is classified and labeled according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC Europe TSCA Korea Philippines Japan

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	AICS	KECL
Ethylbenzene	202-849-4	-		X	X	-	X	X	X	X	X
Xylenes (o-, m-, p- isomers)	215-535-7	-		X	X	-	X	X	X	X	X

Toluene	203-625-9	-		X	X	-	X	X	X	X	X
Benzene	200-753-7	-		X	X	-	X	X	X	X	X

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Toluene		Use restricted. See item 48. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details)	
Benzene		Use restricted. See item 5. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details) Use restricted. See item 28. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details) Use restricted. See item 29. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details)	

National Regulations

Component	Germany - Water Classification (VwVwS)	Germany - TA-Luft Class
Ethylbenzene	WGK 1	
Xylenes (o-, m-, p- isomers)	WGK 2	
Toluene	WGK 2	
Benzene	WGK 3	Krebserzeugende Stoffe - Class III : 1 mg/m³ (Massenkonzentration)

Component	France - INRS (Tables of occupational diseases)
Ethylbenzene	Tableaux des maladies professionnelles (TMP) - RG 84
Xylenes (o-, m-, p- isomers)	Tableaux des maladies professionnelles (TMP) - RG 4bis,RG 84
Toluene	Tableaux des maladies professionnelles (TMP) - RG 4bis,RG 84
Benzene	Tableaux des maladies professionnelles (TMP) - RG 4,RG 4bis,RG 84

Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment.
Take note of Dir 94/33/EC on the protection of young people at work
Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has not been conducted

SECTION 16: OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3
R10 - Flammable
R11 - Highly flammable
R20 - Harmful by inhalation
R38 - Irritating to skin
R45 - May cause cancer
R46 - May cause heritable genetic damage
R63 - Possible risk of harm to the unborn child
R65 - Harmful: may cause lung damage if swallowed
R67 - Vapors may cause drowsiness and dizziness

R20/21 - Harmful by inhalation and in contact with skin
R36/38 - Irritating to eyes and skin
R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation
R48/23/24/25 - Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed

Full text of H-Statements referred to under sections 2 and 3
H226 - Flammable liquid and vapor
H225 - Highly flammable liquid and vapor
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H304 - May be fatal if swallowed and enters airways
H373 - May cause damage to organs through prolonged or repeated exposure

Legend

CAS - Chemical Abstracts Service
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japanese Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit
ACGIH - American Conference of Governmental Industrial Hygienists
DNEL - Derived No Effect Level
RPE - Respiratory Protective Equipment
LC50 - Lethal Concentration 50%
NOEC - No Observed Effect Concentration
PBT - Persistent, Bioaccumulative, Toxic
TWA - Time Weighted Average
IARC - International Agency for Research on Cancer
PNEC - Predicted No Effect Concentration
LD50 - Lethal Dose 50%
EC50 - Effective Concentration 50%
POW - Partition coefficient Octanol:Water
vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor
ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC - Volatile Organic Compounds

Key literature references and sources for data
Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice
Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.

Creation Date	13-Feb-2015
Revision Date	21-Feb-2014
Revision Summary	Not applicable.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of Safety Data Sheet

SAFETY DATA SHEET

Version 5.8
Revision Date 10/12/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Zinc

Product Number : 96454
Brand : Sigma-Aldrich

CAS-No. : 7440-66-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Combustible dust,
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

May form combustible dust concentrations in air
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P391 Collect spillage.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Zn
Molecular weight : 65.39 g/mol

Hazardous components

Component		Classification	Concentration
Zinc powder (stabilized)			
CAS-No. EC-No. Index-No.	7440-66-6 231-175-3 030-001-01-9	Aquatic Acute 1; Aquatic Chronic 1; H410	<= 100 %
Zinc oxide			
CAS-No. EC-No. Index-No.	1314-13-2 215-222-5 030-013-00-7	Aquatic Acute 1; Aquatic Chronic 1; H410	>= 5 - < 10 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Special powder against metal fire Dry sandUse water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media
Water

5.2 Special hazards arising from the substance or mixture

Zinc/zinc oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Zinc oxide	1314-13-2	TWA	2.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	metal fume fever		
		STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		metal fume fever		

		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	15.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	15.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	Not applicable
e)	Melting point/freezing point	Melting point/range: 420 °C (788 °F) - lit.
f)	Initial boiling point and boiling range	907 °C (1,665 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	Not applicable
l)	Vapour density	No data available
m)	Relative density	7.133 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable
p)	Auto-ignition temperature	does not ignite
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	During processing, dust may form explosive mixture in air.
t)	Oxidizing properties	No data available

9.2 Other safety information

Bulk density	1.8 - 3.2 kg/m3

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Dust may form explosive mixture in air.

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Acids and bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available (Zinc powder (stabilized))

Inhalation: No data available (Zinc powder (stabilized))

Dermal: No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Skin corrosion/irritation
No data available (Zinc powder (stabilized))

Serious eye damage/eye irritation
No data available (Zinc powder (stabilized))

Respiratory or skin sensitisation
Did not cause sensitisation on laboratory animals. (Zinc powder (stabilized))

Germ cell mutagenicity
No data available (Zinc powder (stabilized))

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Specific target organ toxicity - single exposure
No data available (Zinc powder (stabilized))

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available (Zinc powder (stabilized))

Additional Information
RTECS: ZG8600000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Effects due to ingestion may include:, chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness, Contact with eyes or skin may cause:, Irritation (Zinc powder (stabilized))

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 450 µg/l - 96 h (Zinc powder (stabilized))
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h (Zinc powder (stabilized))
	mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d (Zinc powder (stabilized))

12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Algae - 7 d at 16 °C - 5 µg/l (Zinc powder (stabilized))
	Bioconcentration factor (BCF): 466

12.4 Mobility in soil

No data available (Zinc powder (stabilized))

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Zinc powder (stabilized))
Reportable Quantity (RQ): 1020 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc powder (stabilized))
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Zinc powder (stabilized))

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Zinc oxide	1314-13-2	2007-03-01
Zinc powder (stabilized)	7440-66-6	1993-04-24

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

	May form combustible dust concentrations in air
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information
Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 10/12/2015 Print Date: 05/01/2016

ATTACHMENT I

Langan Guidelines

LANGAN

ATTACHMENT I

LANGAN GUIDELINES

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carrying passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to insure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signalman to direct backing as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done, and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

APPENDIX I

GENERIC NYSDOH COMMUNITY AIR MONITORING PLAN

LANGAN

New York State Department of Health Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area and when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.
Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required at one upwind and two downwind stations for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** bases or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background

conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

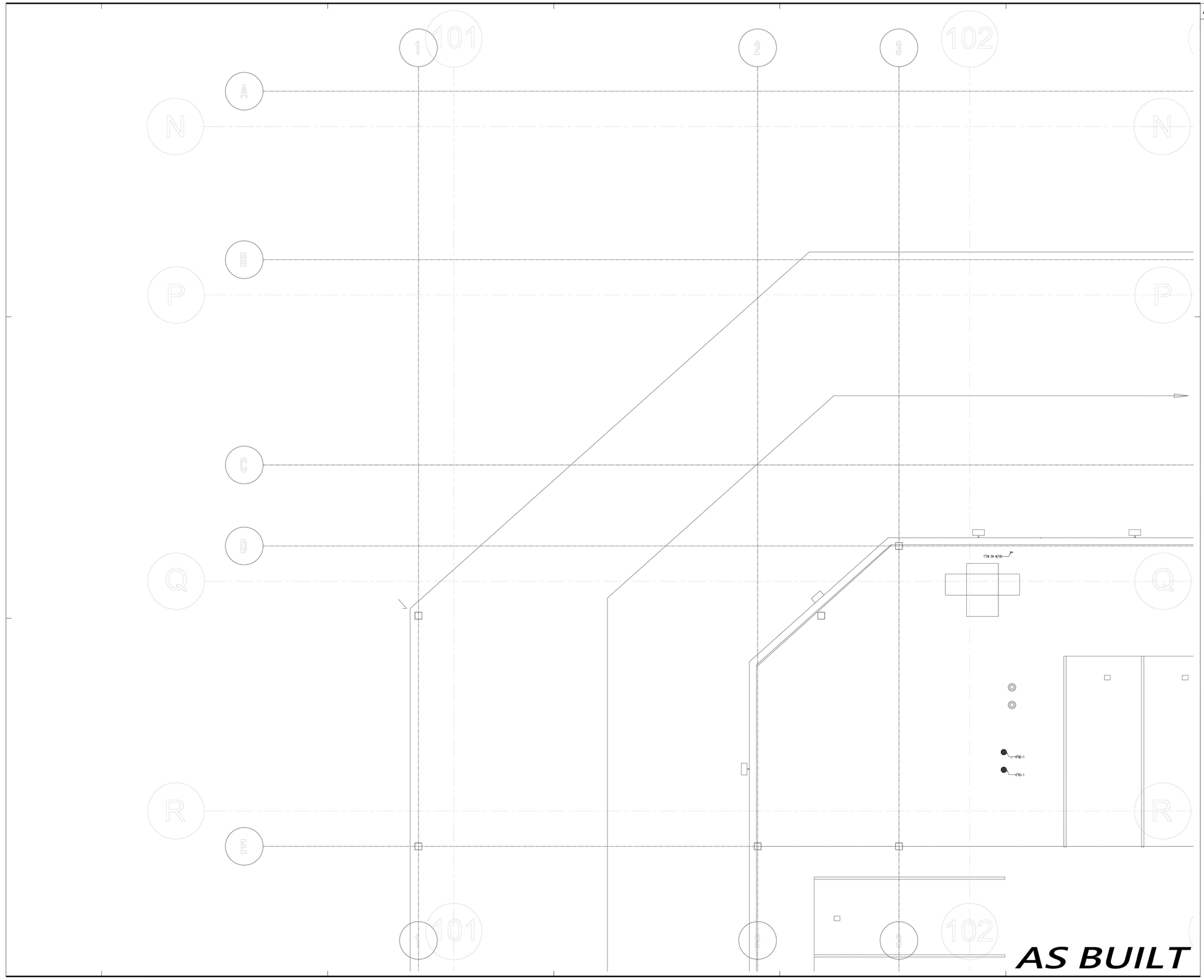
Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

APPENDIX J

SUB-SLAB DEPRESSURIZATION SYSTEM AS-BUILT DRAWINGS

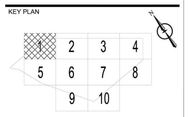
LANGAN



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
1 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

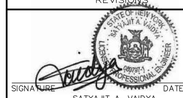
PROJECT NO.

DRAWING NO. PL-RF-1 | REVISION NO.

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.
REVISIONS		



SIGNATURE SATYAJIT A. VAIDYA DATE SIGNED
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

PLUMBING PIPING
PART PLAN
ROOF LEVEL
1 OF 10

Project No.	Drawing No.
100652602	3
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

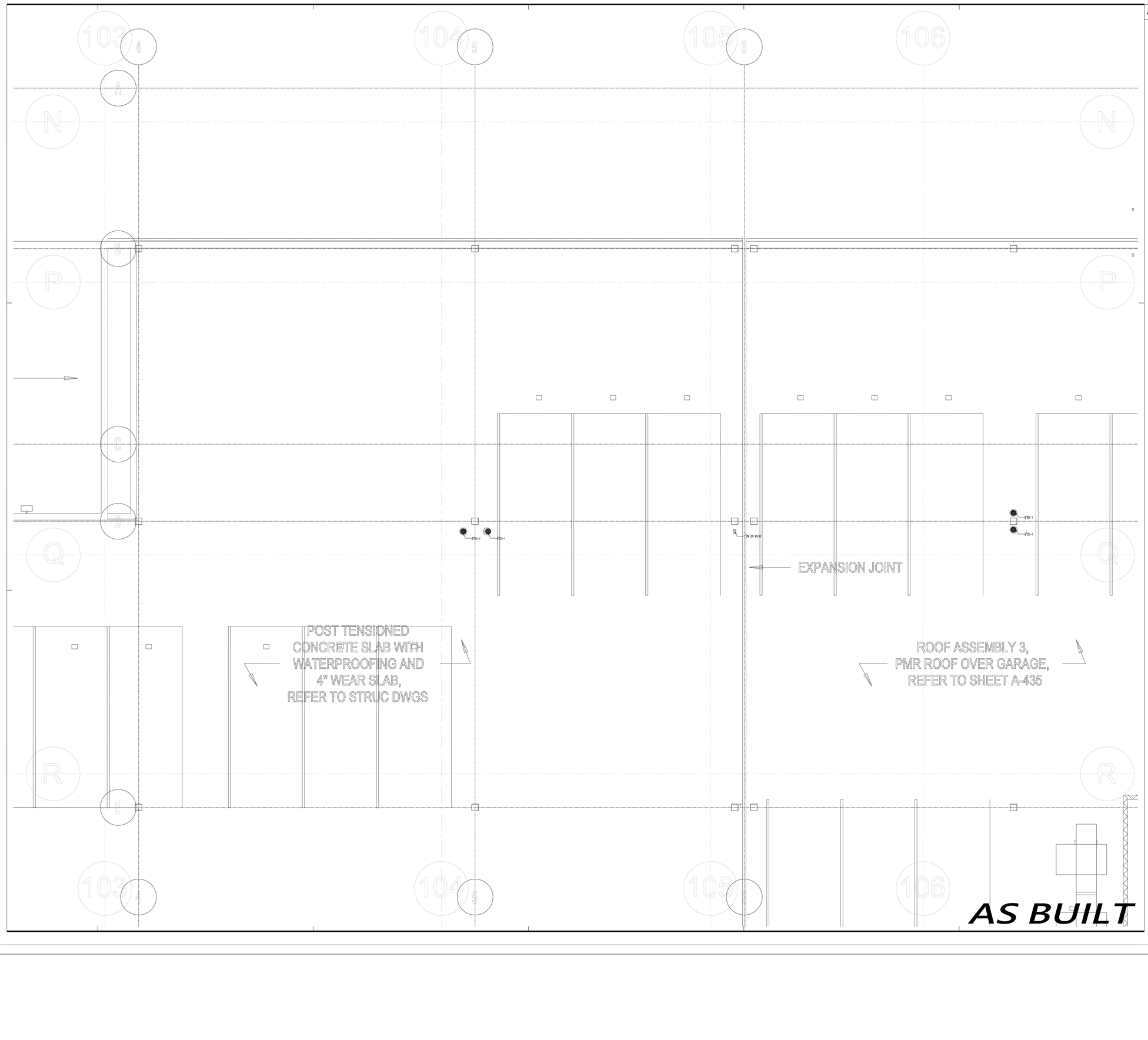
AS BUILT

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

LANGAN

PROJECT NO. 100652602

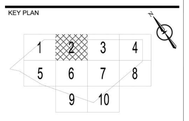
Filename: C:\pms\langan-pw-01\d08824431\100652602-BI701-01101.dwg Date: 12/10/2025 Time: 08:12 User: acofrancesco Style Table: Langan.stb Layout: 3



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
2 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. REVISION NO.

PL-RF-2

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.
REVISIONS		

SIGNATURE SATYAJIT A. VAIDYA DATE SIGNED
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

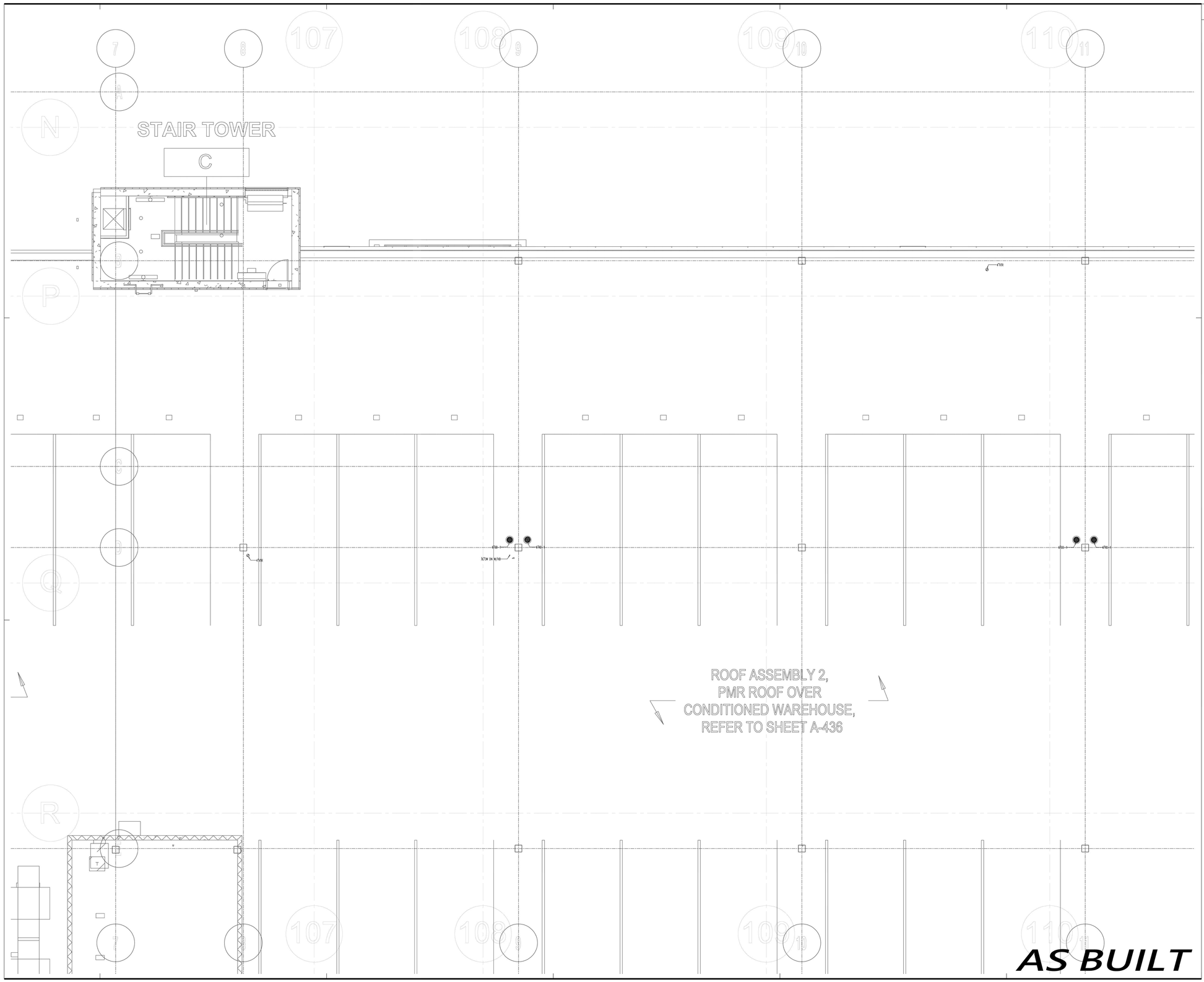
PLUMBING PIPING
PART PLAN
ROOF LEVEL
2 OF 10

Project No.	Drawing No.
100652602	4
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

PROJECT NO. 100652602

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\c0882443\100652602-BI701-D101.dwg Date: 12/10/2025 Time: 08:10 User: acofrancesco Style Table: Langan.stb Layout: 4



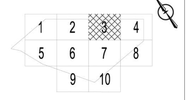
NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
3 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-RF-3

REVISION NO.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Date	Description	No.

REVISIONS

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

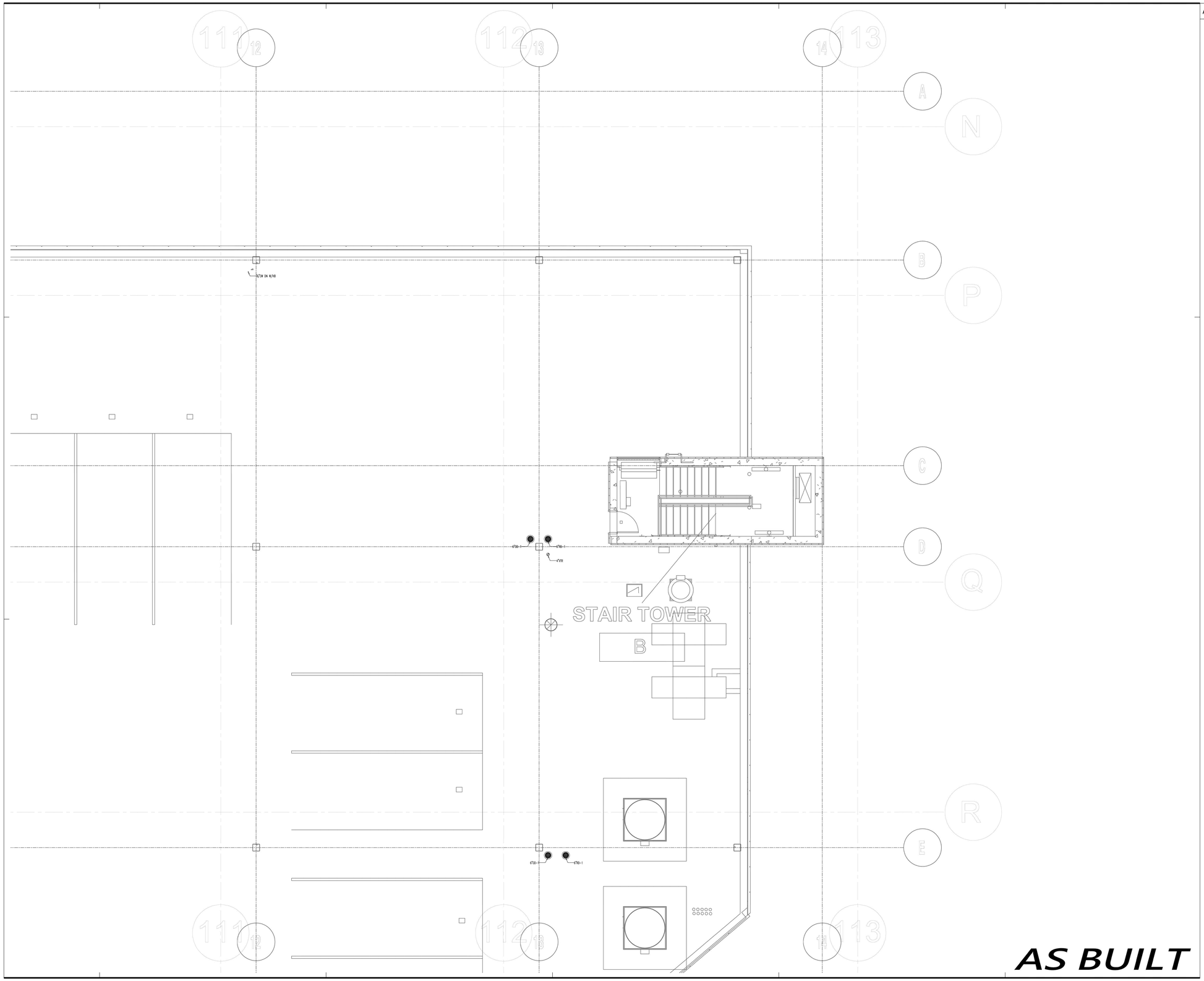
PLUMBING PIPING
PART PLAN
ROOF LEVEL
3 OF 10

Project No.	Drawing No.
100652602	5
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

LANGAN

PROJECT NO. 100652602

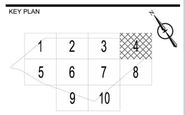
Filename: C:\bim\langan-pw-07\d0652443\100652602-BIT01-0101.dwg Date: 12/10/2025 Time: 08:15 User: acofrancesco Style Table: Langan.stb Layout: 5



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
4 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-RF-4

REVISION NO.

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.

REVISIONS

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797-1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054

T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

PLUMBING PIPING
PART PLAN
ROOF LEVEL
4 OF 10

Project No.	Drawing No.
100652602	6
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

PROJECT NO. 100652602

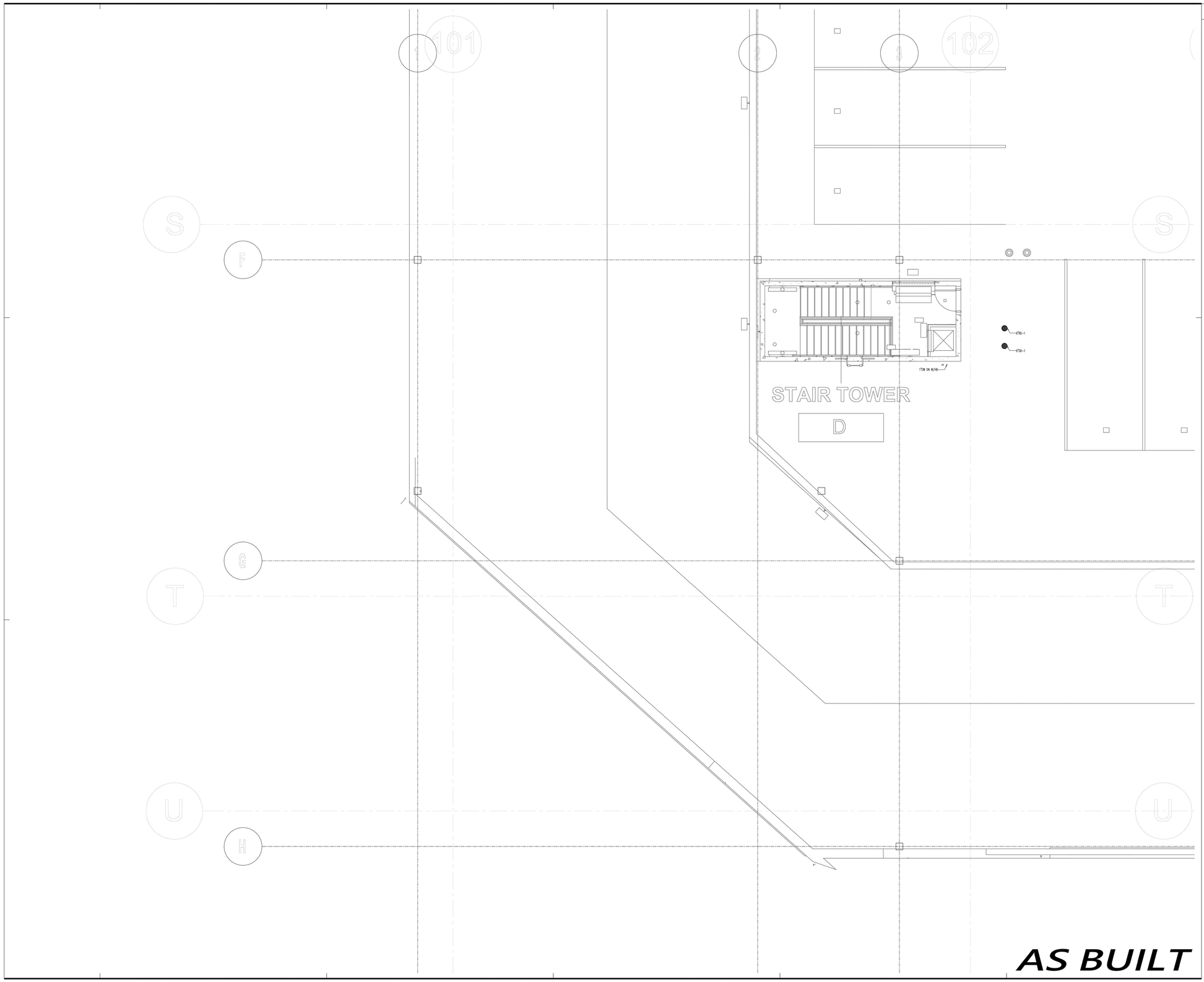
LANGAN

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\c0682443\100652602-BIT01-0101.dwg Date: 12/10/2025 Time: 08:16 User: acohnanceco Style Table: Langan.stb Layout: 6

NOTES:

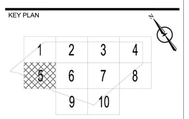
1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
5 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-RF-5

REVISION NO.

AS BUILT

Date	Description	No.

REVISIONS

SIGNATURE SATYAJIT A. VADYA DATE SIGNED
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

PLUMBING PIPING
PART PLAN
ROOF LEVEL
5 OF 10

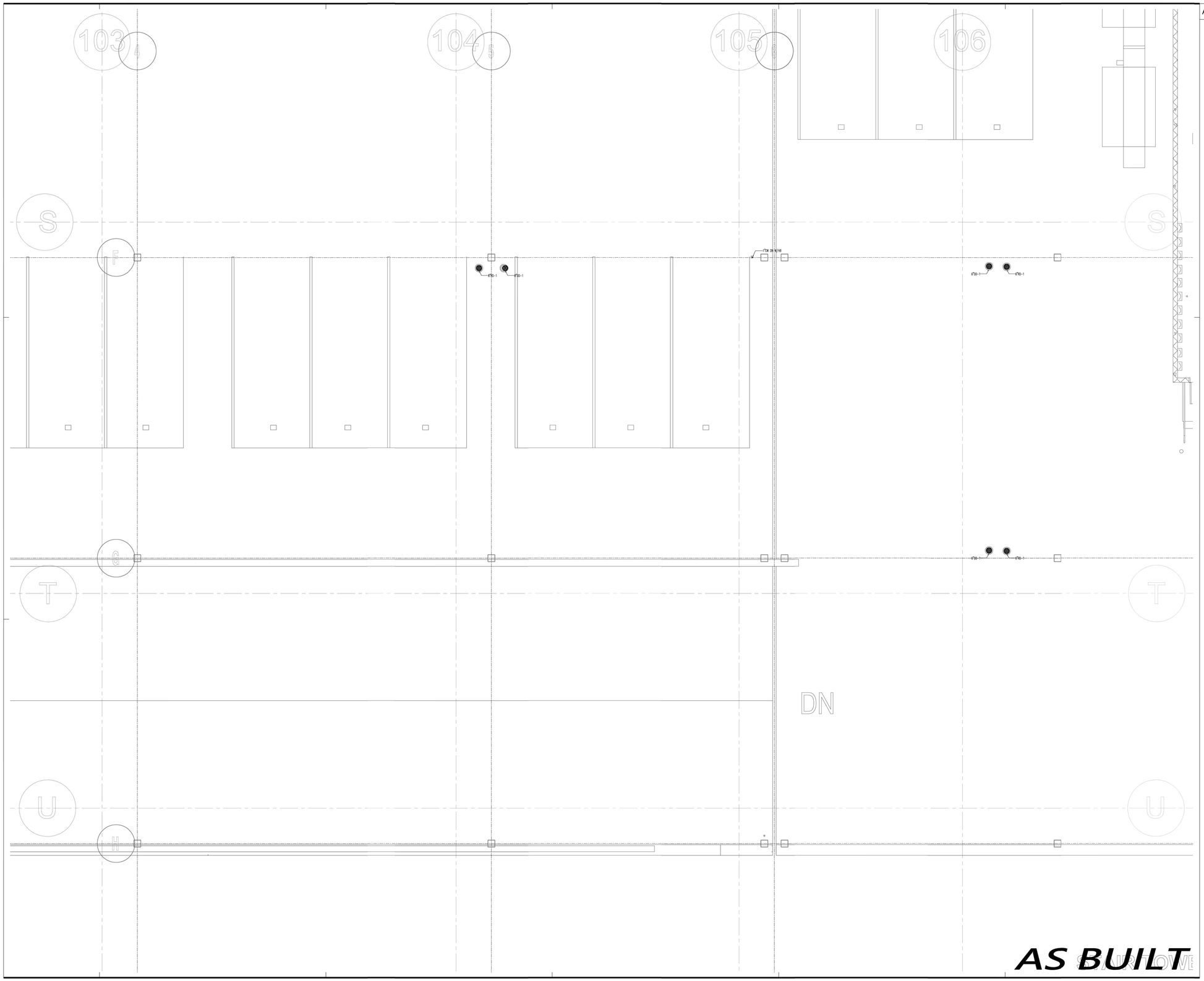
Project No.	Drawing No.
100652602	7
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

PROJECT NO. 100652602

LANGAN

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\c0882443\100652602-B0701-0101.dwg Date: 12/10/2025 Time: 08:17 User: acofrancesco Style Table: Langan.stb Layout: 7



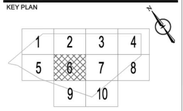
NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
6 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-RF-6 REVISION NO.

AS BUILT

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Date	Description	No.
REVISIONS		

STATE OF NEW YORK · SATYAJIT A. VAIDYA · 089797 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED
SATYAJIT A. VAIDYA
(NYS PE No. 089797-1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

PLUMBING PIPING
PART PLAN
ROOF LEVEL
6 OF 10

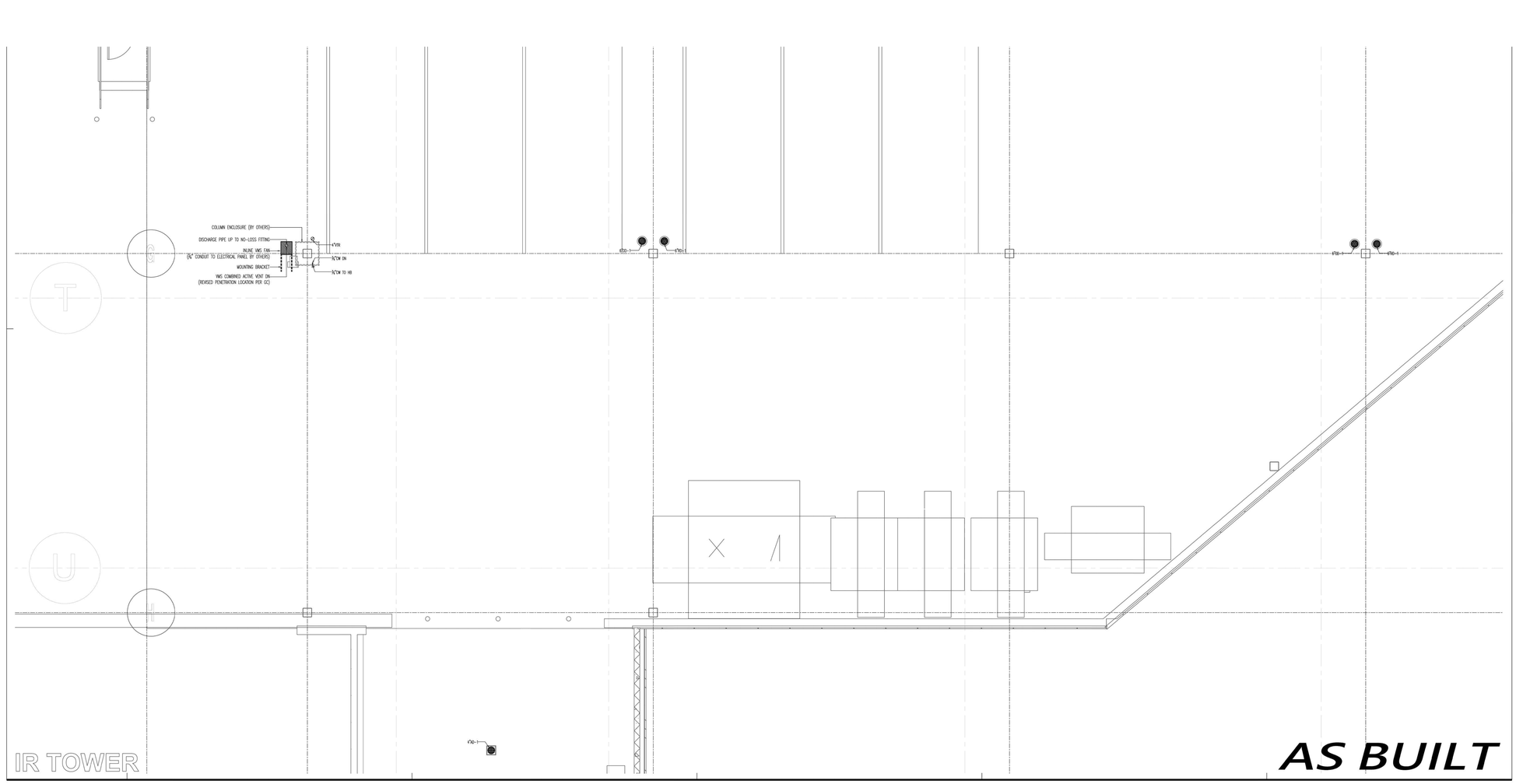
Project No.	Drawing No.
100652602	8
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

LANGAN PROJECT NO. 100652602

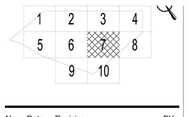
Filename: C:\bim\langan-pw-01\d0882443\100652602-6bf701-01.01.dwg Date: 12/10/2025 Time: 08:18 User: acothroncecio Style Table: Langan.stb Layout: 8

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.



KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
7 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO.	REVISION NO.
PL-RF-7	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Date	Description	No.
REVISIONS		

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

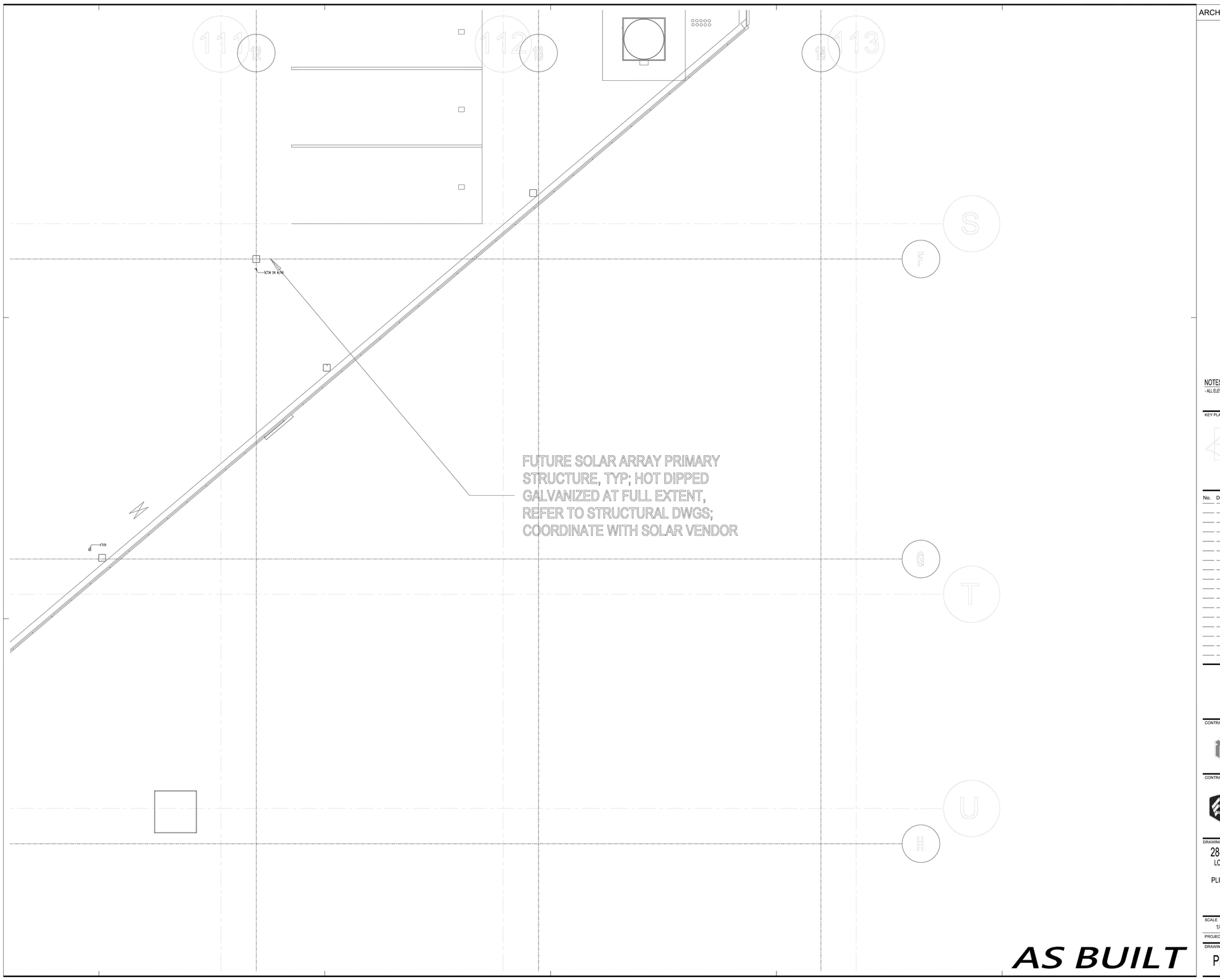
Drawing Title

PLUMBING PIPING
PART PLAN
ROOF LEVEL
7 OF 10

Project No.	Drawing No.
100652602	9
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

LANGAN PROJECT NO. 100652602

Filename: C:\bim\langan-pw-01\100652443\100652602-BIT01-0101.dwg Date: 12/10/2025 Time: 08:19 User: acothroneoco Style Table: Langan.stb Layout: 9



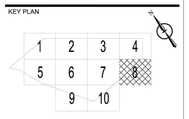
NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
8 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-RF-8

REVISION NO.

Date	Description	No.

REVISIONS

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797-1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA2799400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

PLUMBING PIPING
PART PLAN
ROOF LEVEL
8 OF 10

Project No.	Drawing No.
100652602	10
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

LANGAN PROJECT NO. 100652602

Filename: C:\bim\langan-pw-01\d0682443\100652602-BP01-0101.dwg Date: 12/10/2025 Time: 08:20 User: acolfrancesco Style Table: Langan.stb Layout: 10

STAIR TOW

W L J 4 5 6 103 104 105 106

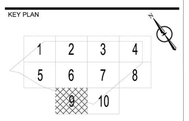
NO WORK IN THIS AREA

AS BUILT

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
9 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-RF-9

REVISION NO.

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.

REVISIONS

STATE OF NEW YORK · SATYAJIT A. VAIDYA · 089797 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE SATYAJIT A. VAIDYA DATE SIGNED
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

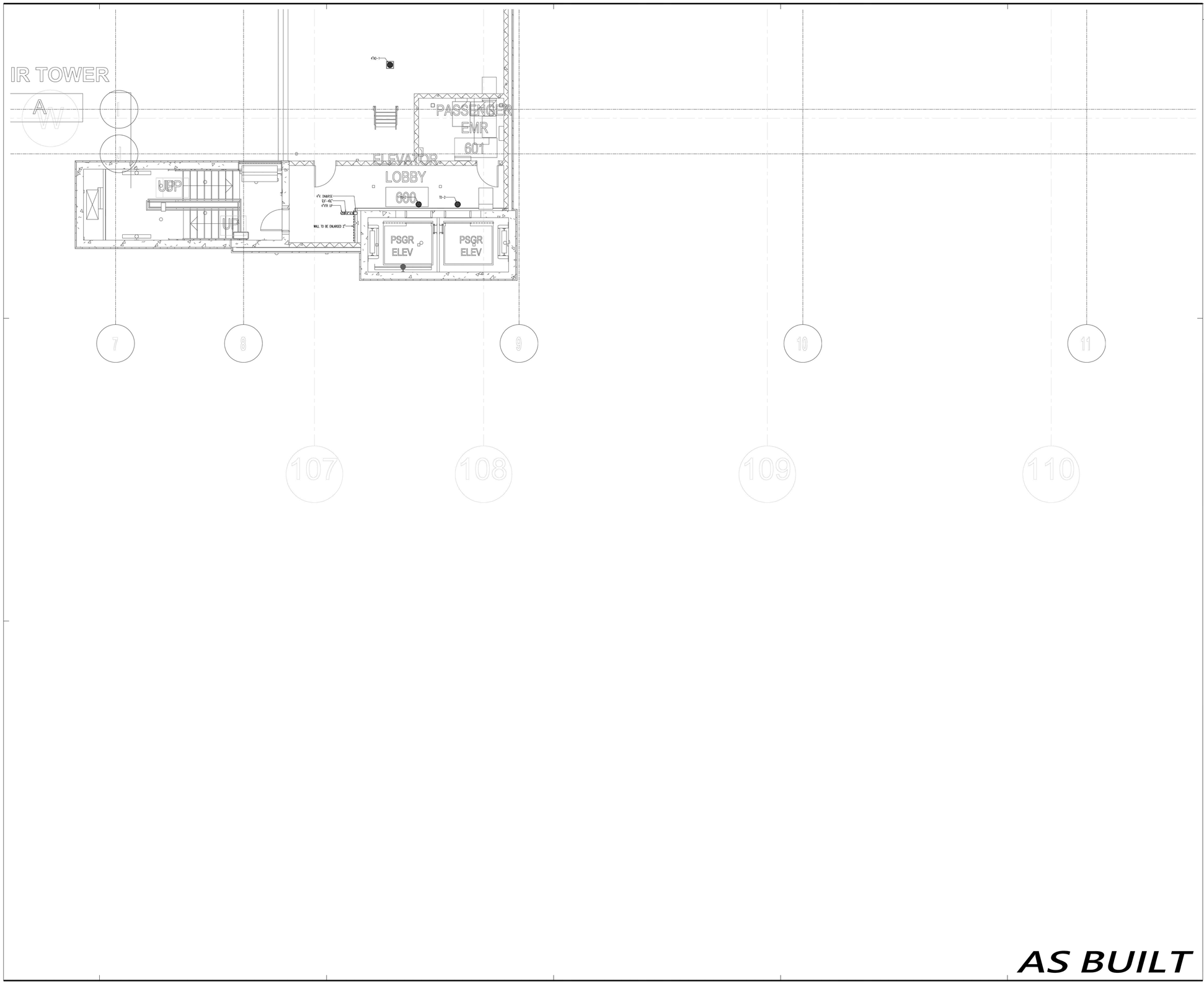
PLUMBING PIPING
PART PLAN
ROOF LEVEL
9 OF 10

Project No.	Drawing No.
100652602	11
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

LANGAN

PROJECT NO. 100652602



AS BUILT

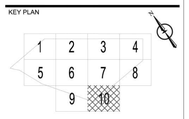
NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING PART PLAN
ROOF LEVEL
10 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO.	REVISION NO.
PL-RF-10	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Date	Description	No.
REVISIONS		

STATE OF NEW YORK · SATYAJIT A. VAIDYA · 089797 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED
SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

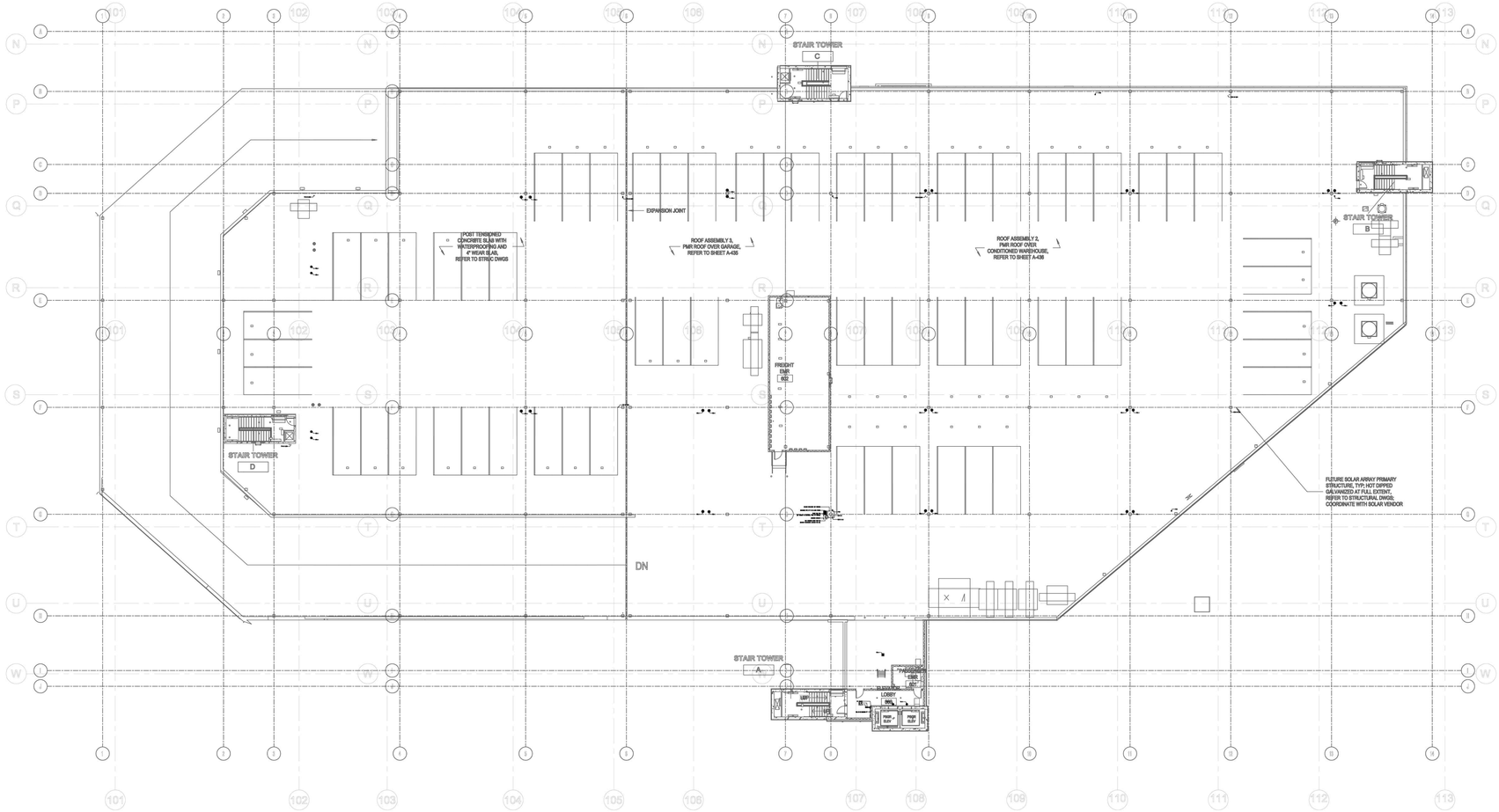
PLUMBING PIPING PART PLAN ROOF LEVEL 10 OF 10

Project No.	Drawing No.
100652602	12
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

LANGAN

PROJECT NO. 100652602

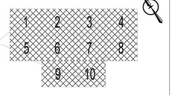
Filename: C:\bim\langan-pw-01\d0882443\100652602-BF701-0101.dwg Date: 12/10/2025 Time: 08:22 User: acofrancesco Style Table: Langan.stb Layout: 12



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM ROOF SLAB (U.O.N.)

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

MPD
MASI PIPING DESIGNS

CONTRACTOR

FORWARD MECHANICAL

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

PLUMBING PIPING OVERALL PLAN
ROOF LEVEL

SCALE	DRAWN
1/16" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-RF-0A

REVISION NO.

AS BUILT

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE PLUMBING PIPING ROOF LEVEL AS-BUILT PLANS PACKAGE PREPARED BY FORWARD MECHANICAL CORP AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.
REVISIONS		

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797-1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

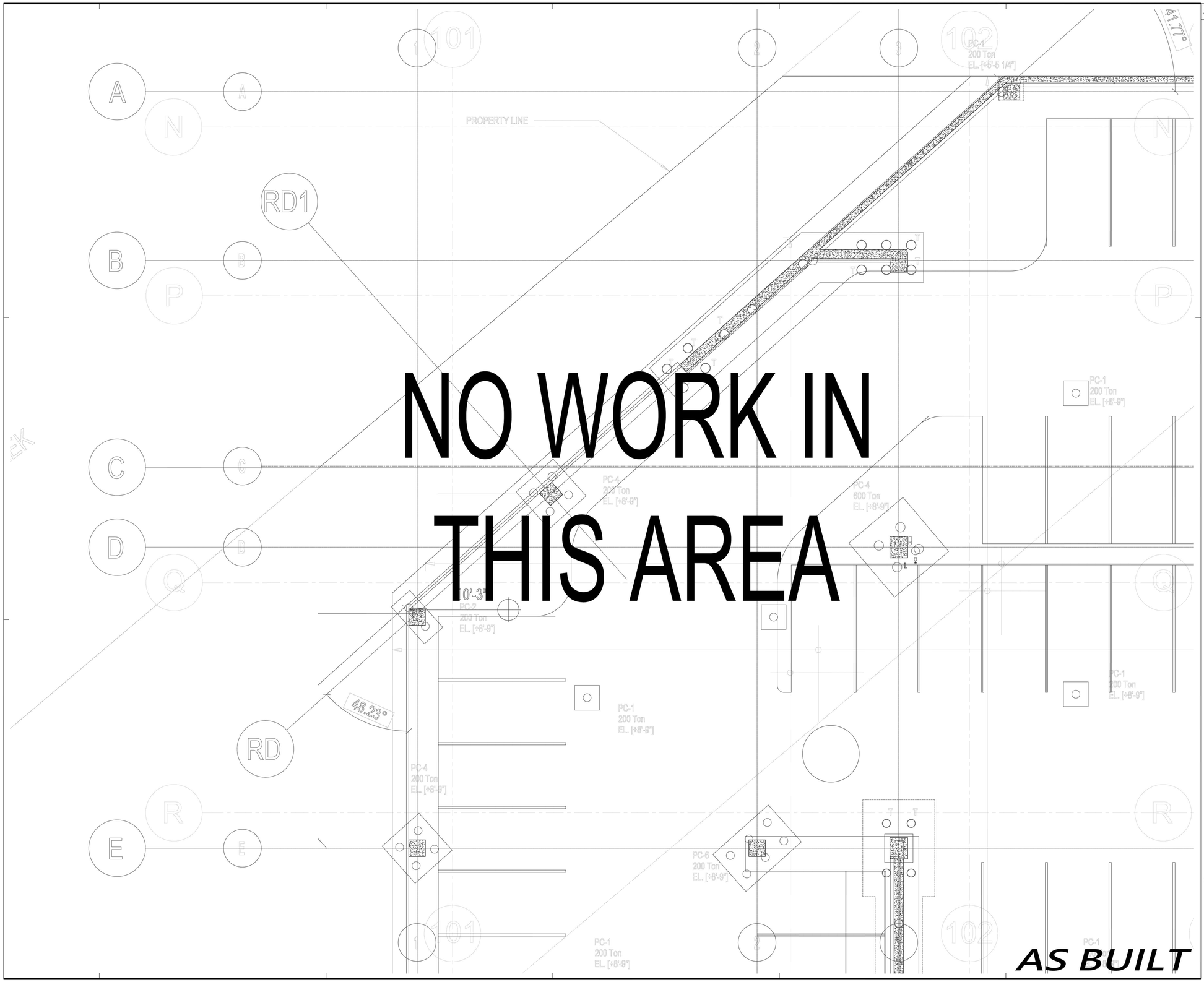
PLUMBING PIPING OVERALL PLAN ROOF LEVEL

Project No.	Drawing No.
100652602	13
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

LANGAN PROJECT NO. 100652602

Filename: C:\bim\langan-pw-01\d0682443\100652602-BT01-0101.dwg Date: 12/10/2025 Time: 08:24 User: asofrancesco Style Table: Langan.stb Layout: 13



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN

	2	3	4
5	6	7	8
9	10		

No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
1 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. | REVISION NO.

PL-VMS-1

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.

REVISIONS

STATE OF NEW YORK · SATYAJIT A. VADYA · 089797 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE | SATYAJIT A. VADYA | DATE SIGNED
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

VAPOR MITIGATION SYSTEM
PART PLAN
UNDERGROUND PIPING
1 OF 10

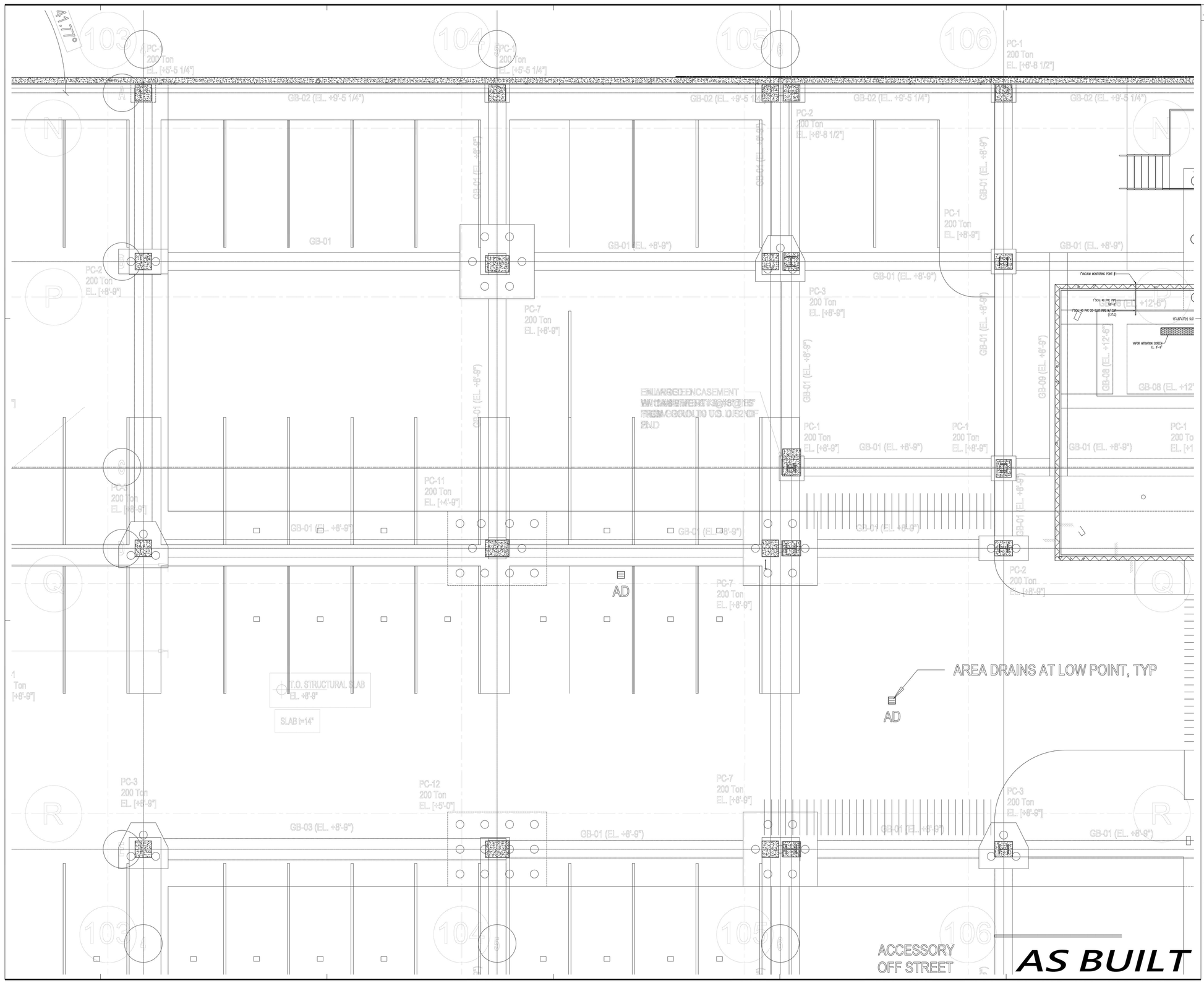
Project No.	Drawing No.
100652602	14
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

LANGAN

PROJECT NO. 100652602

Filename: C:\tmp\langan-pw-01\d0682443\100652602-BP01-0102.dwg Date: 12/10/2025 Time: 08:27 User: acothamcesco Style Table: Langan.stb Layout: 14



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN

1	2	3	4
5	6	7	8
	9	10	

No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE
28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
2 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-2 REVISION NO.

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.

REVISIONS

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED
SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

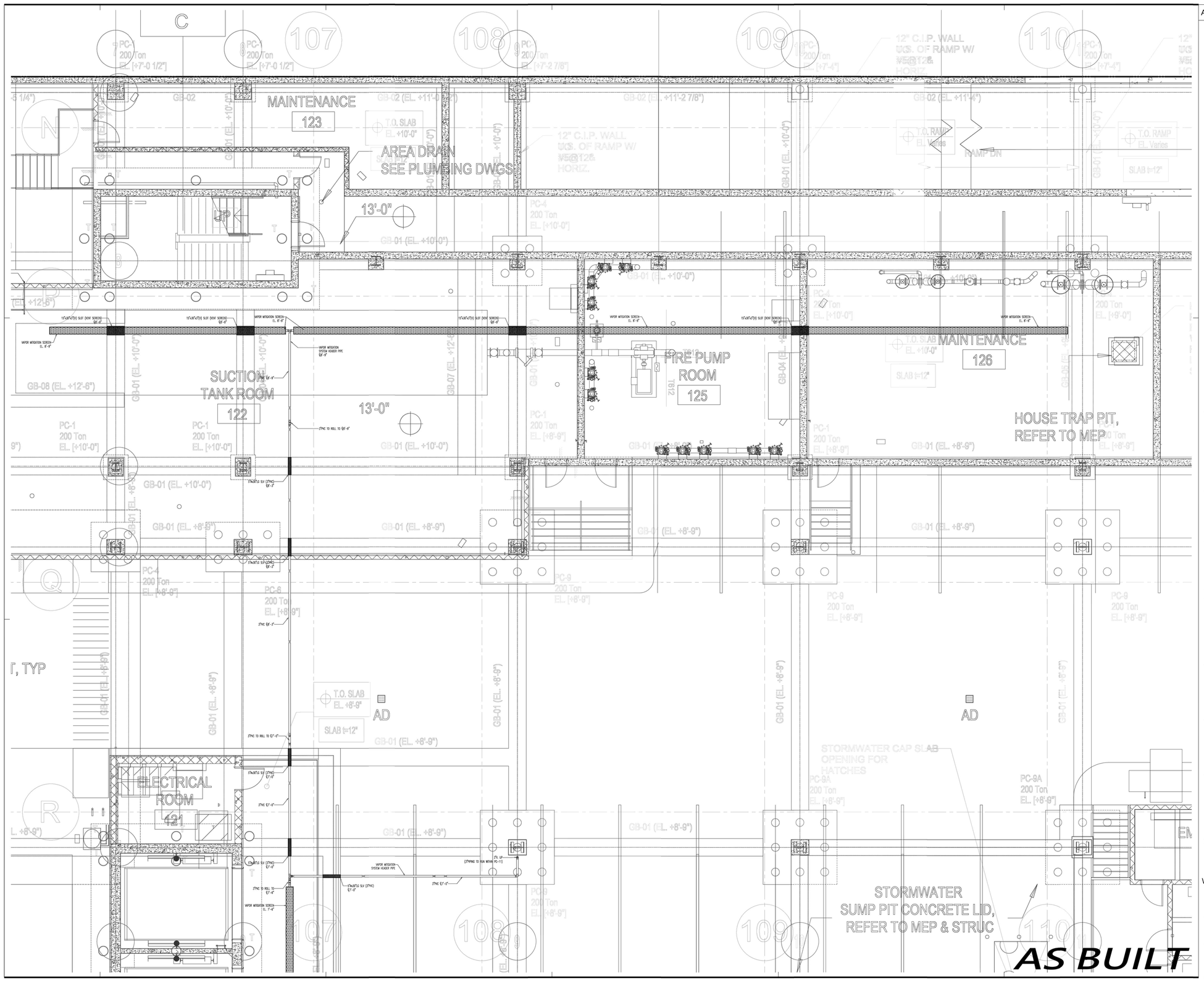
Drawing Title
VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 2 OF 10

Project No.	Drawing No.
100652602	15
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

PROJECT NO. 100652602

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

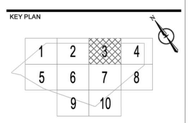
Filename: C:\bim\langan-pw-01\c00652443\100652602-BIT01-0102.dwg Date: 12/10/2025 Time: 08:29 User: acorfranceso Style Table: Langan.stb Layout: 15



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
3 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. | REVISION NO.

PL-VMS-3

AS BUILT

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Date	Description	No.

REVISIONS

STATE OF NEW YORK
SATYAJIT A. VAIDYA
089797
LICENSED PROFESSIONAL ENGINEER

SIGNATURE SATYAJIT A. VAIDYA DATE SIGNED
(NYS PE No. 089797-1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

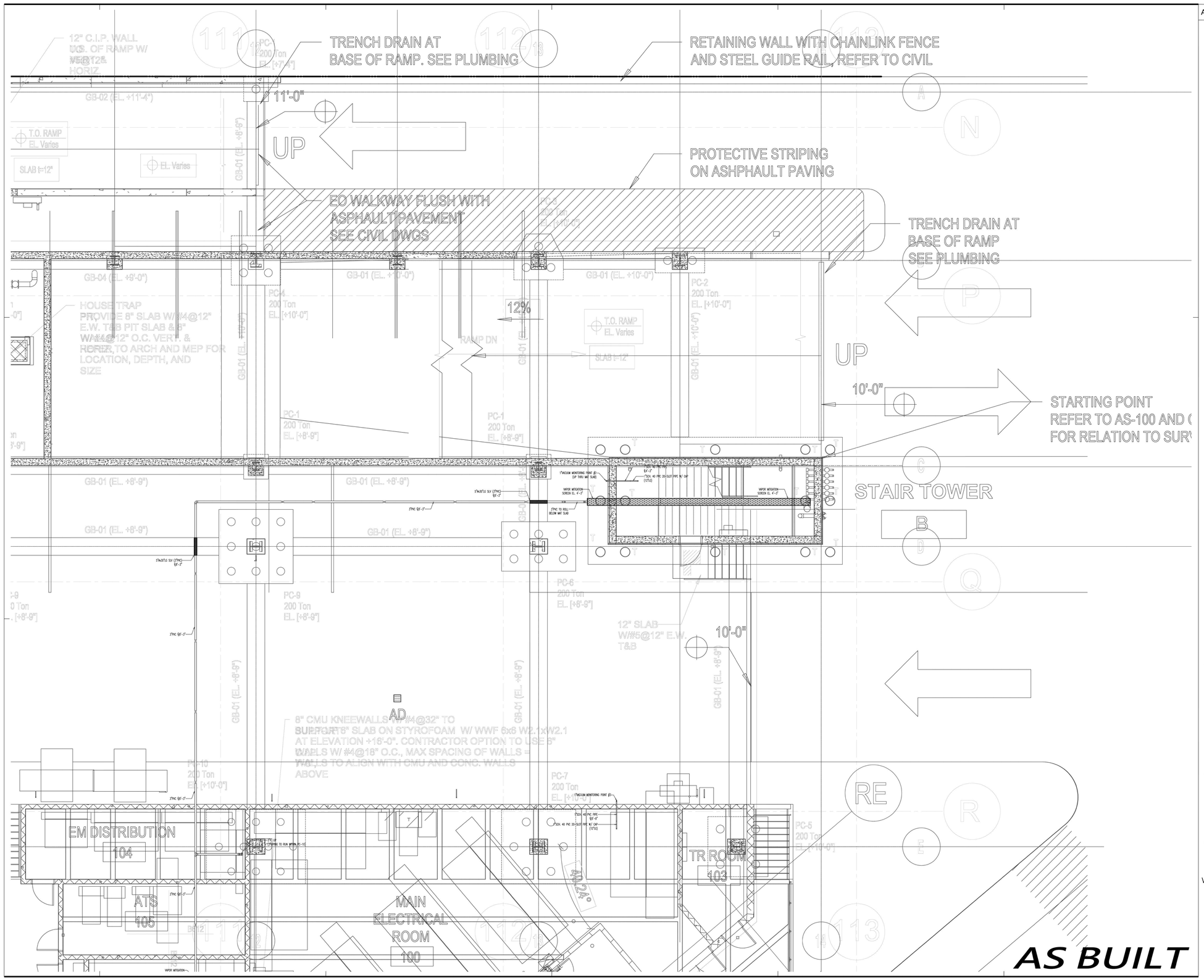
Drawing Title

VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 3 OF 10

Project No.	Drawing No.
100652602	16
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

LANGAN
PROJECT NO. 100652602

Filename: C:\bim\langan-pw-01\d0682443\100652602-68701d102.dwg Date: 12/10/2025 Time: 08:30 User: asothanceaco Style Table: Langan.stb Layout: 16



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN

1	2	3	4
5	6	7	8
9	10		

No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
4 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-4

REVISION NO.

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.
REVISIONS		

STATE OF NEW YORK · SATYAJIT A. VAIDYA · 089797 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED
SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 4 OF 10

Project No.	Drawing No.
100652602	17
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

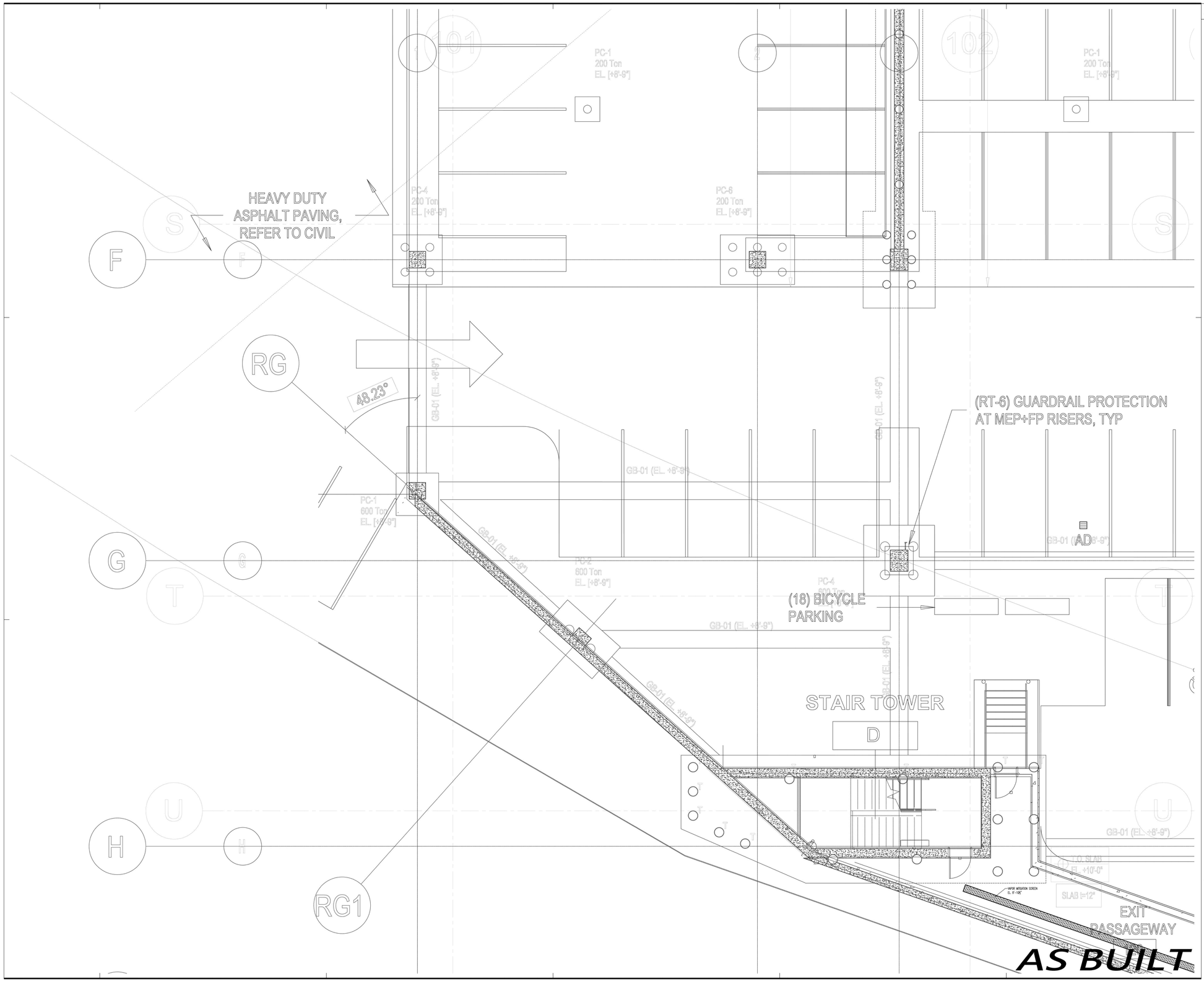
PROJECT NO. 100652602

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\d0682443\100652602-BP701-0102.dwg Date: 12/10/2025 Time: 08:33 User: acofrancesco Style Table: Langan.stb Layout: 17

NOTES:

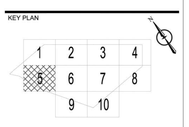
1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.



ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
5 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD
PROJECT NO.	
DRAWING NO.	REVISION NO.
PL-VMS-5	

Date	Description	No.

REVISIONS

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054

T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 5 OF 10

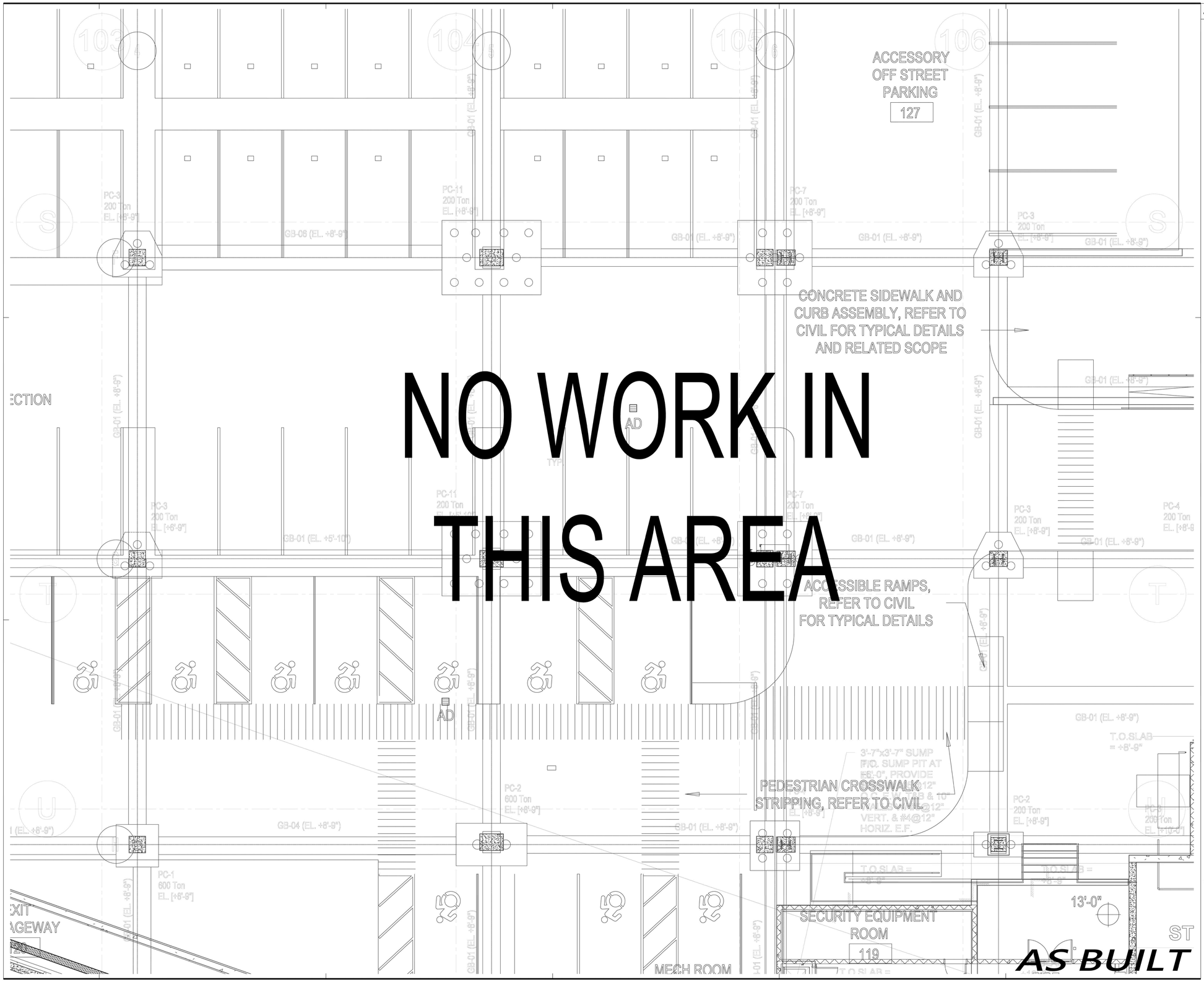
Project No.	Drawing No.
100652602	18
Date	
12/10/2025	
Drawn By	
AC	
Checked By	
BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

LANGAN

PROJECT NO. 100652602

Filename: C:\bim\langan-pw-01\d0882443\100652602-BP701-0102.dwg Date: 12/10/2025 Time: 08:35 User: acofrancesco Style Table: Langan.stb Layout: 18



NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN

	1	2	3	4
	5	6	7	8
		9	10	

No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR
FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE
28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
6 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-6 REVISION NO.

Date	Description	No.

REVISIONS

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED
SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

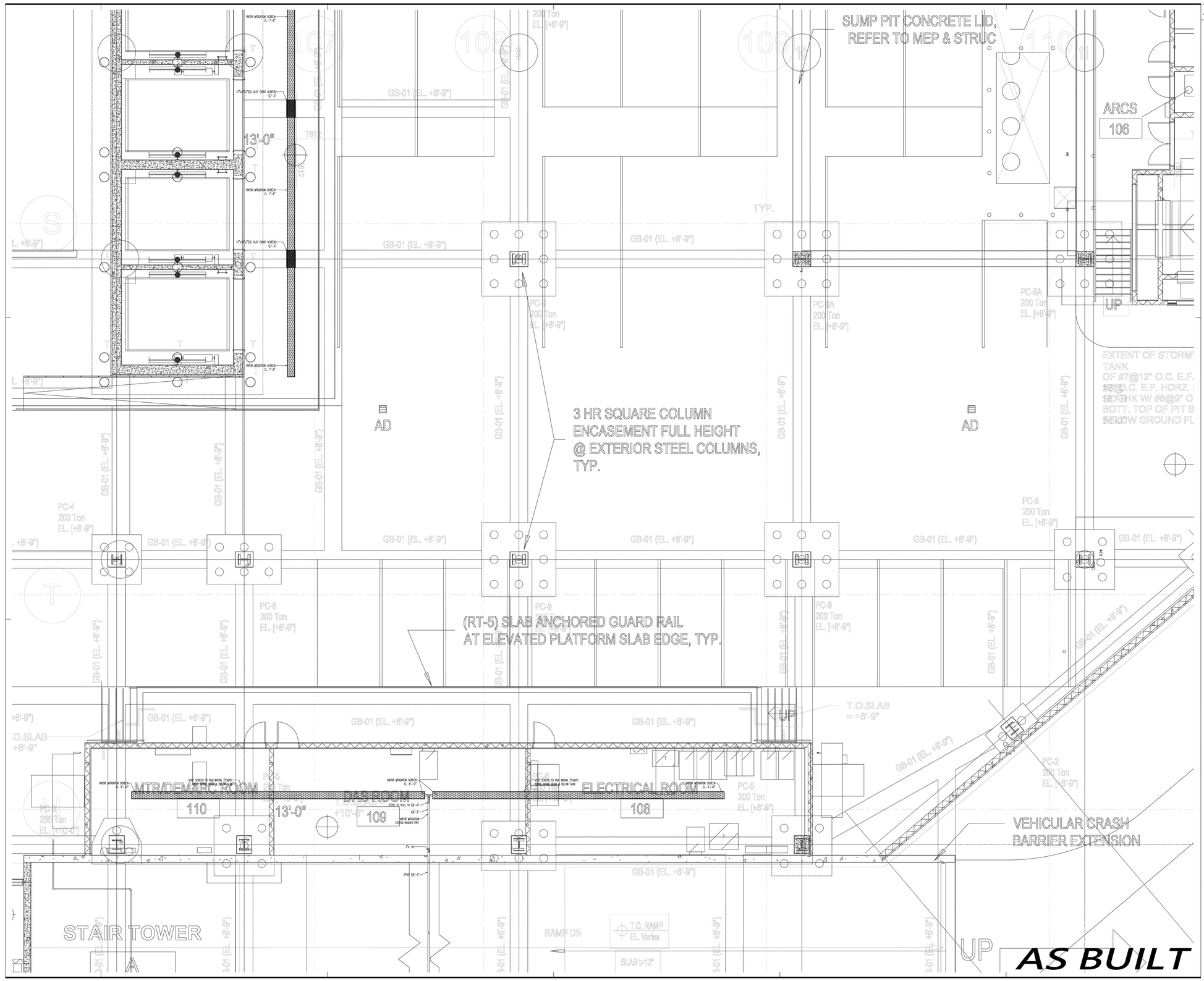
Drawing Title
VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 6 OF 10

Project No.	Drawing No.
100652602	19
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

PROJECT NO. 100652602

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\c00652443\100652602-BIT01-0102.dwg Date: 12/10/2025 Time: 08:38 User: acorfrancesco Style Table: Langan.stb Layout: 19



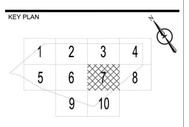
ARCHITECT/ENGINEER NOTES

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
7 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-7

REVISION NO.

Date	Description	No.

REVISIONS

SIGNATURE SATYAJIT A. VAIDYA (NYS PE No. 089797–1) DATE SIGNED

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

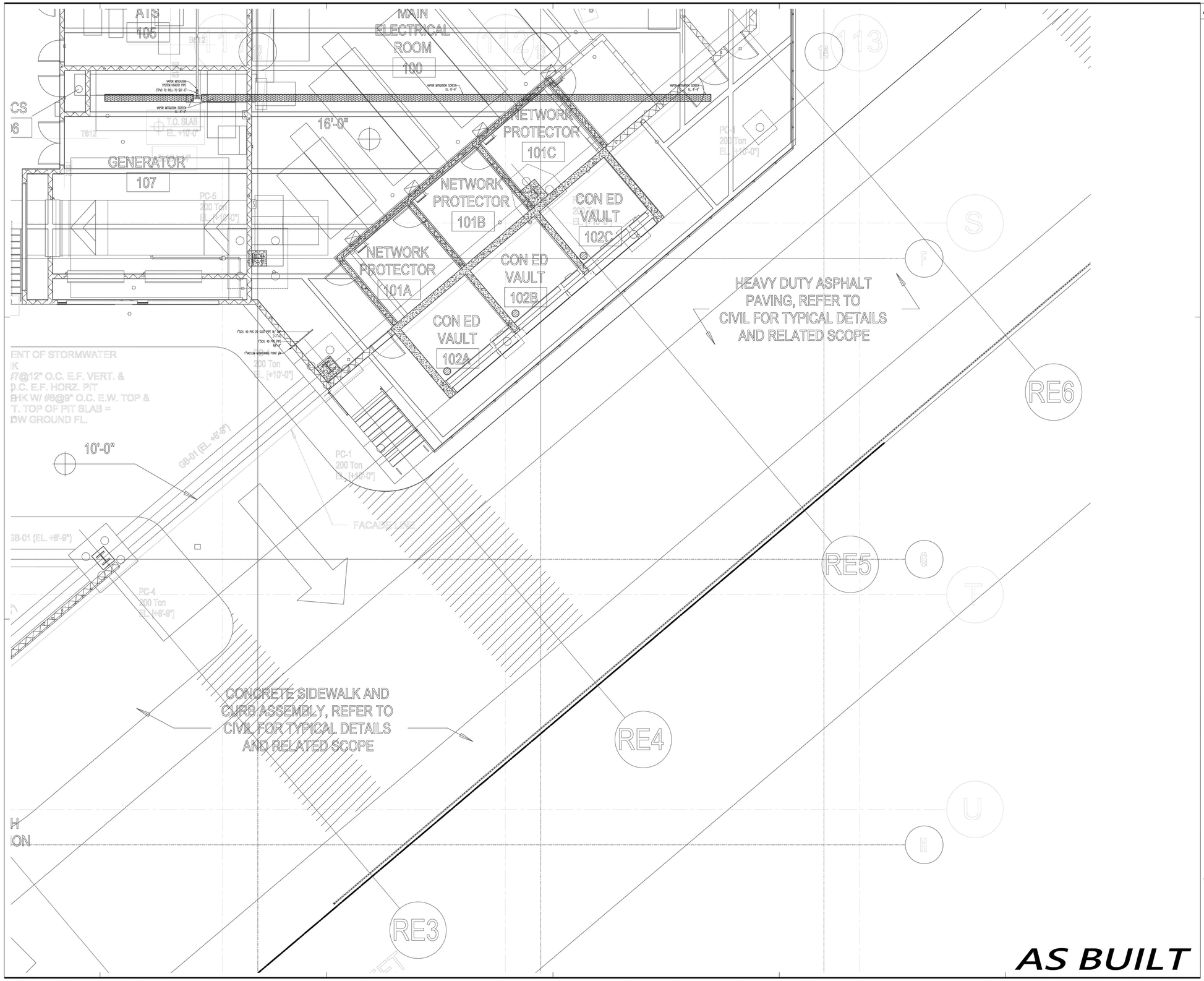
VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 7 OF 10

Project No.	Drawing No.
100652602	20
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\c00652443\100652502-BIT01-0102.dwg Date: 12/10/2025 Time: 08:41 User: acorbancesco Style Table: Langan.stb Layout: 20

LANGAN
PROJECT NO. 100652602



NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN

1	2	3	4
5	6	7	8
	9	10	

No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
8 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-8 REVISION NO.

Date	Description	No.

REVISIONS

SIGNATURE SATYAJIT A. VAIDYA DATE SIGNED
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

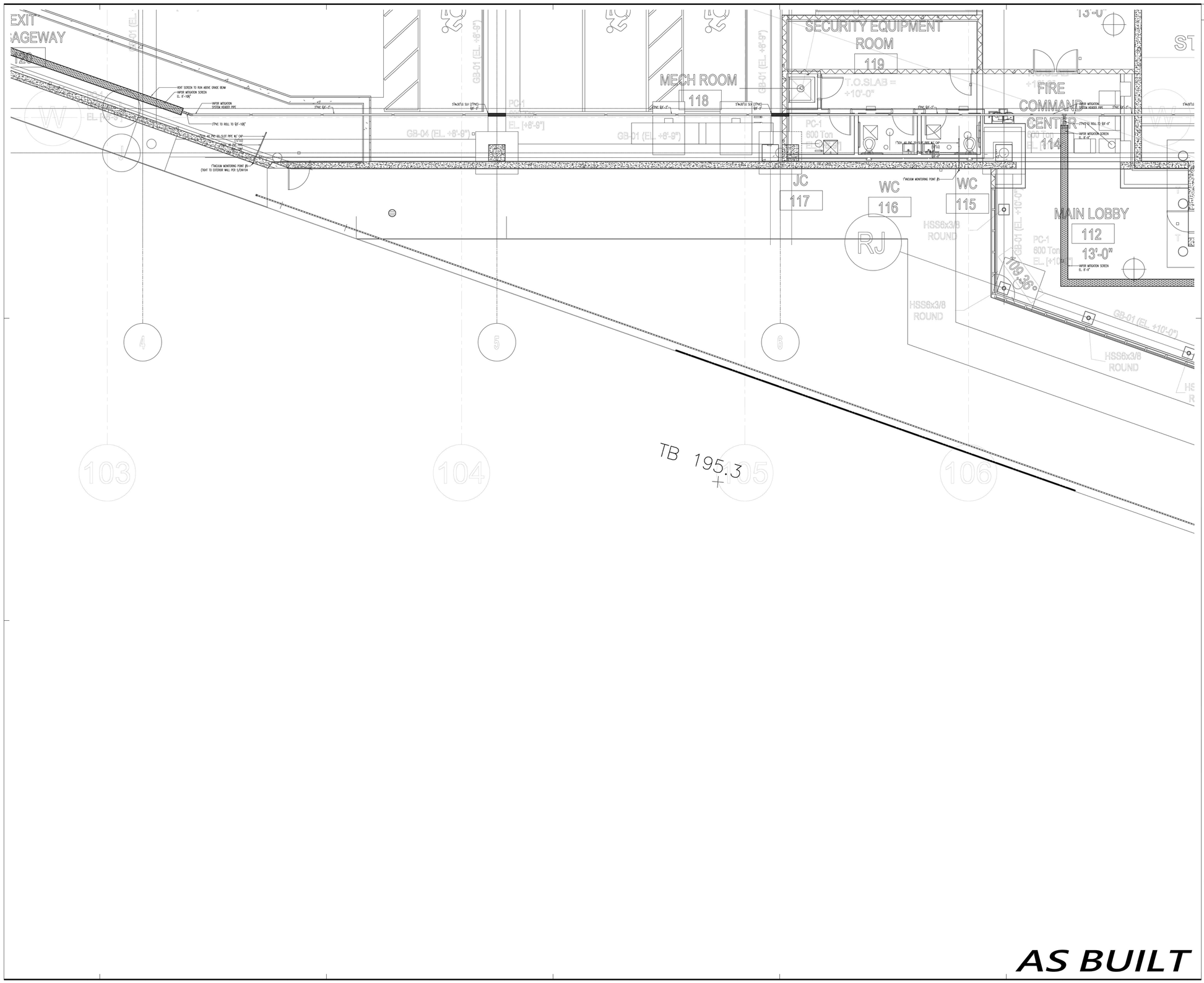
VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 8 OF 10

Project No.	Drawing No.
100652602	21
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
PROJECT NO. 100652602

Filename: C:\bim\langan-pw-01\d0824431\100652602-BIT01-0102.dwg Date: 12/10/2025 Time: 08:43 User: acofrancesco Style Table: Langan.stb Layout: 21



ARCHITECT/ENGINEER NOTES

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN

1	2	3	4
5	6	7	8
	9	10	

No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
9 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-9

REVISION NO.

Date	Description	No.

REVISIONS

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED
SATYAJIT A. VAIDYA
(NYS PE No. 089797-1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA2799400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 9 OF 10

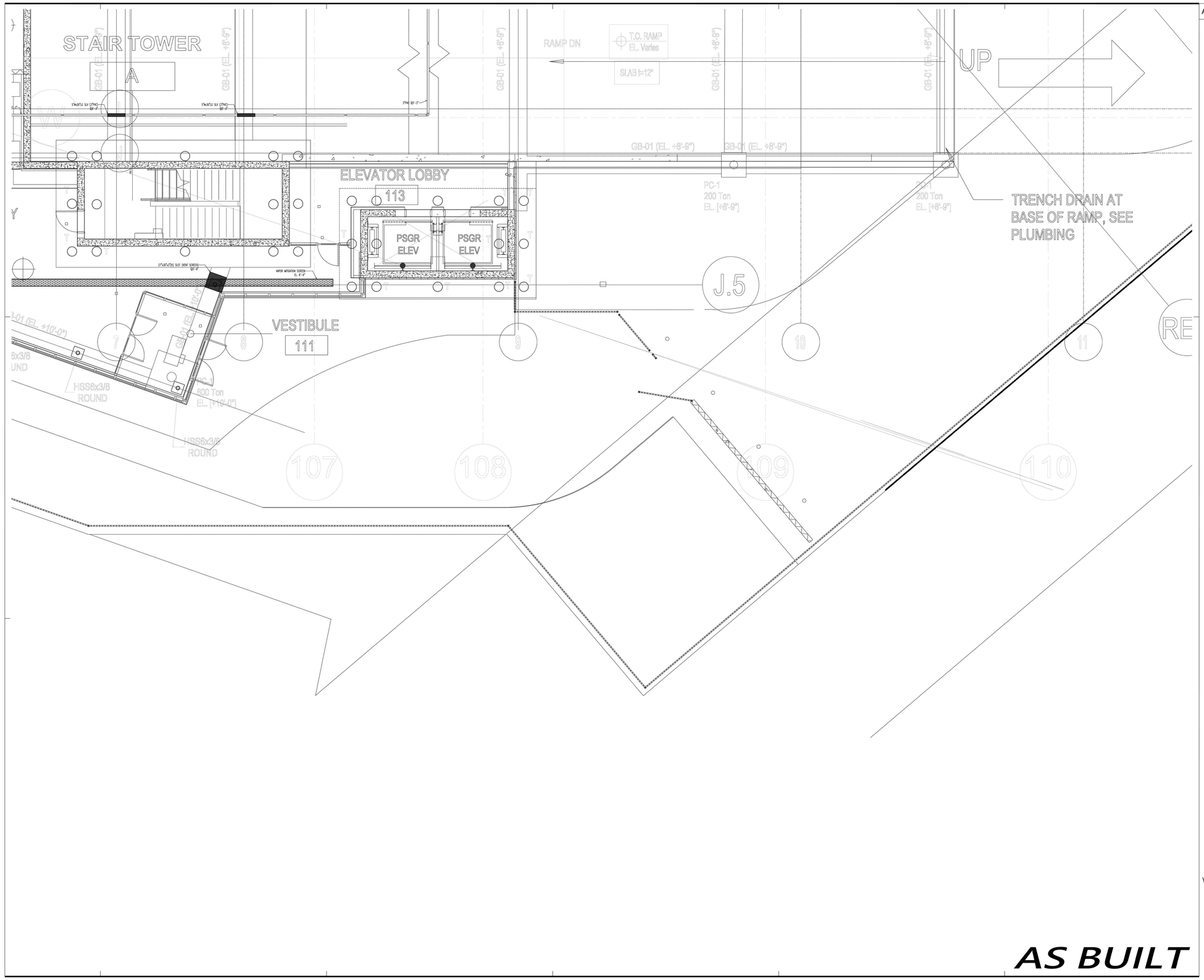
Project No.	Drawing No.
100652602	22
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

PROJECT NO. 100652602

LANGAN

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\d0682443\100652602-BP01-0102.dwg Date: 12/10/2025 Time: 08:45 User: acolfrancesco Style Table: Langan.stb Layout: 22

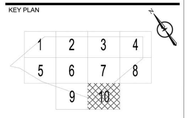


AS BUILT

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM PART PLAN
UNDERGROUND PIPING
10 OF 10

SCALE	DRAWN
1/4" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-10 | REVISION NO.

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

Date	Description	No.
REVISIONS		

STATE OF NEW YORK · SATYAJIT A. VAIDYA · 089797 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797-1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA2799400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

VAPOR MITIGATION SYSTEM PART PLAN UNDERGROUND PIPING 10 OF 10

Project No.	Drawing No.
100652602	23
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

PROJECT NO. 100652602

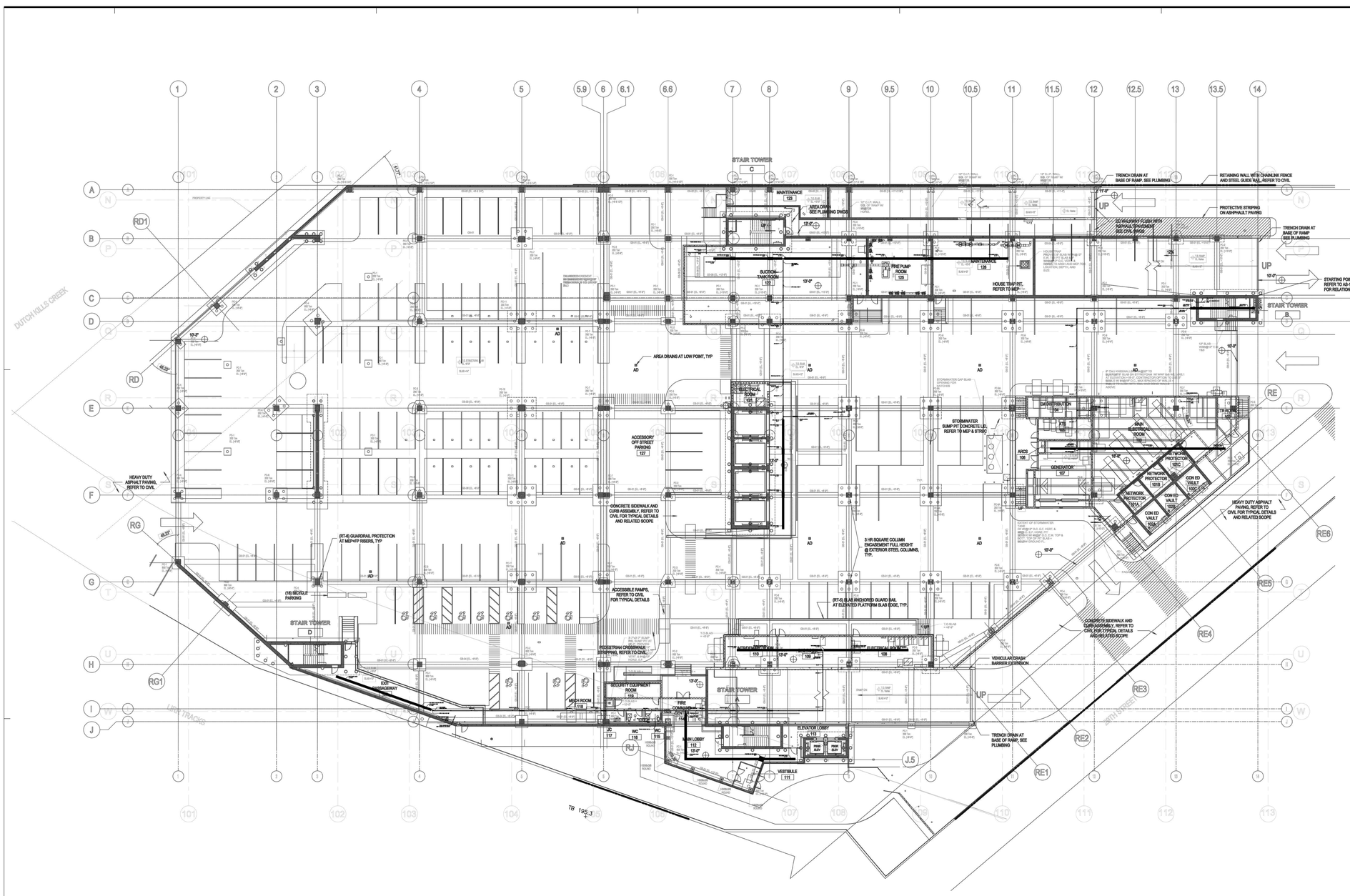
LANGAN

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

Filename: C:\bim\langan-pw-01\d0682443\100652602-BP01-0102.dwg Date: 12/10/2025 Time: 09:02 User: acorfrancesco Style Table: Langan.stb Layout: 23

NOTES:

1. DRAWING IS NOT TO SCALE.
2. THIS DRAWING REPRODUCES A DRAWING FROM THE VAPOR MITIGATION SYSTEM AS-BUILT UNDERGROUND PIPING PLAN PACKAGE PREPARED BY FORWARD MECHANICAL CORP. AND PROVIDED TO LANGAN BY LEEDING BUILDERS GROUP, LLC ON 22 SEPTEMBER 2025, AND HAS BEEN REPRODUCED HERE FOR REFERENCE PURPOSES ONLY.

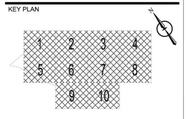


AS BUILT

ARCHITECT/ENGINEER NOTES

NOTES:
- ALL ELEVATIONS TAKEN FROM PROJECT ORIGIN (0'-0") U.O.N.

KEY PLAN



No.	Date	Revision	BY

CONTRACTOR

CONTRACTOR

FORWARD MECHANICAL
55-54 60TH STREET
MASPETH, NY 11378

DRAWING TITLE

28-90 REVIEW AVENUE
LONG ISLAND CITY, QUEENS, NY

VAPOR MITIGATION SYSTEM OVERALL PLAN
UNDERGROUND PIPING

SCALE	DRAWN
1/16" = 1'-0"	MPD

PROJECT NO.

DRAWING NO. PL-VMS-0A

REVISION NO.

Date	Description	No.

REVISIONS

STATE OF NEW YORK — SATYAJIT A. VAIDYA — 089797 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

SATYAJIT A. VAIDYA
(NYS PE No. 089797–1)

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

28-90 REVIEW AVENUE

BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title

VAPOR MITIGATION SYSTEM OVERALL PLAN UNDERGROUND PIPING

Project No.	Drawing No.
100652602	24
Date: 12/10/2025	
Drawn By: AC	
Checked By: BM	

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

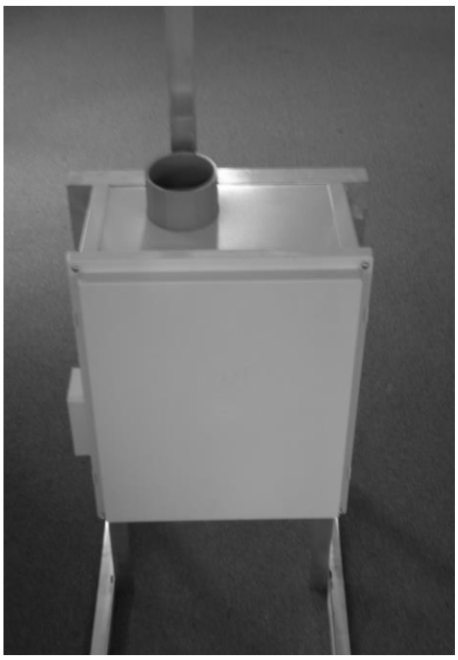
LANGAN

PROJECT NO. 100652602

Filename: C:\tmp\langan-pw-01d0882443\100652602-BF701-0102.dwg Date: 12/10/2025 Time: 09:14 User: acofrancesco Style Table: Langan.stb Layout: 24

THE OBAR GBR76
COMPACT RADIAL BLOWER

Based on 25 years of experience and 2 years of research and development, the patent pending GBR series of compact radial blowers provide the perfect combination of performance and design.



GBR76 WITH ROOF MOUNT

PERFORMANCE

- GBR76 SOE 16" WC @ 0 Max flow 155 CFM.
- GBR76 UD 40" WC @ 0 Max flow 195 CFM.
- Built in speed control to customize performance.
- Condensate bypass built in.
- 12 month warranty - 40,000 hr sealed bearings.

DESIGN

- Our modular design means the blower and manifold assembly can be removed and replaced as a unit. This makes repairs cost effective and easy and allows contractors to upgrade systems simply by swapping assemblies.
- The GBR series is based on a bypass blower designed to handle combustible materials.
- The housing is not required to be air tight, so you can add gauges and alarms without compromising the system.
- Built in condensate bypass.
- Built in speed control.
- Quick disconnect electrical harness.
- All UL listed components including UL listed enclosure for outside use.
- Wall fastening lugs included.
- GBR series roof and wall mounts available to quickly configure the blowers for your installation while providing a custom built look.
- Compact design 16"x 14"x 8" weighing only 18 lbs.
- 3" schedule 40 inlet and exhaust.
- Universal Drive model accepts voltage from 120-240V without alteration

OBAR SYSTEMS INC 2969 ROUTE 23 SOUTH NEWFOUNDLAND NJ 07435 800 949 6227

GBR76 SOE	0”	2”	4”	6”	8”	10”	12”	16”	Wattage
SOE 16	150	140	129	118	105	90	75	35	150-320
SOE 12	125	115	100	83	62	39	0		110-200
SOE 8	105	90	70	42	0				60-120
SOE 4	75	50	0						37-50

GBR SOE performance using built in potentiometer set at sealed vacuums of 16, 12, 8, and 4” WC

GBR76 UD	0”	10”	20”	30”	37”	Wattage
110V	195	158	118	63	20	700-870
220V	197	162	130	89	50	800-1100

Blower Specifications

GBR76 SOE

- **Input Voltage Range:** 108-132 Volts AC RMS, 50/60 Hz, single phase.
- **Input Current:** 6 amps AC RMS
- **Operating Temperature (Ambient Air and Working Air):** 0°C to 50°C
- **Storage Temperature:** -40°C to 85°C
- **Dielectric Testing:** 1500 Volts AC RMS 60 Hz applied for one second between input pins and ground, 3mA leakage maximum.
- **Speed Control Methods:** PWM (Pulse Width Modulation) (1 kHz to 10 kHz)
  0 to 10 VDC speed control.
  Mechanical: A potentiometer is available for speed control of the blower. The potentiometer can be preset for a specific speed. Access for speed adjustment located in motor housing.
- **Approximate Weight:** 4.8 Lbs. / 2.2 Kg
- **Regulatory Agency Certification:** Underwriters Laboratories Inc. UL507 Recognized under File E94403 and compliant under the CE Low Voltage Directive 2006/95/EC.
- **Design Features:** Designed to provide variable airflow for low NOx & CO emission in high efficiency gas fired combustion systems. Built with non-sparking materials. Blower housing assembly constructed of die cast aluminum. Impeller constructed from hardened aluminum. Rubber isolation mounts built into blower construction to dampen vibration within the motor. Two piece blower housing assembly sealed with O-ring gasket for combustion applications. Customer is responsible to check for any leakage once the blower is installed into the final application.
- **Miscellaneous:** Blower inlet, discharge, and all motor cooling inlet and discharge vents must not be obstructed. Motor ventilation air to be free of oils and other foreign particles, (i.e. breathing quality air). Blower is to be mounted so ventilation air cannot be re-circulated.
  POWER CONNECTION: Blower connector, AMP Universal MATE-N-LOK, part no. 1-350943-0.
  SPEED CONNECTION: Blower connector, Molex Mini-Fit Jr., part no. 39-30-3056.
  Mating harnesses available upon request.

GBR76 UD

- **Input Voltage Range:** 100-240 Volts AC RMS, 50/60 Hz, single phase.
- **input Current:** 10 amps AC RMS
- **Operating Temperature (Ambient Air and Working Air):** 0°C to 50°C
- **Storage Temperature:** -40°C to 85°C
- **Dielectric Testing:** 1800 Volts AC RMS 60 Hz applied for one second between input pins and ground, 3mA leakage maximum.
- **Speed Control Methods:** Mechanical- A potentiometer is provided for speed control of the blower. The potentiometer can be preset for specific speed. Access for speed adjustment located inside motor housing.
- **Approximate Weight:** 4.8 Lbs. / 2.2 Kg
- **Regulatory Agency Certification:** Underwriters Laboratories Inc. UL507 Recognized under FIle E94403 and compliant under the CE Low Voltage Directive 2006/95/EC.
- **Design Features:** Designed to provide variable airflow for low NOx & CO emission in high efficiency gas fired combustion systems. Built with non-sparking materials. Blower housing assembly constructed of die cast aluminum. Impeller constructed from hardened aluminum. Rubber isolation mounts built into blower constuction to dampen vibration within the motor. Two piece blower housing assembly sealed with O-ring gasket for combustion applications. Customer is responsible to check for any leakage once the blower is installed into the final application. **Additional Design Features:** (1) PCB coated with silicone. (2) Both bearings utilizing light contact seals. (3) Stainless steel components in working air compartment; ie shaft, washer and nut for securing the impeller, and stainless bearing thrust washer.

- **Miscellaneous:** Blower inlet, discharge, and all motor cooling inlet and discharge vents must not be obstucted. Motor ventilation air to be free of oils and other foreign particles (i.e. breathing quality air). Blower to be mounted so ventilation air cannot be re-circulated.

POWER CONNECTION: Blower connector, AMP Universal MATE-N-LOK, part no. 350767-1 mates with customer supplied AMP connector, (PN#350766-1) with female terminals. PN#350536-3 or equivalent on 16GA, 600V rated wire
GROUND LEAD: Amp pin terminal (350547-1) on green/yellow 18 GA. 105ºC, 600V rated wire.

Enclosure Specifications

Ratings:

Ingress Protection (EN 60529): 66/67

Electrical insulation: Totally insulated

Halogen free (DIN/VDE 0472, Part 815): yes

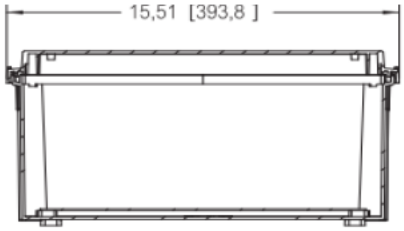
UV resistance: UL 508

Flammability Rating (UL 746 C 5): complies with UL 508

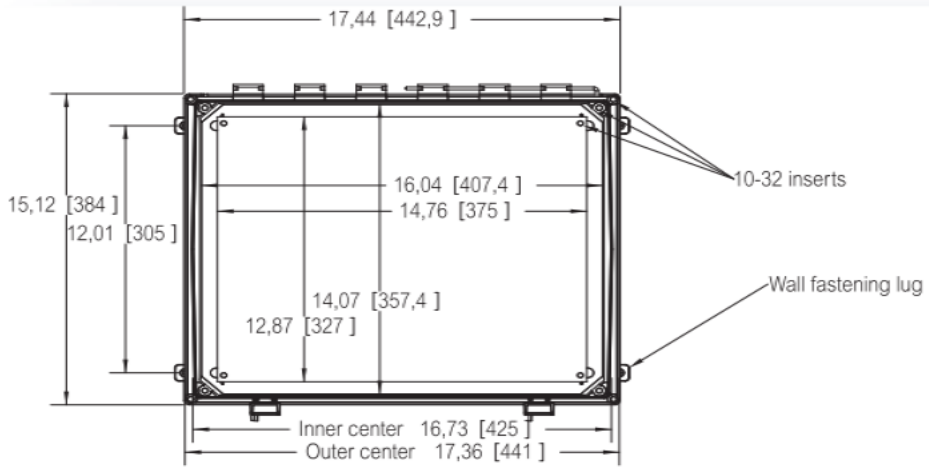
Glow Wire Test (IEC 695-2-1) °C: 960

NEMA Class: UL Type 4, 4X, 6, 6P, 12 and 13

Certificates: Underwriters Laboratories



Screw cover



Top View - cover removed

OBAR SYSTEMS INC 2969 ROUTE 23 SOUTH NEWFOUNDLAND NJ 07435 800 949 6227

SITEDRAIN™ STRIP 9400

PREFABRICATED STRIP DRAIN

AWD
AMERICAN WICK DRAIN



PRODUCT OVERVIEW

SITEDRAIN Strip 9400 geocomposite strip drain products are composed of a dimpled polymeric perforated core fully wrapped in a nonwoven geotextile. The geotextile allows water to pass through while retaining backfill materials. The perforated core allows water collection from all sides and provides a continuous flow path to designated drainage exits.

SITEDRAIN Strip 9400 products provide a value engineered alternative to perforated pipe and aggregate subsurface drainage systems requiring high strength, high flow capacity, and a geotextile meeting AASHTO M288 Class 3 subsurface drainage requirements.

PROPERTY [1]	TEST METHOD	UNIT OF MEASURE	Typical Value	MARV
GEOTEXTILE				
Material [2]			PP, NPNW	PP, NPNW
Survivability	AASHTO M288	Class	3	3
Grab Tensile Strength	ASTM D4632	lbs	135	120
		N	601	534
Grab Elongation	ASTM D4632	%	60	50
CBR Puncture	ASTM D6241	lbs	365	340
		N	1,624	1,512
Trapezoidal Tear	ASTM D4533	lbs	60	50
		N	267	222
UV Resistance	ASTM D4355	% / 500 Hrs	70	70
Apparent Opening Size (AOS)[3]	ASTM D4751	sieve	70	70
		mm	0.212	0.212
Permittivity	ASTM D4491	sec^{-1}	2.4	1.7
Water Flow Rate	ASTM D4491	gpm / ft^2	175	140
		Lpm / m^2	7,130	5,704
CORE				
Compressive Strength	ASTM D6364 ASTM D1621	psf	9,500	-
		kPa	455	-
Thickness	ASTM D5199	in	1.0	-
		mm	25.4	-
In-Plane Flow Rate [4]	ASTM D4716	gpm/ft	21	-
		Lpm/m	261	-

MODEL	WIDTH	ROLL LENGTH	ROLL WEIGHT	ITEM CODE
9406	6"	150'	26 lbs	10600
9412	12"	150'	48 lbs	10610
9412	12"	500'	160 lbs	11270
9418	18"	150'	72 lbs	10620
9418	18"	500'	240 lbs	11280
9424	24"	150'	90 lbs	10630
9424	24"	500'	300 lbs	11290
9436	36"	100'	90 lbs	10640

[1] Unless otherwise noted, all physical and performance properties listed are Typical Value or Minimum Average Roll Value (MARV) as defined in ASTM D4439.
[2] PP = Polypropylene; NPNW = Needle-Punched Nonwoven; WM = Woven Monofilament; SBNW = Spunbonded Nonwoven
[3] Values for AOS represent Maximum Average Roll Value (MaxARV).
[4] In-plane flow rate measured at 3,600 psf (172 kPa) compressive load and a hydraulic gradient of 1.0.

All technical information contained in this document is accurate as of publication. AWD reserves the right to make changes to products and literature without notice.
Please refer to our website for the most current technical information available.

American Wick Drain • 1209 Airport Road, Monroe, NC 28110 USA • TF: +1.800.242.9425 • PH: +1.704.238.9200 • EMAIL: info@awd-usa.com • WEB: awd-usa.com

APPENDIX K

QUALITY ASSURANCE PROJECT PLAN

LANGAN

QUALITY ASSURANCE PROJECT PLAN

for

28-90 REVIEW AVENUE
QUEENS, NEW YORK
NYSDEC BCP No. C241236

Prepared For:

28-90 Review Ave Property Owner LLC
c/o Innovo Property Group
1350 Avenue of the Americas, 17th Floor
New York, New York 10019

Prepared By:

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, New Jersey 07054

June 2025
100652601

LANGAN

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION....1

1.1 Introduction....1

1.2 Project Objectives....1

1.3 Scope of Work....1

2.0 DATA QUALITY OBJECTIVES AND PROCESS....1

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY....3

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA....4

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES....7

5.1 Field Documentation Procedures....7

5.1.1 Field Data and Notes....7

5.1.2 Sample Labeling....9

5.2 Equipment Calibration and Preventative Maintenance....9

5.3 Sample Collection....10

5.3.1 Soil Samples....10

5.3.2 Groundwater Samples....12

5.3.3 Soil Vapor / Indoor Air Samples....13

5.3.4 PFAS Sampling Procedures....14

5.4 Sample Containers and Handling....16

5.5 Sample Preservation....17

5.6 Sample Shipment....17

5.6.1 Packaging....17

5.6.2 Shipping....17

5.7 Decontamination Procedures....18

5.8 Residuals Management....18

5.9 Chain of Custody Procedures....19

5.10 Laboratory Sample Storage Procedures....20

6.0 DATA REDUCTION, VALIDATION, AND REPORTING....21

6.1 Introduction....21

LANGAN

TABLE OF CONTENTS

6.2 Data Reduction....21

6.3 Data Validation....22

7.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS....23

7.1 Introduction....23

7.2 System Audits....24

7.3 Performance Audits....24

7.4 Formal Audits....24

8.0 CORRECTIVE ACTION....25

8.1 Introduction....25

8.2 Procedure Description....25

9.0 REFERENCES....28

LIST OF FIGURES

Figure 1 Site Location Map

Figure 2 Proposed Soil Vapor and Indoor Air Sampling Locations

Figure 3 Proposed Groundwater Sampling Locations

LIST OF ATTACHMENTS

Attachment A Resumes

Attachment B Laboratory Reporting Limits and Method Detection Limits

Attachment C Analytical Methods / Quality Assurance Summary Table

Attachment D Sample Nomenclature

Attachment E Laboratory Standard Operating Procedures for PFAS Analysis

Attachment F ELAP Certification (York Analytical Laboratories, Inc.)

1.0 PROJECT DESCRIPTION

1.1 Introduction

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) has prepared this Quality Assurance Project Plan (QAPP) on behalf of 28-90 Review Ave Property Owner LLC (the Volunteer) for the property at 28-90 Review Avenue (Tax Block 294, Lot 106) in the Long Island City neighborhood of Queens, New York (the Site). A Site Location Map is included as Figure 1.

This QAPP specifies analytical methods to be used to ensure that data collected during the Site Management Plan (SMP) are precise, accurate, representative, comparable, complete, and meet the sensitivity requirements of the project.

1.2 Project Objectives

The SMP involves semi-annual groundwater sampling for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) and a single soil vapor intrusion sampling event for VOCs. This QAPP addresses sampling and analytical methods that will be necessary in support of SMP activities. These objectives have been established in order to meet standards that will protect public health and the environment for the site.

1.3 Scope of Work

The specific scope of work covered in this QAPP includes any groundwater, soil vapor, and indoor air sampling that will occur during implementation of the SMP.

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQOs) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall objective is to evaluate the quality of groundwater.

DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and quality assurance/quality control (QA/QC) documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- Precision – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and/or matrix spike duplicates.
- Accuracy – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. For soil samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.
- Representativeness – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical

methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOPs), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

- Completeness – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- Comparability – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in the QAPP, using standard reporting units and reporting formats, and data validation.
- Sensitivity – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Implementation of the SMP will be overseen by Langan for 28-90 Review Ave Property Owner LLC. The environmental consultant will also arrange data analysis and reporting tasks. The analytical services will be performed by an Environmental Laboratory Approval Program (ELAP)-certified laboratory. Data validation services will be performed by approved data validation contractor(s).

For the required sampling as stated in the SMP, sampling will be conducted by Langan, the analytical services will be performed by York Analytical Laboratories, Inc. of Stratford, Conn. (New York State Department of Health [NYSDOH] ELAP certification number 10854). Data validation services will be performed by Joseph Conboy; résumé attached (Attachment A).

Key contacts for this project are as follows:

28-90 Review Ave Property Owner LLC c/o Innovo Property Group	Stephen Kim Telephone: (212) 218-3158
Langan Project Manager:	Christopher McMahon Telephone: (973) 560-4900
Langan Quality Assurance Officer (QAO):	Steve Ciambruschini Telephone: (973) 560-4900
Langan Remedial Engineer:	Satyajit Vaidya Telephone: (973) 560-4900
Program Quality Assurance Monitor:	Ashley Sandve Telephone: (973) 560-4900
Data Validator:	Joseph Conboy Telephone: (609) 282-8055
Laboratory Representative:	York Analytical Laboratories, Inc. Phil Murphy Telephone: (203) 598-1371

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA

The overall quality assurance objective is to develop and implement procedures for sampling, laboratory analysis, field measurements, and reporting that will provide data of sufficient quality to evaluate soil impacts at the site. The sample set, chemical analysis results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the site. Quality assurance objectives are usually expressed in terms of accuracy or bias, sensitivity, completeness, representativeness, comparability, and sensitivity of analysis. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

Precision

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 2x the reporting limit

(RL) meet the precision criteria if the absolute difference is less than ±2X the RL. For results greater than 2X the RL, the acceptance criteria is a relative percent difference (RPD) of ≤50% (soil), and <30% (groundwater). RLs and method detection limits (MDL) are provided in Attachment B.

Accuracy

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix interferences, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of field blanks and through compliance to all sample handling, preservation, and holding time requirements. All field blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an associated field blank was evaluated against laboratory blanks (preparation or method) and evaluated against field samples collected on the same day to determine potential for bias.

Laboratory accuracy is assessed by evaluating the percent recoveries of MS/MSD samples, LCS/LCSDs, surrogate compound recoveries, internal standard responses and the results of method preparation blanks. MS/MSD, LCS/LCSD, internal standard responses and surrogate percent recoveries were compared to either method-specific control limits or laboratory-derived control limits. Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

Completeness

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and

- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Soil and groundwater data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the sampling program and was satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. This is performed by following applicable standard operating procedures (SOPs) and this QAPP. All field technicians will be given copies of appropriate documents prior to sampling events and will be required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is performed by following all applicable EPA and standard methods, laboratory-issued SOPs, the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

Comparability

Comparability is an expression of the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and was satisfied by ensuring that the sampling plan is followed and that sampling is performed according to the SOPs or other project-specific procedures. Analytical data were comparable when similar sampling and analytical methods are used as documented in the QAPP. Comparability was controlled by requiring the use of specific nationally-recognized analytical methods and requiring consistent method performance criteria. Comparability is also dependent on similar quality assurance objectives. Previously collected data were evaluated to determine whether they may be combined with contemporary data sets.

Sensitivity

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest (e.g., at the NYSDEC Ambient Water Quality Standards and Guidance Value [SGVs]). The Project Manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the Project Manager will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the reporting limit.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in DER-10 and as described in Section 5.3.2.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

Soil sampling will be conducted in accordance with the established NYSDEC protocols contained in DER-10/Technical Guidance for Site Investigation and Remediation (May 2010). The following sections describe procedures to be followed for specific tasks.

5.1 Field Documentation Procedures

Field documentation procedures will include summarizing field data in field books and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability and secure page binding. The pages of the notebook will not be removed.

Entries were made in waterproof, permanent blue or black ink. No erasures will be allowed. Incorrect entries will be crossed out with a single strike mark and the change initialed and dated by the team member making the change.

Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number;
- Reasons for being on-site or taking the sample;
- Date and time of activity;
- Sample identification numbers;
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches were made in the field logbook when appropriate;
- Physical location of sampling locations such as depth below ground surface;
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures;
- Description of the sample including physical characteristics, odor, etc.;
- Readings obtained from health and safety equipment;
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample;
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera;

- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.; and,
- Names of sampling personnel and signature of persons making entries.

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

5.1.2 Sample Labeling

Each sample collected will be assigned a unique identification number and placed in an appropriate sample container. Each sample container will have a sample label affixed to the outside with the date and time of sample collection and project name. In addition, the label will contain the sample identification number, analysis required and chemical preservatives added, if any. All documentation will be completed in waterproof ink. Sample nomenclature procedures are included in Attachment D.

5.2 Equipment Calibration and Preventative Maintenance

A photoionization detector (PID) will be used during the sampling activities to evaluate work zone action levels and screen soil samples. Field calibration and/or field checking of the PID will be the responsibility of the field team leader and the site HSO, and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)
- Reference standard used for calibration
- Calibration and/or maintenance procedure used
- Other pertinent information

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by qualified personnel. A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

5.3 Sample Collection

5.3.1 Soil Samples

Soil sampling is not anticipated during SMP activities. In the event that soil sampling is required, soil samples will be visually classified and field screened using a PID to assess potential impacts from VOCs and for health and safety monitoring. Soil samples collected for analysis of VOCs will be collected using Terra Core® sampling equipment. For analysis of non-volatile parameters, samples will be homogenized and placed into glass jars. After collection, all sample jars will be capped and securely tightened, and placed in iced coolers and maintained at 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected soil samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected soil sample will meet all quality assurance criteria set forth by this QAPP and DER-10.

Soil samples analyzed for per- and poly-fluoro alkyl substances (PFAS) will be collected in an 8-ounce high-density polyethylene (HDPE) containers provided by the laboratory and analyzed by using USEPA Method 1633. The reporting limits for PFAS in soil are included in Attachment B. The laboratory standard operating procedures (SOP) for the analysis of PFAS is included in Attachment E. Soil samples analyzed for 1,4-dioxane will be

collected in an 8-ounce jar provided by the laboratory and analyzed using USEPA Method 8270. The reporting limit for 1,4-dioxane in soil is 0.1 milligram per kilogram (mg/kg).

5.3.1.1 Sample Field Blanks and Duplicates

Use of dedicated sampling equipment is planned; therefore, collection of field blanks is not anticipated. If the use of reusable sampling equipment is required, proper decontamination procedures will be employed (as further described in Section 5.7) and field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative soil samples. If required, field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blanks will be collected at a rate of one per 20 samples and will be analyzed for the complete list of analytes on the day of sampling. If less than 20 samples are collected during a particular sampling event, one field blank sample will be collected. Equipment blanks will be collected at a rate of one per day when soil samples are analyzed for PFAS. Trip blanks will be collected at a rate of one per day if soil samples are analyzed for VOCs during that day.

Duplicate soil samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. If less than 20 samples are collected during a particular sampling event, one MS/MSD sample will be collected. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes.

5.3.2 Groundwater Samples

Groundwater samples will be collected into laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to a NYSDOH ELAP-certified analytical laboratory. Analysis and/or extraction and digestion of collected groundwater samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected groundwater samples will meet all quality assurance criteria set forth by this QAPP and DER-10.

Although groundwater sampling for PFAS is not anticipated during SMP activities, groundwater samples analyzed for PFAS will be collected in three 500-mL HDPE containers provided by the laboratory and analyzed using USEPA Method 1633. The reporting limits for PFAS in groundwater are provided in Attachment B. The laboratory SOP for the analysis of PFAS is included in Attachment E.

5.3.2.1 Sample Field Blanks and Duplicates

Use of dedicated sampling equipment is planned; therefore, collection of field blanks is not anticipated. If the use of reusable sampling equipment is required, proper decontamination procedures will be employed (as further described in Section 5.7) and field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative groundwater samples. If required, field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blanks will be collected at a rate of one per 20 samples and will be analyzed for the complete list of analytes on the day of sampling. If less than 20 samples are collected during a particular sampling event, one field blank sample will be collected. Equipment blanks will be collected at a rate of one per day when groundwater samples are analyzed for PFAS. Trip blanks will be collected at a rate of one per day if groundwater samples are analyzed for VOCs during that day.

Duplicate groundwater samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. If less than 20 samples are collected during a particular sampling event, one MS/MSD sample will be collected. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes.

5.3.3 Soil Vapor / Indoor Air Samples

Soil vapor and indoor air samples will be collected in accordance with the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH October 2006). Soil vapor intrusion samples will be collected from immediately below the first floor slab via the newly installed VMPs. Co-located indoor air samples will also be collected for each of the sub-slab soil vapor samples in order to complete the soil vapor intrusion evaluation. Sampling will occur for the duration of 8 hours.

Samples will be collected in appropriately sized Summa canisters that have been certified clean by the laboratory and samples will be analyzed by using USEPA Method TO-15. Flow rate for both purging and sampling will not exceed 0.2 L/min. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

As part of the vapor intrusion evaluation, a tracer gas will be used in accordance with NYSDOH protocols to serve as a quality assurance/quality control (QA/QC) device to verify the integrity of the soil vapor probe seal. A container (box, plastic pail, etc.) will serve to keep the tracer gas in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer gas prior to

sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration. At the conclusion of the sampling round, tracer monitoring will be performed a second time to confirm the integrity of the probe seals.

5.3.3.1 Soil Vapor / Indoor Air Sample Duplicates

Duplicate soil vapor / indoor air samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil vapor or indoor air samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected for each matrix.

5.3.4 PFAS Sampling Procedures

Field personnel conducting PFAS sampling will wear clothing and use equipment which does not contain PFAS materials including: powderless nitrile gloves, natural rubber overboots, and synthetic and natural fiber clothing. Clothing advertised as waterproof, water-repellant, and/or dirt and/or stain resistant will not be worn. Personal hygiene products with conditioning agents will be avoided prior to the sampling event. Insect repellent and sunscreen will be avoided. Consumption of food and/or beverages will be strictly prohibited during sampling activities, excluding bottled water for hydration. Ballpoint pens will be used as the sole writing instrument to complete labels and record field notes. Waterproof field books, including "Rite-in-Rain"™ will be avoided.

Only sampling equipment known to be devoid of PFAS containing materials will be used. Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. In general, PFAS-free pumps, tubing, interface probes, soil sampling equipment, and bottleware will be considered prior to the sampling event. It is not anticipated that groundwater samples will be collected for PFAS analysis; however, if required, peristaltic pumps will be utilized as the depth of groundwater is less than 20-feet. If groundwater is determined to be greater than 20 feet deep, bladder pumps (QED Sample Pro, or equivalent) with a fluoropolymer-free bladder will be used. HDPE will be used for tubing, soil sampling equipment, and bottleware.

Field personnel will follow standard discrete soil sampling and low flow procedures when sampling for PFAS. When possible, disposable and dedicated equipment will be used for each sample location to avoid potential cross contamination and limit errors from inadequate decontamination between samples. Bladder pumps and/or peristaltic pump tubing will not be re-used and therefore decontamination of sampling equipment between samples will not be necessary. Nitrile gloves will be changed between each step during set up and sampling.

When sampling for PFAS, no sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

Whenever an action occurs outside of procedure, such as the writing of field notes, nitrile gloves will be changed. Sampling equipment will be staged 5-feet away from the boring or open wellhead. Equipment not directly related to sampling will be staged in a separate area away from the boring or open wellhead. When inserting the tubing into the well, the surrounding platform will be avoided as a source of transference. While stabilizing the well, the pump will not be allowed to stop as backflow from the water quality meter can pose a risk to cross contamination. Once stability has been achieved, sampling will occur. PFAS sample bottleware must be made of HDPE and bottleware must be filled to the container neck. Soil sample bottleware must only be filled half-way. The PFAS field and equipment blanks will be collected immediately following completion of PFAS sampling at the frequency discussed above (Sections 5.3.1.1 and 5.3.2.1).

The PFAS compounds to be analyzed includes: Perfluorobutanesulfonic acid (PFBS), Perfluoropentanesulfonic acid (PFPeS), Perfluorohexanesulfonic acid (PFHxS), Perfluoroheptanesulfonic acid (PFHpS), Perfluorooctanesulfonic acid (PFOS), Perfluorononanesulfonic acid (PFNS), Perfluorodecanesulfonic acid (PFDS), Perfluorododecanesulfonic acid (PFDoS), Perfluorobutanoic acid (PFBA), Perfluoropentanoic acid (PFPeA), Perfluorohexanoic acid (PFHxA), Perfluoroheptanoic acid (PFHpA), Perfluorooctanoic acid (PFOA), Perfluorononanoic acid (PFNA), Perfluorodecanoic acid (PFDA), Perfluoroundecanoic acid (PFUnA), Perfluorododecanoic acid (PFDoA),

Perfluorotridecanoic acid (PFTrDA), Perfluorotetradecanoic acid (PFTeDA), Hexafluoropropylene oxide dimer acid (HFPO-DA), 4,8-Dioxa-3H-perfluorononanoic acid (ADONA), Perfluoro-3-methoxypropanoic acid (PFMPA), Perfluoro-4-methoxybutanoic acid (PFMBA), Nonafluoro-3,6-dioxaheptanoic acid (NFDHA), 4:2 Fluorotelomer sulfonic acid (4:2-FTS), 6:2 Fluorotelomer sulfonic acid (6:2-FTS), 8:2 Fluorotelomer sulfonic acid (8:2-FTS), 3:3 Fluorotelomer carboxylic acid (3:3 FTCA), 5:3 Fluorotelomer carboxylic acid (5:3 FTCA), 7:3 Fluorotelomer carboxylic acid (7:3 FTCA), Perfluorooctane sulfonamide (PFOSA), N-methylperfluorooctane sulfonamide (NMeFOSA), N-ethylperfluorooctane sulfonamide (NEtFOSA), N-methylperfluorooctane sulfonamidoacetic acid (N-MeFOSAA), N-ethylperfluorooctane sulfonamidoacetic acid (N-EtFOSAA), N-methylperfluorooctane sulfonamidoethanol (NMeFOSE), N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE), 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) (9Cl-PF3ONS), 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) (11Cl-PF3OUdS), Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA).

5.4 Sample Containers and Handling

Certified, commercially clean sample containers will be obtained from the analytical laboratory. The laboratory will also prepare and supply the required field blank sample containers and reagent preservatives. Sample containers, including the field blank containers, will be placed in plastic coolers by the laboratory. These coolers will be received by the field sampling team within 24 hours of their preparation in the laboratory. Prior to the commencement of field work, Langan field personnel will fill the plastic coolers with regular ice only in Ziploc® bags (or equivalent) to maintain a temperature of 4°C±2° C.

Samples collected in the field for laboratory analysis will be placed directly into the laboratory-supplied sample containers. Samples will then be placed and stored on-ice in laboratory provided coolers until shipment to the laboratory. The temperature in the coolers containing samples and associated field blanks will be maintained at a temperature of 4°C±2°C while on-site and during sample shipment to the analytical laboratory.

Possession of samples collected in the field will be traceable from the time of collection until they are analyzed by the analytical laboratory or are properly disposed. Chain-of-custody procedures, described in Section 5.9, will be followed

to maintain and document sample possession. Samples will be packaged and shipped as described in Section 5.6.

5.5 Sample Preservation

Sample preservation measures will be used in an attempt to prevent sample decomposition by contamination, degradation, biological transformation, chemical interactions and other factors during the time between sample collection and analysis. Preservation will commence at the time of sample collection and will continue until analyses are performed. Should chemical preservation be required, the analytical laboratory will add the preservatives to the appropriate sample containers before shipment to the office or field. Samples will be preserved according to the requirements of the specific analytical method selected, as shown in Attachment C.

5.6 Sample Shipment

5.6.1 Packaging

Sample containers will be placed in plastic coolers. Regular ice only in Ziploc® bags (or equivalent) will be placed around sample containers. Cushioning material will be added around the sample containers if necessary. Chains-of-custody and other paperwork will be placed in a Ziploc® bag (or equivalent) and placed inside the cooler and custody seals will be affixed to one side of the cooler at a minimum. If the samples are being shipped by an express delivery company (third-party courier, e.g., FedEx) then laboratory address labels will be placed on top of the cooler.

5.6.2 Shipping

Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

- All environmental samples will be transported to the laboratory from the site or Langan office by a laboratory provided courier under the chain-of-custody protocols described in Section 5.9. A third-party courier may be used if necessary.
- Prior notice will be provided to the laboratory regarding when to expect shipped samples. If the number, type or date of shipment

changes due to site constraints or program changes, the laboratory will be informed.

5.7 Decontamination Procedures

Though not anticipated, decontamination procedures will be used if non-dedicated sampling equipment is utilized during the SMP. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
2. Generous tap water rinse
3. Distilled/de-ionized water rinse

Field sampling equipment that will be used for the collection of PFAS samples that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and clean, PFAS-free water scrub to remove visual contamination
2. Generous clean, PFAS-free water rinse

5.8 Residuals Management

Debris (e.g., paper, plastic and disposable PPE) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings from well installation) will be placed back in the borehole from which it was sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

5.9 Chain of Custody Procedures

A chain-of-custody protocol has been established for collected samples was and will be followed during sample handling activities in both field and laboratory operations. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through shipping, storage and analysis to data reporting and disposal. Chain-of-custody refers to actual possession of the samples. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except for third-party shipping couriers, is responsible for sample integrity and safe keeping. Chain-of-custody procedures are provided below:

- Chain-of-custody will be initiated by the laboratory supplying the pre-cleaned and prepared sample containers. Chain-of-custody forms will accompany the sample containers.
- Following sample collection, the chain-of-custody form will be completed for the samples collected. The sample identification number, date and time of sample collection, analysis requested and other pertinent information (e.g., preservatives) will be recorded on the form. Entries will be made in waterproof, permanent blue or black ink.
- Langan field personnel will be responsible for the care and custody of the samples collected until the samples are transferred to another party, dispatched to the laboratory, or disposed. The sampling/Field Team Leader will be responsible for enforcing chain-of-custody procedures during field work.
- When the form is full or when all samples have been collected that will fit in a single cooler, the sampling/Field Team Leader will check the form for possible errors and sign the chain-of-custody form. Any necessary corrections will be made to the record with a single strike mark, dated, and initialed.

Samples will be packaged for shipment or pickup via courier to the laboratory with the appropriate chain-of-custody form. If applicable, a shipping bill will be completed for each cooler and the shipping bill number recorded on the chain-of-custody form. A copy of the form will be retained by the Langan sampling team for the project file, and the original will be sent to the laboratory with the samples. Bills of lading will also be retained as part of the documentation for the chain-of-

custody records, if applicable. When transferring custody of the samples, the individuals relinquishing and receiving custody of the samples will verify sample numbers and condition and will document the sample acquisition and transfer by signing and dating the chain-of-custody form. This process documents sample custody transfer from the sampler to the analytical laboratory.

Laboratory chain-of-custody will be maintained throughout the analytical processes as described in the laboratory's Quality Assurance Manual. The analytical laboratory will provide a copy of the chain-of-custody in the analytical data deliverable package. The chain-of-custody becomes the permanent record of sample handling and shipment.

5.10 Laboratory Sample Storage Procedures

The subcontracted laboratory will use a laboratory information management system (LIMS) to track and schedule samples upon receipt by the analytical laboratories. Any sample anomalies identified during sample log-in must be evaluated on individual merit for the impact upon the results and the data quality objectives of the project. When irregularities do exist, Langan must be notified to discuss recommended courses of action and documentation of the issue must be included in the project file.

For samples requiring thermal preservation, the temperature of each cooler will be immediately recorded. Each sample and container will be assigned a unique laboratory identification number and secured within the custody room walk-in coolers designated for new samples. Samples will be, as soon as practical, disbursed in a manner that is functional for the operational team. The temperature of all coolers and freezers will be monitored and recorded using a certified temperature sensor. Any temperature excursions outside of acceptance criteria (i.e., below 2°C or above 6°C) will initiate an investigation to determine whether any samples may have been affected. Following analysis, the laboratory's specific procedures for retention and disposal will be followed as specified in the laboratory's SOPs and/or QA manual.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

6.1 Introduction

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed and be reported in standard format.

The completed copies of the chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

6.2 Data Reduction

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS. To avoid transcription errors, data will be loaded directly into the American Standard Code for Information Interchange (ASCII) format from the LIMS. If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

6.3 Data Validation

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of the QC sample results;
- Verification of the identification of sample results (both positive hits and non-detects); and,
- Preparation of Data Usability Summary Reports (DUSR).

A DUSR will be prepared and reviewed by the QAO before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup (if applicable);
- Compound quantitation and reported detection limits;
- System performance; and,
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;
- Duplicates;
- Matrix Spike;
- Furnace atomic absorption analysis QC;
- Inductively couple plasma (ICP) serial dilutions; and,
- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method;
- "N" – Tentative identification. Analyte is considered present in the sample;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and,
- No Flag - Result accepted without qualification.

7.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

7.1 Introduction

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning

as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

7.2 System Audits

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

7.3 Performance Audits

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

7.4 Formal Audits

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

8.0 CORRECTIVE ACTION

8.1 Introduction

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

8.2 Procedure Description

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined, and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;

- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and,
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 8.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 8.1

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOWUP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

9.0 REFERENCES

NYSDEC. Division of Environmental Remediation. DER-10/Technical Guidance for Site Investigation and Remediation, dated May 3, 2010.

NYSDEC. Division of Environmental Remediation. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, dated April 2023.

NYSDOH. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan

USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D.C.

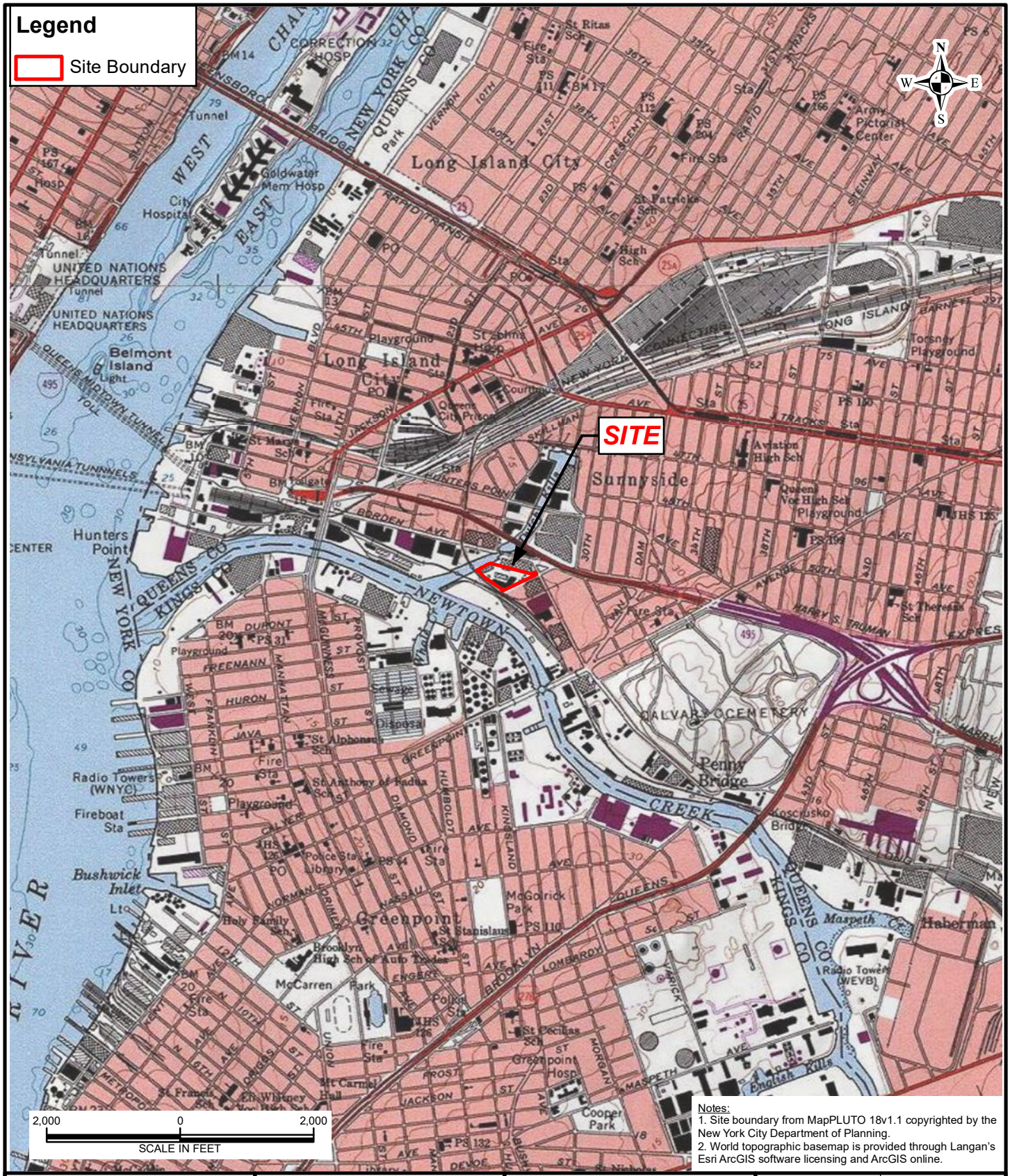
USEPA, 1987. Data Quality Objectives for Remedial Response Actions Activities: Development Process, EPA/540/G-87/003, OSWER Directive 9355.0-7 - U.S. Environmental Protection Agency, Washington, D.C.

USEPA, 1992a. CLP Organics Data Review and Preliminary Review. SOP No. HW-6, Revision #8, dated January 1992. USEPA Region II.

USEPA, 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90. SOP No. HW-2, Revision XI, dated January 1992. USEPA Region II.

USEPA. Hazardous Waste Support Section. Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15. SOP No. HW-31, Revision #6, dated June 2014.

FIGURES



Notes:
1. Site boundary from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.
2. World topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com

Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

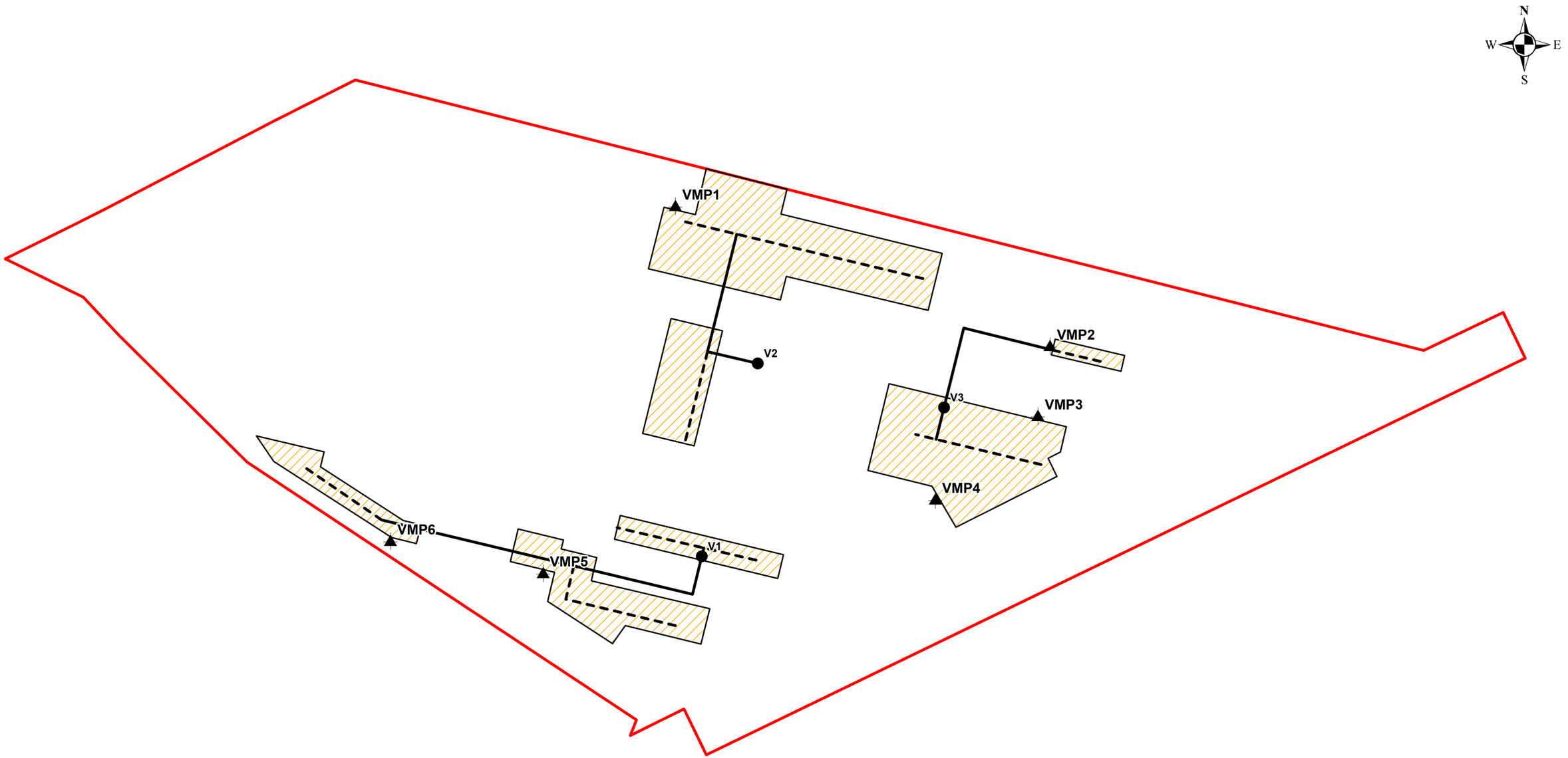
Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
USGS SITE LOCATION MAP

Project No. 100652601	Figure 1
Date 1/8/2021	
Scale 1"=2,000'	
Drawn By AR	
Last Revised 1/22/2021	

© 2013 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\ArcMap_Documents\2020-11 -BCP RAWP\Figure 1 - Site Location Map1.mxd Date: 1/22/2021 User: ibaker Time: 1:36:27 PM



Legend

- Site Boundary
- Horizontal Extents of SSDS
- Vertical Vent Riser to Roof Mounted Fan
- Vacuum Monitoring Point
- SSDS Header Pipe
- SSDS Screen

60 0 60
SCALE IN FEET

Notes:
1. Langan environmental boring locations are approximate and based on geolocation with a Trimble Geo 7x Handheld GNSS System.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

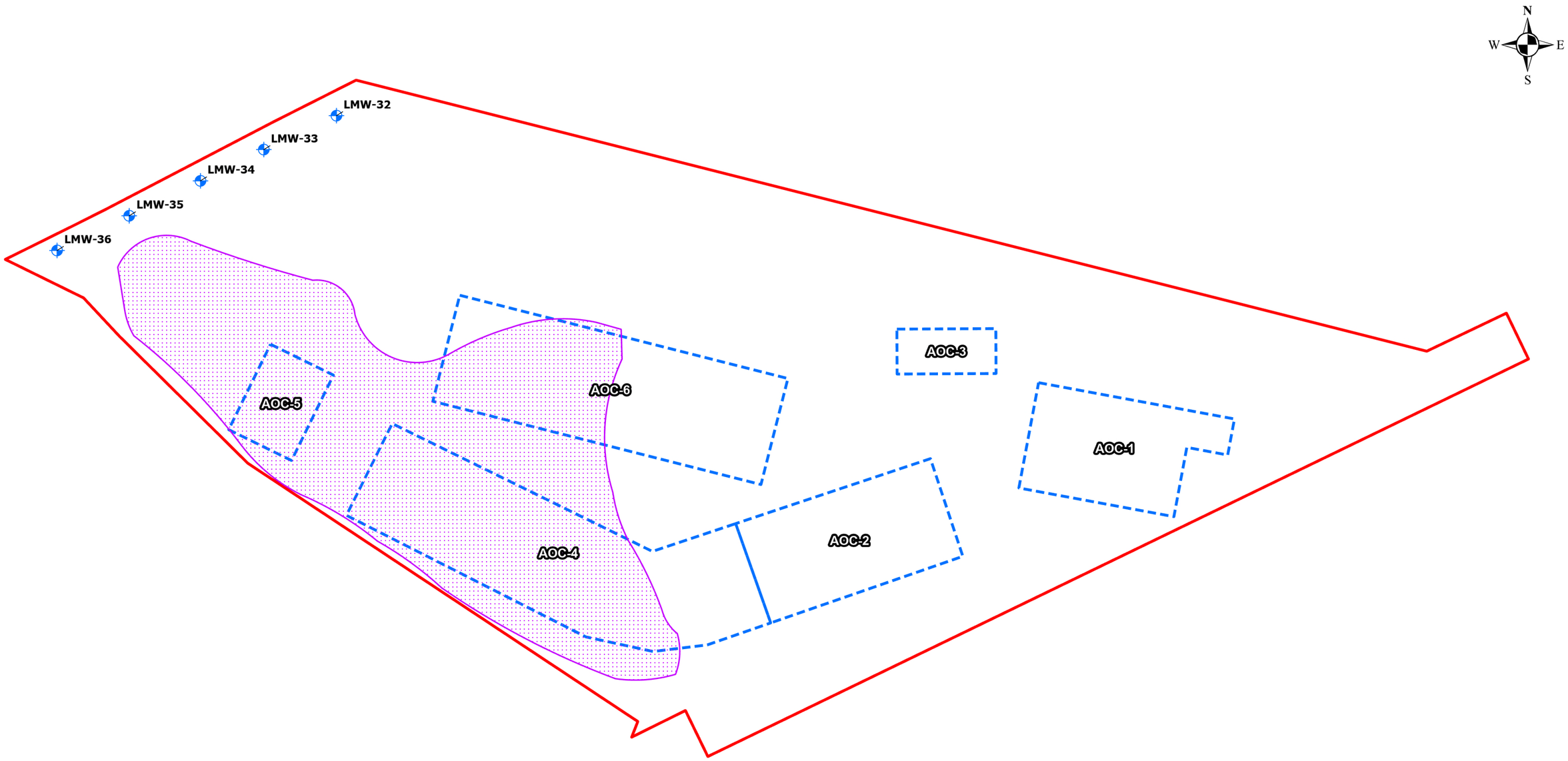
Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
PROPOSED SOIL VAPOR AND INDOOR AIR SAMPLING LOCATIONS

Project No.	100652601
Date	6/20/2025
Scale	1"=60'
Drawn By	IHB
Last Revised	6/23/2025
Figure	2

© 2012 Langan

Path: \\langan.com\data\PAR\data6\100652601\ArcGIS\APRX\28-90 Review Avenue Collector\28-90 Review Avenue Collector.aprx Date: 6/23/2025 User: jfraser Time: 5:40 PM



60 0 60
SCALE IN FEET

Legend
- Site Boundary
- Area of Concern (AOC)
- Extents of ISS Monolith
- Proposed Monitoring Wells for long-term groundwater monitoring

Notes:
1. Langan environmental boring locations are approximate and based on geolocation with a Trimble Geo 7x Handheld GNSS System.
2. Parcel information from MapPLUTO 18v1.1 copyrighted by the New York City Department of Planning.

LANGAN
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
28-90 REVIEW AVENUE
NYSDEC BCP Site No.: C241236
BLOCK No. 294, LOT No. 106
LONG ISLAND CITY
QUEENS COUNTY NEW YORK

Drawing Title
PROPOSED GROUNDWATER SAMPLING LOCATIONS

Project No.	100652601
Date	6/20/2025
Scale	1"=60'
Drawn By	JF
Last Revised	6/24/2025
Figure	3

© 2012 Langan

ATTACHMENT A

Resumes

CHRISTOPHER McMAHON, CHMM

ASSOCIATE PRINCIPAL

BROWNFIELD REDEVELOPMENT, SITE INVESTIGATIONS/REMEDIAL ACTIONS, VAPOR INTRUSION INVESTIGATION

Mr. McMahon is a consulting geologist whose primary focus within his tenure at Langan has been in providing environmental support to redevelopment sites within the metropolitan New York area. He has 23 years of experience with projects in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup, Voluntary Cleanup and Spill Programs, and New York City Office of Environmental Remediation E-Designated and New York City Voluntary Cleanup Program sites. These projects have included the completion of Phase I environmental site assessments, Phase II and remedial investigations, UST closures, NYSDEC closures and remedial excavation oversight for off-site disposal and/or treatment. Mr. McMahon also has significant field experience including implementation and management of all phases of environmental projects involving soil, sediment, groundwater, surface water, and soil vapor contamination including Phase I inspections, Phase II site investigations, Remedial Investigations, and Remedial Actions.

Many of these projects have included his oversight of remedial actions to clean up or mitigate hazardous waste sites in rural, urban, and industrial settings. These remedial action designs have included in-situ soil remedial injections, contaminated soil removal/disposal management plans, and soil vapor intrusion mitigation systems including advanced vapor barriers and sub-slab depressurization systems.

SELECTED PROJECTS

- 1 Seventh Avenue South, New York, NY
- 10 Monroe Street, New York, NY
- 100 Jefferson Road, Parsippany, NJ
- 100 Middlesex Avenue, Carteret, NJ
- 105-109 W28th Street, New York, NY
- 106 Spring Street, New York, NY
- 110 Ashburton Avenue, Yonkers, NY
- 110 First Street, Jersey City, NJ
- 111 Washington Street Development, New York, NY
- 1110 Oak Point Avenue, Bronx, NY
- 1123-1129 Flatbush Avenue, Brooklyn, NY
- 1132 Oak Point Avenue, Bronx, NY
- 119 Division Avenue, Brooklyn, NY
- 12 West 48th Street, New York, NY
- 120 Fifth Avenue Development, Brooklyn, NY
- 120 Fulton Street, New York, NY
- 1203 East New York Avenue, Brooklyn, NY
- 125 West End Avenue, New York, NY
- 126-136 West 19th Street, New York, NY
- 130 Saint Felix Street, Brooklyn, NY
- 133 Greene Street, New York, NY
- 143 Roebling Street, Brooklyn, NY
- 147-171 King Street, Brooklyn, NY



EDUCATION

B. A., Geology (With Honors in Geology and Environmental Science) State University of New York College at Potsdam

B.A., Environmental Science and Engineering Wilkes University

PROFESSIONAL REGISTRATION

Certified Hazardous Materials Manager (CHMM)

OSHA 29 CFR 1910.120 Certification for Hazardous Waste Operations and Emergency Response

OSHA Certification for Hazardous Waste Site Supervisor

Red Cross CPR & First Aid Training

- 1487 First Avenue Development, New York, NY
- 150 52nd Street, Brooklyn, NY
- 152 W 49th Street, New York, NY
- 1560 3rd Avenue, New York, NY
- 158 Bergen Turnpike, Ridgefield Park, NJ
- 160 East 125th Street, New York, NY
- 16-63 Cody Avenue, Ridgewood, NY
- 1681-1693 Third Avenue, New York, NY
- 1760 3rd Avenue, New York, NY
- 1766-1768 Second Avenue, New York, NY
- 17th Street Development, New York, NY
- 180 East 88th Street, New York, NY
- 1921 Atlantic Avenue, Brooklyn, NY
- 2 Hudson Square, New York, NY
- 207-223 East 13th Street Development, New York, NY
- 21-30 44th Drive, Long Island City, NY
- 221 West 57th Street, New York, NY
- 223 N 8th Avenue, Brooklyn, NY
- 224 Mulberry Street, New York, NY
- 225 East 39th Street, New York, NY
- 225 West 58th Street, New York, NY
- 228 Cherry Street, New York, NY
- 2300 Linden Boulevard, Brooklyn, NY
- 23-30 Borden Avenue, Long Island City, NY
- 239 10th Avenue, New York, NY
- 24-02 49th Avenue, Long Island City, NY
- 241 5th Avenue, New York, NY
- 2413 Third Avenue, Bronx, NY
- 250 South Street, New York, NY
- 2505 Bruckner Boulevard, Bronx, NY
- 267 Red Schoolhouse Road, Spring Valley, NY
- 268 & 290 Dyckman Street, New York, NY
- 280 West 155th Street, New York, NY
- 286 Spring Street, New York, NY
- 28-90 Review Avenue, Long Island City, NY
- 2924 8th Avenue, New York, NY
- 30 West 46th Street, New York, NY
- 30-17 40th Avenue, Long Island City, NY
- 302 West 155th Street, New York, NY
- 311 West 42nd Street, New York, NY
- 32-02 Queens Boulevard, Long Island City, NY
- 323 East 61st Street, New York, NY
- 33-00 Northern Boulevard, Long Island City, NY
- 333 Johnson Avenue, Brooklyn, NY
- 400 and 625 Pierce Street, Franklin, NJ
- 400 Park Avenue South, New York, NY
- 401 Washington Street, New York, NY
- 421 Hudson Street, New York, NY
- 42-50 24th Street, Long Island City, NY
- 438 West 51st Street, New York, NY
- 44 West 66th Street, New York, NY
- 44-02 Vernon Boulevard, Long Island City, NY
- 441 Tompkins Avenue Development, Staten Island, NY
- 46 Crown Street, Staten Island, NY
- 460 West 41st Street, New York, NY

- 479 Degraw Street, Brooklyn, NY
- 48-18 Van Dam Street, Long Island City, NY
- 490-504 Myrtle Avenue, Brooklyn, NY
- 50-02 2nd Street, New York, NY
- 504-530 East 14th Street, New York, NY
- 507 Osborn Street, Brooklyn, NY
- 507-511 West 19th Street Development, New York, NY
- 511 Barry Street, Bronx, NY
- 5112 2nd Avenue, Brooklyn, NY
- 514 W 24th Street, New York, NY
- 515 West 19th Street, New York, NY
- 530-548 West 53rd/543 West 52nd Street, New York, NY
- 536-544 W. 26th Street Development, New York, NY
- 537 Columbia Street Development, Brooklyn, NY
- 543 West 122nd Street, New York, NY
- 545 Sackett Street, Brooklyn, NY
- 55-30 46th Street, Maspeth, NY
- 568 Broome Street, New York, NY
- 58-30 Grand Avenue, Maspeth, NY
- 605 Third Avenue and 222 East 40th Street, New York, NY
- 6201 15th Avenue, Brooklyn, NY
- 629-658 Driggs Avenue, Brooklyn, NY
- 633 Driggs Avenue, Brooklyn, NY
- 64 North 9th Street, Brooklyn, NY
- 640 Columbia Street, Brooklyn, NY
- 650 Madison Avenue, New York, NY
- 678 Lexington Avenue, New York, NY
- 681 Flushing Avenue, Brooklyn, NY
- 68-74 Charlton Street, New York, NY
- 69-02 Queens Boulevard, Woodside, NY
- 713-719 American Legion Drive, Teaneck, NJ
- 72 Caton Place, New York, NY
- 728 Court Street, Brooklyn, NY
- 75-11 31st Avenue, East Elmhurst, NY
- 76-82 St Marks Avenue, Brooklyn, NY
- 781 & 789 Post Avenue, Staten Island, NY
- 980 East 149th Street, Bronx, NY
- 990-1026 Rossville Avenue, Staten Island, NY
- Arent, Fort Washington, PA
- Arol Chemical, Newark, NJ
- Banchetto Feast Restaurant at Nanuet Mall, Nanuet, NY
- Bloomfield State Police, Bloomfield, NJ
- Bridgewater Commons Mall, Bridgewater, NJ
- Bright Horizons Daycare Centers, Roseland, NJ
- Brill Building, New York, NY
- Brodson, Montville, NJ
- Bryant Street, Brooklyn, NY
- Carlyle Residential Portfolio, Brooklyn & Queens, NY
- Christian Cultural Center, Brooklyn, NY
- City Point Tower 3, Brooklyn, NY
- Clinton Street Building, Brooklyn, NY
- Con Edison E. 60th St Station, New York, NY
- Con Edison Laconia Site, Bronx, NY
- Con Edison Ossining Substation, Ossining, NY
- Costco, Marlboro, NJ

- Country Deli, Newburgh, NY
- Court Street, Brooklyn, NY
- Former BICC Cables Site, Yonkers, NY
- Former Flintkote Facility, East Rutherford, NJ
- Former Getty Service Station, Kennett Square, PA
- Former Manufactured Gas Plant Site Investigation/Confidential Client, Mechanicville, NY
- Former Manufactured Gas Plant Site Remedial Investigation, Geneva, NY
- Fresh Direct, New Building, Bronx, NY
- Gap Kids Store, Astoria, NY
- Garden State Parkway Toll Plazas, Various Locations, NJ
- Hampton Hollow Apartments, Silver Springs, MD
- Harborside Plazas, Jersey City, NJ
- Hard Rock Café, New York, NY
- Harlem - West 125th Street Development, New York, NY
- Harlem River Tunnel, Bronx, NY
- Hershey Downtown, Hershey, PA
- Icon Riverwalk, Plainsboro, NJ
- Kehilath Jeshurun Synagogue, New York, NY
- Lands End II, New York, NY
- Lowe's, Multiple Locations
- Marble Collegiate Church Office Building, New York, NY
- Meadow Wood at Gateway, Brooklyn, NY
- Mission of Singapore, New York, NY
- MOMA West, New York, NY
- Mulford Gardens, Yonkers, NY
- Museum of Modern Art, New York, NY
- Nanuet Mall, Nanuet, NY
- New York Wheel, Staten Island, NY
- Normandy Gantry Point, Long Island City, NY
- NYCOER E-Designation Remediation, 412 Greenwich Street, New York, NY
- NYCOER E-Designation Remediation, 505 W 19th Street, New York, NY
- NYCOER E-Designation Remediation, 508 West 24th Street, New York, NY
- NYCOER E-Designation Remediation, 525 West 52nd Street, New York, NY
- NYCOER E-Designation Remediation, 53 West 53rd Street, New York, NY
- NYSDEC (Region 2) Superfund Site Remedial Investigation, Jamaica, NY
- NYSDEC (Region 5) Superfund Site Remedial Investigation, Whitehall, NY
- NYSDEC (Region 7) Site Remedial Investigation, Hillcrest, NY
- NYSDEC Brownfield Redevelopment 363 and 365 Bond Street, Brooklyn, NY
- NYSDEC Brownfield Redevelopment, Fashion Outlets of Niagara Falls, NY
- NYSDEC Spills Redevelopment, 101 Murray Street, New York, NY
- NYSDEC Spills Redevelopment, 110 University Place, New York, NY
- NYSDEC Spills Redevelopment, 540 West 26th Street, New York, NY
- NYSDEC Spills Redevelopment, Grant Park, Yonkers, NY
- NYSDEC Spills Redevelopment, The Shops at Nanuet, Nanuet, NY

- OGS Geotechnical Survey for Construction, Rome, NY
- Pan Graphics, Lodi, NJ
- Park Slope Portfolio, Brooklyn, NY
- Pathmark, New York, NY
- Provident Transaction Consulting Service, Bloomfield, NJ
- Randallstown Maryland, Windsor Mill, MD
- Realterm, Bronx, NY
- Remedial Investigation of Industrial Facility/Confidential Client, Batavia, NY
- Riverfront Center, Elmwood Park, NJ
- Route 34, Wall Township, NJ
- Ryder Systems, East Lyme, CT
- Shoppes at Chester, Chester, Chester, NJ
- Site A & Firehouse Site, Yonkers, NY
- Stop & Shop, Multiple Locations in NY and NJ
- Suffolk Street, New York, NY
- Sunset Industrial Park, Brooklyn, NY
- Surf Avenue Block 7060, Brooklyn, NY
- The Diamon Tower Development, New York, NY
- Thor Labs, Newton, NJ
- Tiny Parties Group, Gowanus Canal, NY
- Victoria Theatre, New York, NY
- Village Green Marketplace, Chestnut Ridge, NY
- W. 32nd Street & 6th Avenue, New York, NY
- West Side Site Development Parcel N (Building 2), New York, NY
- Woodside Avenue, Newton, NJ
- Wythe & 3rd Street, Brooklyn, NY
- Wythe Avenue and Grand Street, Brooklyn, NY

STEVEN CIAMBRUSCHINI, PG, LEP

SENIOR PRINCIPAL / SENIOR VICE PRESIDENT

ENVIRONMENTAL ASSESSMENT, BROWNFIELD REMEDIATION

Mr. Ciambruschini has 34 years of experience in hydrogeologic and environmental investigations including management of environmental and geotechnical investigations relating to petroleum and chlorinated solvent spill sites, underground storage tank sites, manufactured gas plant sites, landfills, wastewater treatment facilities and industrial/commercial sites. His experience includes managing environmental compliance audits, remedial investigation, pre-acquisition due diligence and permitting assessment, feasibility studies and design, construction and operation of complex innovative remediation systems to treat, contain and recover contaminated soil and groundwater. These projects are managed under various NJDEP, PADEP, NYDEC, NYCDEP and CTDEP programs. Mr. Ciambruschini provides consultation to a diverse group of clients including private developers, utilities, retail and industrial facilities and is expert in assessing remediation options and funding options under various state and federal grant, loan and tax reimbursement programs including Brownfield programs.

SELECTED PROJECTS

- 1 Nassau Place, Staten Island, NY
- 17th Street Development, New York, NY
- 2 Shore Lane, Jersey City, NJ
- 23-30 Borden Avenue, Long Island City, NY
- 28-90 Review Avenue, Long Island City, NY
- 75 Park Lane South, Jersey City, NJ
- 101 Murray Street, New York, NY
- 110 First Street, Jersey City, NJ
- 110 University Place, New York, NY
- 160 Route 17 South, Paramus, NJ
- 230 Livingston Avenue, Brooklyn, NY
- 260 Hudson Street, Hackensack, NJ
- 328 Spring Street, New York, NY
- 365 Bond Street Residential Development, Brooklyn, NY
- 400 Park Avenue South, New York, NY
- 401 Washington Street, New York, NY
- 460 West 41st Street, New York, NY
- 479 Degraw Street, Brooklyn, NY
- 536-544 W. 26th Street Development, New York, NY
- 554 Old Water Works Road, Old Bridge, NJ
- 990-1026 Rossville Avenue, Staten Island, NY
- 1000 First Street, Harrison, NJ
- 1921 Atlantic Avenue, Brooklyn, NY
- 2505 Bruckner Boulevard Distribution Facility, Bronx, NY
- ADP/ITT, Clifton, NJ
- Air Products and Chemicals, Edison, NJ
- Allergan Headquarters, Madison, NJ
- Amerada Hess, Secaucus, NJ



EDUCATION

M.S., Geology
Montclair State University

M.A., Environmental Science
Montclair University

B.S., Environmental Science
Cook College, Rutgers University

PROFESSIONAL REGISTRATION

Professional Geologist (PG) in NY, DE, KY

Licensed Environmental Professional (LEP) in CT

Underground Storage Tank License in NJ

AFFILIATIONS

National Ground Water Association

Association of Ground Water Scientists and Engineers

American Association of Petroleum Geologists

Environmental Professionals of Connecticut

American Bar Association (ABA)

- Americas Dream Homes, Newark, NJ
- Arol Chemical, Newark, NJ
- Ashburton Avenue Apartments (Site A), Yonkers, NY
- Assisted Care Facility, Waterford, CT
- Baker Center Redevelopment, Elizabeth, NJ
- Battery Park City, New York, NY
- Bayonne Crossing, Bayonne, NJ
- Bayonne Logistics Center, MOTBY, Bayonne, NJ
- Beach Shopping Center, Peekskill, NY
- Bedford Square, Westport, CT
- Belleville Shopping Center, Belleville, NJ
- Best Buy Distribution Center, Piscataway, NJ
- Black Rock School, Bridgeport, CT
- Blue Back Square, West Hartford, CT (UST, Transfer Act, Brownfield)
- Brass Center Demolition, Waterbury, CT
- Bridge Motors, Hackensack, NJ
- Bridgewater Commons Mall, Bridgewater, NJ
- Brodson Property, Montville NJ, (RCRA, NJDEP ACO Cleanup)
- Brooklyn Law School, Brooklyn, NY
- Brooklyn Point (138 Willoughby Street), Brooklyn, NY
- Burlington Town Crossing, Burlington, NJ
- Camden Refrigeration Terminal, Camden, NJ
- Capitol Place Development, Washington, DC
- CareOne, East Brunswick, NJ
- Carnegie House, New York, NY
- Carroll Gardens, Brooklyn, NY
- Catskill Casino, Monticello, NY
- CBC Truck Parts, Secaucus, NJ
- Centerton Square, Mount Laurel, NJ
- Central Jersey Industrial Park, Bridgewater, NJ
- Christian Cultural Center, Brooklyn, NY
- Christiana Retail Center, Christiana, DE
- Cinnaminson Mall, Cinnaminson, NJ
- Clifton Commons, Clifton, NJ
- Clover Square Mall, Hamilton, NJ
- Colgate-Palmolive Waterfront Redevelopment, Jersey City, NJ
- Collegiate School, New York, NY
- Colonial Plaza, Waterbury, CT
- Columbus Center, Columbus, IN
- Commodore 295 Industrial Center, Woolwich, NJ
- Con Edison Appendix B Spill Sites, Various Locations, NY
- Con Edison 110th Street & 1st Avenue, New York, NY
- Con Edison West 49th Street Substation, New York, NY
- Corinthian Housing, Newark, NJ
- Costco Wholesale Stores, Various Locations, NJ, NY, VA, and CT
- CPC Baking, Metuchen, NJ
- Cumberland Mall, Vineland, NJ
- CUNY College of Staten Island, Staten Island, NY
- Curtiss-Wright, Bloomfield, CT
- Custom Living Communities, Hackettstown, NJ
- Dayton Plaza, Queens, NY
- DDC Rikers Island, New York, NY
- DSNY Queens 7 Garage Renovation, New York, NY
- Duro-Test, North Bergen, NJ

- East Rutherford Retail, East Rutherford, NJ
- Engineering & Science University Magnet School, West Haven, CT
- Essex Green Shopping Center, West Orange, NJ
- Extell Development, Hudson Yards, New York, NY (NYC E-Designated, NYS Brownfield Site)
- Farmers and Mechanics Building, West Chester, PA
- Fashion Outlets of Niagara Falls Expansion, Niagara Falls, NY
- Former BICC Cables Site, Yonkers, NY
- Former BMS Campus, Hopewell, NJ
- Former Crown Cork and Seal, North Bergen, NJ
- Former Flintkote Facility, East Rutherford, NJ (LSRP)
- Former Fusco Facility, Branford, CT
- Former Hercules Site, Roxbury, NJ
- Former Hoffman-LaRoche Site Remediation, Nutley, NJ
- Former Macy's Distribution Facility, Belleville, NJ (Voluntary Cleanup, Asbestos/Demolition)
- Former MGP Site, Brooklyn, NY (VCP Site)
- Former Petroleum Refinery, Nassau County, NY (Brownfield)
- Former Wyeth Facility Master Plan, Trenton, NJ
- Fort Wadsworth, New York, NY
- Franklin Square, Bloomfield, NJ
- Gateway Center, Brooklyn, NY
- Goethals Bridge Replacement, Staten Island, NY and Elizabeth, NJ
- Governor's Island, New York, NY
- Grassy Hills Country Club, Orange, CT
- Green Acres Mall, Valley Stream, NY
- Hackensack University Medical Center Expansion, Hackensack, NJ
- Halby Chemical Sites, Various Sites, DE (CERCLA)
- Hamden Retail Center, Hamden, CT
- Hard Rock Café, New York, NY
- Harsimus Cove-Town Cove, Jersey City, NJ
- Haynes Avenue Bridge, Newark, NJ
- Hershey, Act II Investigation (PA VCP)
- Hershey, Naugatuck, CT (CT Transfer Act)
- Hess Terminal, Edgewater, NJ
- Hudson Street Residential Building, New York, NY
- Industrial Park, Branford, CT
- Interport Storage Facility, Newark, NY
- Jackson Heights Hospital, Long Island City, NY
- Jersey Central Power & Light, Various Locations, NJ
- Kikkerfrosch Brewery, Chester, NY
- Laurel Park Landfill, Naugatuck, CT
- Liberty Science Center Expansion, Jersey City, NJ (EO 215)
- Lowe's Home Improvement Stores, Various Locations, CT, NJ, NY, PA and MA
- Mantilia Motors, West Haven, CT
- Marble Collegiate Church Office Building, New York, NY
- Mahwah Industrial Park, Mahwah, NJ
- Marin Boulevard Hotel, Jersey City, NJ
- Merion Golf Club, Ardmore, PA
- Millburn Mall, Union City, NJ
- Mission of Singapore, New York, NY
- Morgan School, Clinton, CT
- Morristown Airport, Morristown, NJ

- Mulford Gardens, Yonkers, NY
- Museum of Modern Art West, New York, NY
- Muss-Sky View Parc, Flushing, NY
- Nanuet Mall Redevelopment, Nanuet, NY
- NBC Universal, Boston, MA
- New Horizons Shopping Center, Bronx, NY
- New Jersey City University, University Place, Jersey City, NJ
- New Jersey Transit, Various Locations, NJ
- New York Wheel, Staten Island, NY
- New Jersey Transit Substation Assessments, Newark, NJ
- New Jersey Transit Lakewood Garage, Lakewood, NJ
- New Jersey Turnpike/Garden State Parkway General Environmental Services Contract, Various Sites, NJ
- Normandy Gantry Point, Long Island City, NY
- Norton-Chemplast, Wayne, NJ
- Orange & Rockland Utilities, Contaminated Sites, Spring Valley, NY
- Orange & Rockland Utilities, Franklin Lakes Substation, Franklin Lakes, NJ
- Orange & Rockland Utilities, Harings Corner to Closter Substation, Old Tappan, NJ
- Orange & Rockland Utilities, Ossining, NY
- Orange & Rockland Utilities, Ringwood Underground Cable, Ringwood, NJ
- Orange Derby Shopping Center, Derby, CT
- Pan Graphics, Bergen County, NJ (ISRA, LSRP)
- Pan Graphics, Lodi, NJ (Eco Risk Assessment, LSRP)
- Penick, Lyndhurst, NJ
- Plaza 42, Turnersville, NJ
- Public School 27, Long Island City, NY
- Raritan Mobil, Raritan, NJ
- Riverfront Center, Elmwood Park, NJ
- Robert Wood Johnson University Hospital, New Brunswick, NJ
- Ryder Rental, Various Sites, CT (CT Transfer Act)
- Sheepshead Bay Development, Brooklyn, NY
- Sky View Parc, Flushing, NY
- Snyder Plaza, Philadelphia, PA
- Soundview Apartments, New York, NY
- St. Marks Avenue, Brooklyn, NY (Vapor Mitigation)
- Sterling Properties, East Rutherford, NJ
- Stevens Institute of Technology, Student Housing, Hoboken, NJ
- Stop & Shop, Various Locations, NJ, NY, CT
- Sunset Industrial Park, Brooklyn, NY
- Target Distribution Facilities, Wilton, NY and Chambersburg, PA
- Target Stores, Various Locations, NJ, PA, NY, and CT
- Terrain, Westport, CT
- Teterboro Airport, Signature Flight Support, Teterboro, NJ
- The Boathouse at Canal Dock-, New Haven, CT
- The Shops at Atlas Park, Queens, NY
- Thor Labs ISRA Compliance, Newton, NJ
- Thor Labs Phoenix Site, Phoenix, AZ
- Tilton Road, Galloway, NJ
- Torrington Commons, Torrington, CT
- Tuxedo Reserve Development, Tuxedo, NY
- Tycom Building, New York, NY
- Unisys, Middletown, CT (CT Transfer Act, Brownfield)

- University of Medicine and Dentistry, Clinical Academic Building, New Brunswick, NJ
- USGA Facility, Far Hills, NJ
- Victoria Theatre Redevelopment, New York, NY
- York Avenue Development, New York, NY
- Walmart Stores, Neptune and Dover, NJ
- Wallace & Tiernan, Belleville, NJ
- Waterside Power Generating Plant, Stamford, CT
- Westinghouse Site, Newark, NJ

ASHLEY SANDVE

PROJECT ENGINEER

ENVIRONMENTAL ENGINEERING

Ms. Sandve's 9 years of experience includes field work and office work on environmental investigation and remediation projects. Her field work experience includes soil, soil vapor, indoor air and groundwater sampling; drilling oversight; air monitoring; soil management; and remediation oversight, including excavation and off-site soil disposal. Her office work experience includes environmental site background research, state environmental database research, EQuIS database management, data evaluation, remedial design, and report work, including, but not limited to, Phase I ESAs, Preliminary Assessment/Site Investigations, Spill Closure Reports, Remedial Investigation Reports, Remedial Action Work Plans, and Remedial Action Reports. Ms. Sandve is proficient in excel and database management and has ample experience researching sites through the online NJDEP and NYSDEC portals.



EDUCATION

M.Eng, Environmental Engineering
Stevens Institute of Technology

B.E., Environmental Engineering
Stevens Institute of Technology

PROFESSIONAL REGISTRATION

40 Hour HAZWOPER

OSHA 29 CFR 1910.120 Certification (HAZWOPER)

SELECTED PROJECTS

- 1 MacDonough Street, Brooklyn, NY
- 1 Nassau Place, Staten Island, NY
- 1 Washington Avenue, Fairfield, NJ
- 10 Godwin Avenue, Ridgewood, NJ
- 100 Jefferson Road, Parsippany, NJ
- 1011 Washington Avenue, Bronx, NY
- 1075 First Avenue, King of Prussia, PA
- 110 First Street, Jersey City, NJ
- 119 Division Avenue, Brooklyn, NY
- 12 West 48th Street, Phase II Environmental Investigation, New York, NY
- 1203 East New York Avenue, Brooklyn, NY
- 125 Greenbush Road, Soil and Groundwater Investigation, Orangeburg, NY
- 125 West End Avenue, New York, NY
- 138 Bruckner Boulevard, Bronx, NY
- 14-16 Burma Road, Jersey City, NJ
- 147-171 King Street, Brooklyn, NY
- 1487 First Avenue, New York, NY
- 150 52nd Street, Brooklyn, NY
- 1500 Harbor Boulevard, Weehawken, NJ
- 1538 Stillwell Avenue, NYCOER E-Designation and VCP Site Remediation, Bronx, NY
- 16 Court Street, Brooklyn, NY
- 160-186 Ease 22nd Street, Brooklyn, NY
- 16-63 Cody Avenue, Ridgewood, NY
- 171 River Road, Middlesex, NJ
- 174 Route 17 North, Rochelle Park, NJ
- 1921 Atlantic Avenue, NYSDEC BCP Site Remediation, Brooklyn, New York

ASHLEY SANDVE

- 2 Shore Lane, Jersey City, NJ
- 23-30 Borden Avenue, Long Island City, NY
- 239 10th Avenue, New York, NY
- 24-02 49th Avenue, New York, NY
- 2447 Third Avenue, Bronx, NY
- 28-90 Review Avenue, NYSDEC BCP Site Remediation, Queens, NY
- 29 Country Road, Tenafly, NJ
- 2924 8th Avenue, New York, NY
- 33-00 Northern Boulevard, Long Island City, NY
- 333 Johnson Avenue, Brooklyn, NY
- 363 Bond Street, Brooklyn, NY
- 384 Passaic Avenue, Fairfield, NJ
- 401 Washington Street, New York, NY
- 412 Greenwich Street, NYCOER E-Designation Remediation, New York, NY
- 425 Meadowlands Parkway, Secaucus, NJ
- 42-50 24th Street, Long Island City, NY
- 44 Whippany Road, Morristown, NJ
- 46 Crown Street, Brooklyn, NY
- 460 West 41st Street, New York, NY
- 479 Degraw Street, Brooklyn, NY
- 5055 Broadway, New York, NY
- 507 Osborn Street, Brooklyn, NY
- 507-511 West 19th Development, New York, NY
- 525 West 52nd Street, New York, NY
- 536-544 W. 26th Street Development, New York, NY
- 537 Columbia Street Development, Brooklyn, NY
- 540 West 26th Street, NYSDEC Spills Redevelopment, Remedial Action, New York, NY
- 550 Tenth Avenue, NYSDEC BCP Site Remediation, New York, NY
- 554 Old Water Works Road, Old Bridge, NJ
- 56 7th Avenue, New York, NY
- 60 East 9th Street, New York, NY
- 68 Charlton Street, NYCOER E-Designation Remediation, New York, NY
- 72 Caton Place, New York, NY
- 724 Park Place, Long Beach, NY
- 740 8th Avenue, New York, NY
- 75 Park Lane South, Jersey City, NJ
- 95 Worth Street, New York, NY
- Avalon Bay Portfolio, New York, NY
- Baker Center Redevelopment, Elizabeth, NJ
- Belleville Logistics Center, Belleville, NJ
- Bright Horizons, Preliminary Assessment and Site Investigation, Roseland, NJ
- Brixmor, Tinton Falls, NJ
- Brodson, Montville, NJ
- Broome Street Parking Lot Site, NYSDEC BCP Site Remediation, New York, NY
- Bryant Street, Brooklyn, NY
- CareOne, East Brunswick, NJ
- Carlyle Residential Portfolio, Brooklyn & Queens, NY
- Centerton Square Retail Shopping Center, Mount Laurel, NJ

- Christian Cultural Center, Brooklyn, NY
- Con Edison 11th Avenue & 50th Street, New York, NY
- Former BMS Campus, Hopewell, NJ
- Former Chevron Site, Bayonne, NJ
- Former Flintkote Facility, East Rutherford, NJ
- Former Hess Terminal, Remediation Oversight, Edgewater, NJ
- Former Penick Corporation Facility RCRA Site, Data Management, Remedial Investigation, and Remedial Action, Montville, NJ
- Giralda Farms, Chatham, NJ
- Haddonfield Road, Cherry Hill, NJ
- Icon Riverwalk, Plainsboro, NJ
- International House, New York, NY
- Kehilath Jeshurun Synagogue, New York, NY
- Lincoln Equities, Piscataway, NJ
- Marble Collegiate Church Office Building, New York, NY
- Mobil, Raritan, NJ
- Newels Development, Bloomfield, NJ
- NJ Turnpike Interchange 8, Hightstown, NJ
- Norfolk Street Site, NYCOER E-Designation Remediation, New York, NY
- One Burma Road, Jersey City, NJ
- Pan Graphics, Garfield, NJ
- Paragon, Cherry Hill, NJ
- Park Slope Portfolio, Brooklyn, NY
- Phase I Environmental Site Assessments and Due Diligence Investigations, Various Sites, NJ and NY
- Queens Plaza Park, Long Island City, NY
- Randallstown Maryland, Windsor Mill, MD
- Realterm, 1538 Stillwell Avenue, Bronx, NY
- RonBet Portfolio, New York, NY
- Self Storage Facility, Far Rockaway, NY
- Seward Park, New York, NY
- Shops at Pennsville, Pennsville, NJ
- Simply Self-Storage, Glen Rock, NJ
- Somerset Corporate Center, Bridgewater, NJ
- Stop & Shop, Raritan, NJ
- Stop & Shop, Soil Vapor Intrusion Investigation, Emerson, NJ
- Suffolk Street, New York NY
- Sunset Industrial Park, Brooklyn, NY
- Surf Avenue, Brooklyn, NY
- Target, Riverdale, NJ
- The Ritz Plaza, New York, NY
- ThorLabs, Groundwater and Soil Vapor Intrusion Investigation, Andover, NJ
- Z+G Residential Portfolio, Multiple Locations, Brooklyn, NY

MARLENA JEWETT

DATA ANALYST

CAD/GIS

1 year in the industry

Proposed Title: Field Technician



Ms. Jewett is a data analyst with experience in database design, management and visualization using EarthSoft's EQuIS™ database in support of environmental site characterizations for sites regulated under federal and state compliance programs. Her expertise includes integration of analytical databases and coordination with GIS users.

In her current role Marlena assists project teams with planning and implementation of project databases and data visualization. This includes coordinating with field staff and laboratories to define, workflows, SOPs and ensure the receipt of the proper deliverables for field and lab data; reviewing and managing project data and information using EQuIS™, Microsoft® Access, and Excel; generating data reports including tables, graphs, charts, and GIS compatible files; and generating and reviewing electronic data deliverables following project or agency specific formats.

Education

B.A., Environmental Economics
Colgate University

Work History

Equitable Advisors
Financial Advisor
9/7/2020-4/23/2021

Langan
Data Analyst
5/10/2021 – Present

SELECTED PROJECTS

EQuIS Management and NYSDEC deliverables – Data Analyst. Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a remedial investigation and waste characterizations of New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), NYC Office of Environmental Remediation (OER), and due diligence sites. Provided final report deliverables including sample summaries; tags; and exceedance summary exports from EQuIS. Completed this work for the following projects:

- **2-8 Main Street**
- **28-90 Review Avenue**
- **34-15 10th Street**
- **37-11 30th Street**
- **44-01 Northern Boulevard**
- **45 Commercial Avenue**
- **50 Jersey Avenue**
- **111 Willow Street**
- **118 West 13th Street**
- **122 Fifth Avenue**
- **155 Third Street**
- **160 East 125th Street**
- **210 Clarkson Avenue**
- **241 West 28th Street**
- **266 West 96th Street**
- **445 Gerard Avenue**
- **475 Bay Street and 31 Wave Street**

- **495 Peninsula Boulevard**
- **561 Greenwich Street**
- **563 Sackett Street**
- **805-825 Atlantic Avenue**
- **1525 Bedford Avenue**
- **2455 Third Avenue**
- **4650 Broadway**
- **ABC Block 27**
- **Bay Crane**
- **Broome Street**
- **Former Grant Hardware**
- **Forsyth and Delancy Street**
- **Gowanus Canal Northside**
- **Greenpoint Landing E1**
- **Greenpoint Landing Parcel H3**
- **John Evans**
- **Kissena Boulevard**
- **NYCHA Farragut**
- **Remeeder**

JOSEPH CONBOY

STAFF CHEMIST

ENVIRONMNETAL

Mr. Conboy has seven years of environmental chemistry, quality assurance, and environmental database management experience, with a current emphasis on validation of laboratory data for submittal to NJDEP via the New Jersey Data of Known Quality Protocols and to NYSDEC. Previous work experience includes performing validation of data for projects in USEPA Regions 2 and 3 while employing appropriate validation guidelines for each region, managing large data sets, updating appropriate regulatory limits, performing statistical evaluations, and preparing electronic data deliverables and report deliverables using the Earthsoft EQuIS database program, and acted as an intermediary between project managers, field staff, and laboratories. Mr. Conboy also has experience in field sampling techniques and maintains current OSHA HAZWOPER certification.



EDUCATION

B.Sc., Chemistry with a minor in Mathematics
Rowan University

CERTIFICATIONS & TRAINING

OSHA 40-Hour HAZWOPER 29 CFR 1910.120(e)(4) Certification

NJ Analytical Guidance and Data Usability Training

USEPA Data Validation Training

Earthsoft EQuIS Environmental Database Training

SELECTED PROJECTS

- 1400 Ferris, Bronx, NY – Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs and SVOCs including 1,4-dioxane, and tangentially used based on professional judgment to perform validation of PFAS data.
- Broome Street Parking Lot, NY - Completed validation of waste characterization data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs, SVOCs, herbicides, PCBs, pesticides, metals including mercury, ignitability temperature, pH, reactive cyanide, reactive sulfide, cyanide, and hexavalent chromium. Toxicity characteristic leachate procedure extraction data for VOCs, SVOCs, herbicides, pesticides, metals, and mercury were also validated.
- 215 North 10th Street, Brooklyn, NY - Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data.
- 35 Commercial Street, Brooklyn, NY - Completed validation of soil data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data, and tangentially used based on professional judgment to perform validation of PFAS data.
- Suffolk Street, Lower East Side, NY- Completed validation of soil, groundwater, and soil vapor data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II

guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, VOCs by USEPA TO-15, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data, and tangentially used based on professional judgment to perform validation of PFAS data.

- Managed a database for a confidential client containing 10+ years of environmental chemical data from multiple laboratories, requiring select data validation in accordance with New Jersey Data of Known Quality Protocols and identifying areas of delineation from historic field information. Once identified, NJDEP designated groundwater, surface water, soil, sediment, soil vapor, and custom screening criteria were researched and applied to each area, requiring individualized flagging for reporting.*
- Prepared the New Jersey Data of Known Quality Protocol Data Usability Evaluation and managed the database for a confidential client for a data set greater than 20 years old. A DUE or any validation effort was not prepared in the 20 years prior to current. This included data from variations of methods for volatile organic compounds, semivolatile organic compounds, total and dissolved metals, pesticides, herbicides, natural attenuation parameters, and per- and polyfluoroalkyl substances in multiple media.*
- Performed 200+ Stage 2a validations for a combined 87-acre USEPA designated Corrective Action site under the Resource Conservation and Recovery Act, including a quick-turn USEPA required PCB by soxhlet extraction investigation across multiple plants. Once a former train car painting facility, USEPA required a quick-turn PCB by soxhlet extraction soil investigation.
- Preparation of a quality assurance program for a confidential client in West Virginia. A quick turn QAPP was prepared in a service location new to the consultant, resulting in research into state requirements for data usability and auditing newly employed laboratories. The QAPP was understood to be prepared for groundwater only, but the client did not reveal the need for sediment and soil. Two QAPPs were submitted for review to governing agencies.*
- Used statistical software to determine a localized background upper confidence limit of chromium for a confidential client's sand and gravel site. Validation was used to confirm laboratory procedures, and data was used in ProUCL calculations to compare to researched background chromium levels for Pennsylvania soils. *
- Prepared daily perimeter dust and air monitoring summaries and validation of low level mirex data for a confidential client's superfund site. Low level mirex data was generated by university laboratories and subject to validation following national functional guidelines to aide in river clean-up, including sediment, surface water, and treatment system water matrices.*

**Project completed prior to employment at LANGAN.*

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

LANGAN

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	1,1,1,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,1-Trichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2-Trichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1-Dichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Bromochloromethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2,3-Trichloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,2,4-Trichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2,4-Trimethylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dibromo-3-chloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dibromoethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,3,5-Trimethylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,3-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,4-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,4-Dioxane	10	10	ug/kg
EPA 8260C	Soil	Cyclohexane	2.5	5	ug/kg
EPA 8260C	Soil	2-Butanone	2.5	5	ug/kg
EPA 8260C	Soil	2-Hexanone	2.5	5	ug/kg
EPA 8260C	Soil	4-Methyl-2-pentanone	2.5	5	ug/kg
EPA 8260C	Soil	Acetone	5	10	ug/kg
EPA 8260C	Soil	Acrolein	5	10	ug/kg
EPA 8260C	Soil	Acrylonitrile	2.5	5	ug/kg
EPA 8260C	Soil	Benzene	2.5	5	ug/kg
EPA 8260C	Soil	Bromodichloromethane	2.5	5	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	Bromoform	2.5	5	ug/kg
EPA 8260C	Soil	Bromomethane	2.5	5	ug/kg
EPA 8260C	Soil	Carbon disulfide	2.5	5	ug/kg
EPA 8260C	Soil	Carbon tetrachloride	2.5	5	ug/kg
EPA 8260C	Soil	Chlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	Chloroethane	2.5	5	ug/kg
EPA 8260C	Soil	Chloroform	2.5	5	ug/kg
EPA 8260C	Soil	Chloromethane	2.5	5	ug/kg
EPA 8260C	Soil	cis-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	cis-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260C	Soil	Dibromochloromethane	2.5	5	ug/kg
EPA 8260C	Soil	Dibromomethane	2.5	5	ug/kg
EPA 8260C	Soil	Dichlorodifluoromethane	2.5	5	ug/kg
EPA 8260C	Soil	Naphthalene	2.5	10	ug/kg
EPA 8260C	Soil	Ethyl Benzene	2.5	5	ug/kg
EPA 8260C	Soil	Methylcyclohexane	2.5	5	ug/kg
EPA 8260C	Soil	Hexachlorobutadiene	2.5	5	ug/kg
EPA 8260C	Soil	Isopropylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Methyl acetate	2.5	5	ug/kg
EPA 8260C	Soil	Methyl tert-butyl ether (MTBE)	2.5	5	ug/kg
EPA 8260C	Soil	Methylene chloride	5	10	ug/kg
EPA 8260C	Soil	n-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	n-Propylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2,3-Trichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	o-Xylene	2.5	5	ug/kg
EPA 8260C	Soil	p- & m- Xylenes	5	10	ug/kg
EPA 8260C	Soil	p-Isopropyltoluene	2.5	5	ug/kg
EPA 8260C	Soil	sec-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Styrene	2.5	5	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	tert-Butyl alcohol (TBA)	2.5	5	ug/kg
EPA 8260C	Soil	tert-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Tetrachloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Toluene	2.5	5	ug/kg
EPA 8260C	Soil	trans-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	trans-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260C	Soil	Trichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Trichlorofluoromethane	2.5	5	ug/kg
EPA 8260C	Soil	Vinyl Chloride	2.5	5	ug/kg
EPA 8260C	Soil	Xylenes, Total	7.5	15	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Acenaphthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Acenaphthylene	20.9	41.7	ug/kg
EPA 8270D	Soil	Acetophenone	20.9	41.7	ug/kg
EPA 8270D	Soil	Aniline	83.5	167	ug/kg
EPA 8270D	Soil	Anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Atrazine	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzaldehyde	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzidine	83.5	167	ug/kg
EPA 8270D	Soil	Benzo(a)anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(a)pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(b)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(g,h,i)perylene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzoic acid	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(k)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzyl alcohol	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzyl butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,1'-Biphenyl	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Bromophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Caprolactam	41.7	83.3	ug/kg
EPA 8270D	Soil	Carbazole	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chloro-3-methylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chloroaniline	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroethoxy)methane	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroethyl)ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroisopropyl)ether	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Chloronaphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Chlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chlorophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Chrysene	20.9	41.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Dibenzo(a,h)anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Dibenzofuran	20.9	41.7	ug/kg
EPA 8270D	Soil	Di-n-butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,2-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	1,3-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	1,4-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	3,3'-Dichlorobenzidine	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4-Dichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Diethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4-Dimethylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Dimethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	4,6-Dinitro-2-methylphenol	41.7	83.3	ug/kg
EPA 8270D	Soil	2,4-Dinitrophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	2,4-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270D	Soil	2,6-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270D	Soil	Di-n-octyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,2-Diphenylhydrazine (as Azobenzene)	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-ethylhexyl)phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	Fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Fluorene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorobutadiene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorocyclopentadiene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachloroethane	20.9	41.7	ug/kg
EPA 8270D	Soil	Indeno(1,2,3-cd)pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Isophorone	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Methylnaphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Methylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	3- & 4-Methylphenols	20.9	41.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Naphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	2-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	3-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	Nitrobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Nitrophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Nitrophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	N-nitroso-di-n-propylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	N-Nitrosodimethylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	N-Nitrosodiphenylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	Pentachlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Phenanthrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Phenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Pyridine	83.5	167	ug/kg
EPA 8270D	Soil	1,2,4,5-Tetrachlorobenzene	41.7	83.3	ug/kg
EPA 8270D	Soil	2,3,4,6-Tetrachlorophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	1,2,4-Trichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4,6-Trichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4,5-Trichlorophenol	20.9	41.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Pesticides					
EPA 8081B	Soil	Aldrin	0.33	0.33	ug/kg
EPA 8081B	Soil	alpha-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	beta-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	delta-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	gamma-BHC (Lindane)	0.33	0.33	ug/kg
EPA 8081B	Soil	gamma-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Soil	alpha-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Soil	Chlordane, total	1.32	1.32	ug/kg
EPA 8081B	Soil	4,4'-DDD	0.33	0.33	ug/kg
EPA 8081B	Soil	4,4'-DDE	0.33	0.33	ug/kg
EPA 8081B	Soil	4,4'-DDT	0.33	0.33	ug/kg
EPA 8081B	Soil	Dieldrin	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan I	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan II	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan sulfate	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin aldehyde	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin ketone	0.33	0.33	ug/kg
EPA 8081B	Soil	Heptachlor	0.33	0.33	ug/kg
EPA 8081B	Soil	Heptachlor epoxide	0.33	0.33	ug/kg
EPA 8081B	Soil	Methoxychlor	1.65	1.65	ug/kg
EPA 8081B	Soil	Toxaphene	16.7	16.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PCBs					
EPA 8082A	Soil	Aroclor 1016	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1221	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1232	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1242	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1248	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1254	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1260	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1262	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1268	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Total PCBs	0.0167	0.0167	mg/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Metals					
EPA 6010C	Soil	Aluminum	1	1	mg/kg
EPA 6010C	Soil	Antimony	0.5	0.5	mg/kg
EPA 6010C	Soil	Arsenic	1	1	mg/kg
EPA 6010C	Soil	Barium	1	1	mg/kg
EPA 6010C	Soil	Beryllium	0.1	0.1	mg/kg
EPA 6010C	Soil	Cadmium	0.3	0.3	mg/kg
EPA 6010C	Soil	Calcium	0.5	5	mg/kg
EPA 6010C	Soil	Chromium	0.5	0.5	mg/kg
EPA 6010C	Soil	Cobalt	0.5	0.5	mg/kg
EPA 6010C	Soil	Copper	0.5	0.5	mg/kg
EPA 6010C	Soil	Iron	2	2	mg/kg
EPA 6010C	Soil	Lead	0.3	0.3	mg/kg
EPA 6010C	Soil	Magnesium	5	5	mg/kg
EPA 6010C	Soil	Manganese	0.5	0.5	mg/kg
EPA 7473	Soil	Mercury	0.03	0.03	mg/kg
EPA 6010C	Soil	Nickel	0.5	0.5	mg/kg
EPA 6010C	Soil	Potassium	5	5	mg/kg
EPA 6010C	Soil	Selenium	1	1	mg/kg
EPA 6010C	Soil	Silver	0.5	0.5	mg/kg
EPA 6010C	Soil	Sodium	10	10	mg/kg
EPA 6010C	Soil	Thallium	1	1	mg/kg
EPA 6010C	Soil	Vanadium	1	1	mg/kg
EPA 6010C	Soil	Zinc	1	1	mg/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
		PFAS			
Modified EPA 537	Soil	Perfluorobutanesulfonic acid (PFBS)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorohexanoic acid (PFHxA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluoroheptanoic acid (PFHpA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorohexanesulfonic acid (PFHxS)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorooctanoic acid (PFOA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorooctanesulfonic acid (PFOS)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorononanoic acid (PFNA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorodecanoic acid (PFDA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluoroundecanoic acid (PFUnA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorododecanoic acid (PFDoA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorotridecanoic acid (PFTrDA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluorotetradecanoic acid (PFTA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	N-MeFOSAA	0.5	0.5	ug/kg
Modified EPA 537	Soil	N-EtFOSAA	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluoropentanoic acid (PFPeA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluoro-1-octanesulfonamide (FOSA)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluoro-1-heptanesulfonic acid (PFHpS)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluoro-1-decanesulfonic acid (PFDS)	0.5	0.5	ug/kg
Modified EPA 537	Soil	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.5	0.5	ug/kg
Modified EPA 537	Soil	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.5	0.5	ug/kg
Modified EPA 537	Soil	Perfluoro-n-butanoic acid (PFBA)	0.5	0.5	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	1,1,1,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,1-Trichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2-Trichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1-Dichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Bromochloromethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2,3-Trichloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,2,4-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2,4-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dibromo-3-chloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dibromoethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,3,5-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,3-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,4-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	Cyclohexane	0.2	0.5	ug/L
EPA 8260C	Water	2-Butanone	0.2	0.5	ug/L
EPA 8260C	Water	2-Hexanone	0.2	0.5	ug/L
EPA 8260C	Water	4-Methyl-2-pentanone	0.2	0.5	ug/L
EPA 8260C	Water	Acetone	1	2	ug/L
EPA 8260C	Water	Acrolein	0.2	0.5	ug/L
EPA 8260C	Water	Acrylonitrile	0.2	0.5	ug/L
EPA 8260C	Water	Benzene	0.2	0.5	ug/L
EPA 8260C	Water	Bromodichloromethane	0.2	0.5	ug/L
EPA 8260C	Water	Bromoform	0.2	0.5	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	Bromomethane	0.2	0.5	ug/L
EPA 8260C	Water	Carbon disulfide	0.2	0.5	ug/L
EPA 8260C	Water	Carbon tetrachloride	0.2	0.5	ug/L
EPA 8260C	Water	Chlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	Chloroethane	0.2	0.5	ug/L
EPA 8260C	Water	Chloroform	0.2	0.5	ug/L
EPA 8260C	Water	Chloromethane	0.2	0.5	ug/L
EPA 8260C	Water	cis-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	cis-1,3-Dichloropropylene	0.2	0.5	ug/L
EPA 8260C	Water	Dibromochloromethane	0.2	0.5	ug/L
EPA 8260C	Water	Dibromomethane	0.2	0.5	ug/L
EPA 8260C	Water	Dichlorodifluoromethane	0.2	0.5	ug/L
EPA 8260C	Water	Naphthalene	1	2	ug/L
EPA 8260C	Water	Ethyl Benzene	0.2	0.5	ug/L
EPA 8260C	Water	Methylcyclohexane	0.2	0.5	ug/L
EPA 8260C	Water	Hexachlorobutadiene	0.2	0.5	ug/L
EPA 8260C	Water	Isopropylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Methyl acetate	0.2	0.5	ug/L
EPA 8260C	Water	Methyl tert-butyl ether (MTBE)	0.2	0.5	ug/L
EPA 8260C	Water	Methylene chloride	1	2	ug/L
EPA 8260C	Water	n-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	n-Propylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	o-Xylene	0.2	0.5	ug/L
EPA 8260C	Water	p- & m- Xylenes	0.5	1	ug/L
EPA 8260C	Water	1,2,3-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	p-Isopropyltoluene	0.2	0.5	ug/L
EPA 8260C	Water	sec-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Styrene	0.2	0.5	ug/L
EPA 8260C	Water	tert-Butyl alcohol (TBA)	0.5	1	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	tert-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Tetrachloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Toluene	0.2	0.5	ug/L
EPA 8260C	Water	trans-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	trans-1,3-Dichloropropylene	0.2	0.5	ug/L
EPA 8260C	Water	Trichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Trichlorofluoromethane	0.2	0.5	ug/L
EPA 8260C	Water	Vinyl Chloride	0.2	0.5	ug/L
EPA 8260C	Water	Xylenes, Total	0.6	1.5	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	Acenaphthene	0.05	0.05	ug/L
EPA 8270D	Water	Acenaphthylene	0.05	0.05	ug/L
EPA 8270D	Water	Acetophenone	2.5	5	ug/L
EPA 8270D	Water	Aniline	2.5	5	ug/L
EPA 8270D	Water	Anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Atrazine	0.5	0.5	ug/L
EPA 8270D	Water	Benzaldehyde	2.5	5	ug/L
EPA 8270D	Water	Benzidine	10	20	ug/L
EPA 8270D	Water	Benzo(a)anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(a)pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(b)fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(g,h,i)perylene	0.05	0.05	ug/L
EPA 8270D	Water	Benzoic acid	25	50	ug/L
EPA 8270D	Water	Benzo(k)fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Benzyl alcohol	2.5	5	ug/L
EPA 8270D	Water	Benzyl butyl phthalate	2.5	5	ug/L
EPA 8270D	Water	1,1'-Biphenyl	2.5	5	ug/L
EPA 8270D	Water	4-Bromophenyl phenyl ether	2.5	5	ug/L
EPA 8270D	Water	Caprolactam	2.5	5	ug/L
EPA 8270D	Water	Carbazole	2.5	5	ug/L
EPA 8270D	Water	4-Chloro-3-methylphenol	2.5	5	ug/L
EPA 8270D	Water	4-Chloroaniline	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroethoxy)methane	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroethyl)ether	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroisopropyl)ether	2.5	5	ug/L
EPA 8270D	Water	2-Chloronaphthalene	2.5	5	ug/L
EPA 8270D	Water	2-Chlorophenol	2.5	5	ug/L
EPA 8270D	Water	4-Chlorophenyl phenyl ether	2.5	5	ug/L
EPA 8270D	Water	Chrysene	0.05	0.05	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	Dibenzo(a,h)anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Dibenzofuran	2.5	5	ug/L
EPA 8270D	Water	Di-n-butyl phthalate	2.5	5	ug/L
EPA 8270D	Water	1,4-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	1,2-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	1,3-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	3,3'-Dichlorobenzidine	2.5	5	ug/L
EPA 8270D	Water	2,4-Dichlorophenol	2.5	5	ug/L
EPA 8270D	Water	Diethyl phthalate	2.5	5	ug/L
EPA 8270D	Water	2,4-Dimethylphenol	2.5	5	ug/L
EPA 8270D	Water	Dimethyl phthalate	2.5	5	ug/L
EPA 8270D	Water	4,6-Dinitro-2-methylphenol	2.5	5	ug/L
EPA 8270D	Water	2,4-Dinitrophenol	2.5	5	ug/L
EPA 8270D	Water	2,4-Dinitrotoluene	2.5	5	ug/L
EPA 8270D	Water	2,6-Dinitrotoluene	2.5	5	ug/L
EPA 8270D	Water	Di-n-octyl phthalate	2.5	5	ug/L
EPA 8270 SIM	Water	1,4-Dioxane	0.2	0.4	ug/L
EPA 8270D	Water	1,2-Diphenylhydrazine (as Azobenzene)	2.5	5	ug/L
EPA 8270D	Water	Bis(2-ethylhexyl)phthalate	0.5	0.5	ug/L
EPA 8270D	Water	Fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Fluorene	0.05	0.05	ug/L
EPA 8270D	Water	Hexachlorobenzene	0.02	0.02	ug/L
EPA 8270D	Water	Hexachlorobutadiene	0.5	0.5	ug/L
EPA 8270D	Water	Hexachlorocyclopentadiene	2.5	5	ug/L
EPA 8270D	Water	Hexachloroethane	0.5	0.5	ug/L
EPA 8270D	Water	Indeno(1,2,3-cd)pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Isophorone	2.5	5	ug/L
EPA 8270D	Water	2-Methylnaphthalene	2.5	5	ug/L
EPA 8270D	Water	2-Methylphenol	2.5	5	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	3- & 4-Methylphenols	2.5	5	ug/L
EPA 8270D	Water	Naphthalene	0.05	0.05	ug/L
EPA 8270D	Water	3-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	4-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	2-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	Nitrobenzene	0.25	0.25	ug/L
EPA 8270D	Water	4-Nitrophenol	2.5	5	ug/L
EPA 8270D	Water	2-Nitrophenol	2.5	5	ug/L
EPA 8270D	Water	N-nitroso-di-n-propylamine	2.5	5	ug/L
EPA 8270D	Water	N-Nitrosodimethylamine	0.5	0.5	ug/L
EPA 8270D	Water	N-Nitrosodiphenylamine	2.5	5	ug/L
EPA 8270D	Water	Pentachlorophenol	0.25	0.25	ug/L
EPA 8270D	Water	Phenanthrene	0.05	0.05	ug/L
EPA 8270D	Water	Phenol	2.5	5	ug/L
EPA 8270D	Water	Pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Pyridine	2.5	5	ug/L
EPA 8270D	Water	1,2,4,5-Tetrachlorobenzene	2.5	5	ug/L
EPA 8270D	Water	2,3,4,6-Tetrachlorophenol	2.5	5	ug/L
EPA 8270D	Water	1,2,4-Trichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	2,4,6-Trichlorophenol	2.5	5	ug/L
EPA 8270D	Water	2,4,5-Trichlorophenol	2.5	5	ug/L

Method	Matrix	Analyte	MDL	RL	Units
Total Petroleum Hydrocarbons (TPH)					
EPA 8015D	Water	Diesel Range Organics (DRO) (C10-C28)	0.066	0.1	mg/L
EPA 8015D	Water	Oil Range Organics (ORO) (C28-C44)	0.066	0.1	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Pesticides					
EPA 8081B	Water	Aldrin	0.004	0.004	ug/L
EPA 8081B	Water	alpha-BHC	0.004	0.004	ug/L
EPA 8081B	Water	beta-BHC	0.004	0.004	ug/L
EPA 8081B	Water	delta-BHC	0.004	0.004	ug/L
EPA 8081B	Water	gamma-BHC (Lindane)	0.004	0.004	ug/L
EPA 8081B	Water	gamma-Chlordane	0.01	0.01	ug/L
EPA 8081B	Water	alpha-Chlordane	0.004	0.004	ug/L
EPA 8081B	Water	Chlordane, total	0.04	0.04	ug/L
EPA 8081B	Water	4,4'-DDD	0.004	0.004	ug/L
EPA 8081B	Water	4,4'-DDE	0.004	0.004	ug/L
EPA 8081B	Water	4,4'-DDT	0.004	0.004	ug/L
EPA 8081B	Water	Dieldrin	0.002	0.002	ug/L
EPA 8081B	Water	Endosulfan I	0.004	0.004	ug/L
EPA 8081B	Water	Endosulfan II	0.004	0.004	ug/L
EPA 8081B	Water	Endosulfan sulfate	0.004	0.004	ug/L
EPA 8081B	Water	Endrin	0.004	0.004	ug/L
EPA 8081B	Water	Endrin aldehyde	0.01	0.01	ug/L
EPA 8081B	Water	Endrin ketone	0.01	0.01	ug/L
EPA 8081B	Water	Heptachlor	0.004	0.004	ug/L
EPA 8081B	Water	Heptachlor epoxide	0.004	0.004	ug/L
EPA 8081B	Water	Methoxychlor	0.004	0.004	ug/L
EPA 8081B	Water	Toxaphene	0.1	0.1	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PCBs					
EPA 8082A	Water	Aroclor 1016	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1221	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1232	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1242	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1248	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1254	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1260	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1262	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1268	0.05	0.05	ug/L
EPA 8082A	Water	Total PCBs	0.05	0.05	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Metals					
EPA 6010C	Water	Aluminum	0.01	0.01	mg/L
EPA 6010C	Water	Antimony	0.005	0.005	mg/L
EPA 6010C	Water	Arsenic	0.004	0.004	mg/L
EPA 6010C	Water	Barium	0.01	0.01	mg/L
EPA 6010C	Water	Beryllium	0.001	0.001	mg/L
EPA 6010C	Water	Cadmium	0.003	0.003	mg/L
EPA 6010C	Water	Calcium	0.05	0.05	mg/L
EPA 6010C	Water	Chromium	0.005	0.005	mg/L
EPA 6010C	Water	Cobalt	0.005	0.005	mg/L
EPA 6010C	Water	Copper	0.003	0.003	mg/L
EPA 6010C	Water	Iron	0.02	0.02	mg/L
EPA 6010C	Water	Lead	0.003	0.003	mg/L
EPA 6010C	Water	Magnesium	0.05	0.05	mg/L
EPA 6010C	Water	Manganese	0.005	0.005	mg/L
EPA 7473	Water	Mercury	0.002	0.002	mg/L
EPA 6010C	Water	Nickel	0.005	0.005	mg/L
EPA 6010C	Water	Potassium	0.05	0.05	mg/L
EPA 6010C	Water	Selenium	0.01	0.01	mg/L
EPA 6010C	Water	Silver	0.005	0.005	mg/L
EPA 6010C	Water	Sodium	0.1	0.1	mg/L
EPA 6010C	Water	Thallium	0.005	0.005	mg/L
EPA 6010C	Water	Vanadium	0.01	0.01	mg/L
EPA 6010C	Water	Zinc	0.01	0.01	mg/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PFAS					
Modified EPA 537	Water	Perfluorobutanesulfonic acid (PFBS)	0.294	2	ng/L
Modified EPA 537	Water	Perfluorohexanoic acid (PFHxA)	0.471	2	ng/L
Modified EPA 537	Water	Perfluoroheptanoic acid (PFHpA)	0.635	2	ng/L
Modified EPA 537	Water	Perfluorohexanesulfonic acid (PFHxS)	0.281	2	ng/L
Modified EPA 537	Water	Perfluorooctanoic acid (PFOA)	0.531	2	ng/L
Modified EPA 537	Water	Perfluorooctanesulfonic acid (PFOS)	0.292	2	ng/L
Modified EPA 537	Water	Perfluorononanoic acid (PFNA)	0.574	2	ng/L
Modified EPA 537	Water	Perfluorodecanoic acid (PFDA)	0.524	2	ng/L
Modified EPA 537	Water	Perfluoroundecanoic acid (PFUnA)	0.657	2	ng/L
Modified EPA 537	Water	Perfluorododecanoic acid (PFDoA)	0.777	2	ng/L
Modified EPA 537	Water	Perfluorotridecanoic acid (PFTrDA)	1.37	2	ng/L
Modified EPA 537	Water	Perfluorotetradecanoic acid (PFTA)	0.531	2	ng/L
Modified EPA 537	Water	N-MeFOSAA	0.529	2	ng/L
Modified EPA 537	Water	N-EtFOSAA	0.557	2	ng/L
Modified EPA 537	Water	Perfluoropentanoic acid (PFPeA)	0.452	2	ng/L
Modified EPA 537	Water	Perfluoro-1-octanesulfonamide (FOSA)	0.296	2	ng/L
Modified EPA 537	Water	Perfluoro-1-heptanesulfonic acid (PFHpS)	0.415	2	ng/L
Modified EPA 537	Water	Perfluoro-1-decanesulfonic acid (PFDS)	0.574	2	ng/L
Modified EPA 537	Water	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.492	5	ng/L
Modified EPA 537	Water	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.399	2	ng/L
Modified EPA 537	Water	Perfluoro-n-butanoic acid (PFBA)	1.63	2	ng/L

Notes

* = The contract labs has indicated that they are not able to achieve the reporting limits of 2 ng/L for 1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS). Site specific decisions will need to be made by the DEC project manager in consultation with the DEC remedial program chemist

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	1,1,1,2-Tetrachloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,1-Trichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2,2-Tetrachloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2-Trichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1-Dichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1-Dichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	1,2,4-Trichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2,4-Trimethylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dibromoethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichloropropane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichlorotetrafluoroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3,5-Trimethylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3-Butadiene	0.3	0.3	ppb
EPA TO-15	Soil Vapor	1,3-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3-Dichloropropane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,4-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,4-Dioxane	0.2	0.2	ppb
EPA TO-15	Soil Vapor	2-Butanone	0.1	0.1	ppb
EPA TO-15	Soil Vapor	2-Hexanone	0.2	0.2	ppb
EPA TO-15	Soil Vapor	3-Chloropropene	0.5	0.5	ppb
EPA TO-15	Soil Vapor	4-Methyl-2-pentanone	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Acetone	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Acrolein	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Acrylonitrile	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Benzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Benzyl chloride	0.1	0.1	ppb

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	Bromodichloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Bromoform	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Bromomethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Carbon disulfide	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Carbon tetrachloride	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Chlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloroform	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	cis-1,2-Dichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	cis-1,3-Dichloropropylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Cyclohexane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Dibromochloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Dichlorodifluoromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Ethanol	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Ethyl acetate	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Ethyl Benzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Hexachlorobutadiene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Isopropanol	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Isopropylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methyl Methacrylate	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methyl tert-butyl ether (MTBE)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methylene chloride	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Naphthalene	0.2	0.2	ppb
EPA TO-15	Soil Vapor	n-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Heptane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Hexane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Propylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	o-Xylene	0.1	0.1	ppb

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
		VOC			
EPA TO-15	Soil Vapor	p- & m- Xylenes	0.2	0.2	ppb
EPA TO-15	Soil Vapor	p-Ethyltoluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	p-Isopropyltoluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Propylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	sec-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Styrene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	tert-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Tetrachloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Tetrahydrofuran	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Toluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	trans-1,2-Dichloroethylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	trans-1,3-Dichloropropylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Trichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Trichlorofluoromethane (Freon 11)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl acetate	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl bromide	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl Chloride	0.025	0.025	ppb

ATTACHMENT C

Analytical Methods / Quality Assurance Summary Table

LANGAN

ATTACHMENT C
ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

Matrix Type	Field Parameters	Laboratory Parameters	Analytical Methods	Sample Preservation	Sample Container Volume and Type	Sample Hold Time	Number of Samples to be Collected	Field Duplicate Samples	Equipment Blank Samples	Trip Blank Samples	Ambient Air Samples	MS/MSD Samples
Soil	Total VOCs via PID	Part 375 + TCL VOCs / CP-51 VOCs	EPA 8260C	Cool to 4°C	Two 40-ml VOC vials with 5ml H_2O, one with MeOH or 3 Encore Samplers (separate container for % solids)	14 days, freeze at lab within 48 hours	0	1 per 20 samples (minimum 1)	1 per 20 samples, if needed (minimum 1, if needed)	1 per shipment of VOC samples	NA	1 per 20 samples (minimum 1)
		Part 375 + TCL SVOCs / CP-51 SVOCs	EPA 8270D	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		1,4-Dioxane	EPA 8270D	Cool to 4°C	8 oz. jar	14 days extract, 40 days after extraction to analysis						
		Part 375 + TAL Metals	EPA 6010C, EPA 7470, EPA 7196A, EPA 9014/9010C	Cool to 4°C	2 oz. jar*	6 months, except Mercury 28 days						
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	2 oz. jar*	28 days						
		Perfluoroalkyl Substances (PFAs)	EPA 1633	Cool to 4°C	8 ounce HDPE container	90 days						
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
Groundwater	Headspace VOCs via PID, synoptic groundwater level measurement, Temperature, Turbidity, pH, ORP, Conductivity	Part 375 + TCL VOCs	EPA 8260C	Cool to 4°C; HCl to pH <2;no headspace	Three 40-mL VOC vials with Teflon®-lined cap	14 days	5, twice a year	1 per 20 samples (minimum 1)	1 per 20 samples, if needed (minimum 1, if needed)	1 per shipment of VOC samples	NA	1 per 20 samples (minimum 1)
		Part 375 + TCL SVOCs	EPA 8270D	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extract, 40 days after extraction to analysis	5, twice a year					
		1,4-Dioxane	EPA 8270D SIM	Cool to 4°C	1-L Amber Glass	7 days to extract, 40 days after extraction to analysis	0					
		Part 375 + TAL Metals	EPA 6010C, EPA 7470, EPA 7196A, EPA 9014/9010C	Cool to 4°C	Two 1-Liter Amber Glass	6 months, except Mercury 28 days	0					
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	250 mL Plastic	24 hours	0					
		Perfluoroalkyl Substances (PFAs)	EPA 1633	Cool to 4°C	Three 500mL HDPE containers	28 days	0					
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extraction, 40 days after extraction to analysis	0					
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis	0					
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis	0					
		Total Petroleum Hydrocarbons - Diesel Range Organics (C10-C28)	EPA TPH-DRO	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis	0					
		Total Petroleum Hydrocarbons - Oil Range Organics (C28-C40/C44)	EPA TPH-ORO	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis	0					
Soil Vapor	Total VOCs via PID	Part 375 + TCL VOCs	EPA TO-15	NA	6L Summa Cannister	30 days	6	1 per 20 samples (minimum 1)	NA	NA	1 per day	NA
Indoor Air	Total VOCs via PID	Part 375 + TCL VOCs	EPA TO-15	NA	6L Summa Cannister	30 days	6	1 per 20 samples (minimum 1)	NA	NA	1 per day	NA

Notes:
*can be combined in one or more 8 oz. jars
mL = milliliter
VOC = Volatile organic compound
SVOC = Semi-volatile organic compound
PCB = Polychlorinated biphenyls
TAL = Total Analyte List
TCL = Target Criteria List
The PFAS compounds to be analyzed includes the expanded PFAS Analyte 40-list under the EPA's Draft Method 1633.

PID = Photoionization detector
Part 375 = New York State Department of Environmental Conservation (NYSDEC) Title 6 New York City Rules and Regulation (NYCRR) Part 375 List.
ORP = Oxidation reduction potential
EPA = U.S. Environmental Protection Agency
NA = Not applicable
°C = degree Celsius

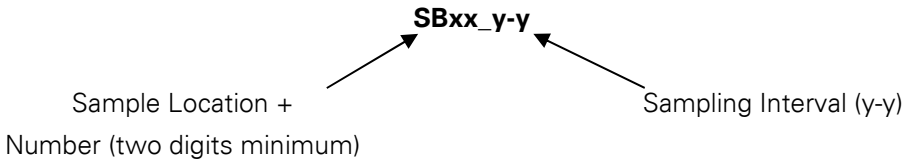
ATTACHMENT D

Sample Nomenclature

Requirements for Sample Nomenclature

The recommendations for sample nomenclature outlined below provide for consistency between sample events and projects but, most importantly, establish unique sample IDs that will avoid confusion months or years after the sample has been collected. Furthermore, unique sample IDs are required for any data submitted to the NYSDEC in EDD format or being uploaded to an EQuIS database.

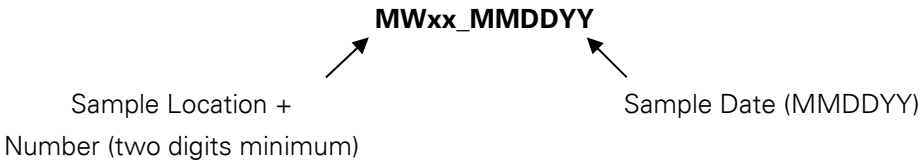
Soil and Sediment Samples



Sample Type	Sample Location	Sample Depth (feet bgs)	Sample Name
Phase II/Remedial Investigation			
Grab	SB01	2 to 4	**SB01_2-4**
	SB02	4	**SB02_4**
Waste Characterization			
Grab	WC01	2 to 4	**WC01_2-4**
	WC02	4	**WC02_4**
Composite	WC01 + WC02	0 to 10	**COMP01_0-10**
Endpoint Sampling			
Grab	EPSW01_N	5	**EPSW01_N_5**
	EPSW01_S	5	**EPSW01_S_5**
	EPSW01_E	5	**EPSW01_E_5**
	EPSW01_W	5	**EPSW01_W_5**
	EPB01	6	**EPB01_6**

- Boring ID (**SB01**_0-0.5) is a sequential number (starting with 01) and should be a minimum of two digits. Any additional characters do not count as part of the 2-digit minimum (SB01**A**, not SB1A).
- Sample Interval (SB01_**0-0.5**) is separated from the boring ID with an underscore, and the top and bottom interval with a dash. Soil and sediment sample intervals should always be in feet.

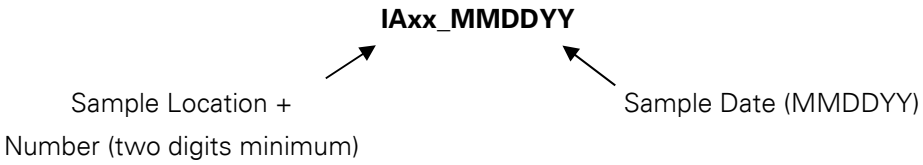
Groundwater and Surface Water Samples



Sample Type	Sample Location	Sample Date	Sample Name
Groundwater Sample	MW01	02/21/2013	**MW01_022113**
Surface Water Sample	SW01	02/21/2013	**SW01_022113**

- Well ID or surface water gauge ID (**MW01**_022113) is the common well name and should be a minimum of two digits. Any additional characters do not count as part of the 2-digit minimum (MW01**A**, not MW1A).
- Sample date (MW01_**022113**) is separated from the well ID (or gauge location) with an underscore and should be provided in MMDDYY format [the date can not contain "/" or "-"].
- If groundwater samples are collected from multiple intervals within one well, you may assign a letter designation (in lower case) to the well ID to differentiate between intervals (i.e., MW01a_022113, MW01b_022113, and MW01c_022113). The letter "a" would indicate the shallowest interval and "c" the deepest. The actual depth intervals should be documented in the project field book or field sheets and the letter designations should be used consistently between sampling events.

Vapor Investigation Samples



Sample Type	Sample Location	Sample Date	Sample Name
Ambient Air Sample	AA01	02/21/2013	**AA01_022113**
Air Sample	IA01	02/21/2013	**IA01_022113**
Soil Vapor Sample	SV01	02/21/2013	**SV01_022113**
Vapor Extraction Well Sample	SVE01 (Inlet/Midpoint/Outlet)	02/21/2013	**SVE01_IN_022113** **SVE01_ MID_022113** **SVE01_ OUT_022113**

- Sample number (**IA01**_022113) should be separated from the sample date by an underscore. Sample numbers should be sequential in order and be a minimum of two digits. Any additional characters do not count as part of the 2-digit minimum (IA01**A**, not IA1A). The location of each sequential sample number should be documented/ illustrated in project field books or field sheets.
- Sample date (IA01**_022113**) is separated from the sample number with an underscore and should be provided in MMDDYY format [the date can not contain "/" or "-"].
- Ambient air samples also need their own unique sample location name. If you revisit a previous ambient air sample location, you can reuse the location name with the new sample date appended to the end.

Duplicate Samples

Sample Type	Parent Sample Code	Date	Sample Name
Groundwater Duplicate Sample (DUP)	MW01_022113	02/21/2013	**DUP01_022113**

Field Blanks and Trip Blanks

Sample Type	Date	Sample Name
Equipment Blank (EB)	02/21/2013	**EB01_022113**
Field Blank (FB)	02/21/2013	**FB01_022113**
Trip Blank (TB)	02/21/2013	**TB01_022113**

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample Type	Sample Location	Parent Sample Name	Sample Name
Matrix Spike (MS)	SB01	SB01_2-4	**SB01_2-4MS**
Matrix Spike Duplicate (MSD)	SB01	SB01_2-4	**SB01_2-4MSD**

NOTES

1. Spaces should not be used in sample names.
2. Special characters should not be used in report naming with the exception of – and _.
3. Letter designations should be used consistently between sampling events.
4. According to USEPA's Contract Laboratory Program (CLP) Guidance for Field Samplers (January 2011), field duplicate samples should remain "blind" to the laboratory (i.e., they should have separate CLP Sample numbers). Assign two separate (unique) CLP sample numbers (i.e., one number to the field sample and one to the duplicate). Submit blind to the laboratory.

ATTACHMENT E

Laboratory Standard Operating Procedures for PFAS Analysis

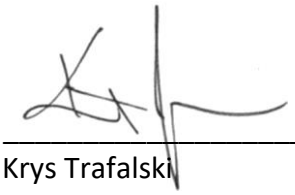
LANGAN

Standard Operating Procedure

Determination of Target Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous and Solid matrices by Isotope Dilution Analysis by HPLC/MS-MS According to EPA Method 1633 Draft 3

Approvals

Laboratory Director/QA Officer



Krys Trafalski

General Manager

Scott R. Hall

Scott Hall

UNCONTROLLED COPY

Controlled Copy No. PFAS_LCMSMS1633, Rev 1.2-____

Issued to: NA

Copyright © 2023
York Analytical Laboratories, Inc.

All rights reserved. The use and copying of this product is subject to approval by York Analytical Laboratories, Inc. Any other use is prohibited. No part of this book may be reproduced in any form or by any means, electronic, mechanical, photocopying, storage in a retrieval system, recording or otherwise, without the prior written permission of York. No part of this book may be translated into any other language without the prior written permission of York.

1. SCOPE AND APPLICATION

This method is used to identify and quantitate specific PFAS compounds in extracts of non-potable water and solid (soil/sediment) samples using HPLC/MS-MS (High Pressure Liquid Chromatography/Tandem Mass Spectrometry). Currently the compounds (40) that are measured by this methodology are listed in Table 1.0 below.

Table 1.0-Target PFAS

Perfluoroalkyl carboxylic acids		
Perfluorobutanoic acid	PFBA	375-22-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorononanoic acid	PFNA	375-95-1
Perfluorodecanoic acid	PFDA	335-76-2
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluoroalkyl sulfonic acids Acid Form		
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluoropentansulfonic acid	PFPeS	2706-91-4
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Fluorotelomer sulfonic acids		
1*H*,1*H*, 2*H*, 2*H*-Perfluorohexane sulfonic acid	4:2FTS	757124-72-4
1*H*,1*H*, 2*H*, 2*H*-Perfluorooctane sulfonic acid	6:2FTS	27619-97-2
1*H*,1*H*, 2*H*, 2*H*-Perfluorodecane sulfonic acid	8:2FTS	39108-34-4
Perfluorooctane sulfonamides		
Perfluorooctanesulfonamide	PFOSA	754-91-6
N-methyl perfluorooctanesulfonamide	NMeFOSA	31506-32-8
N-ethyl perfluorooctanesulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids		
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols		
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2
Per- and Polyfluoroether carboxylic acids		
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
4,8-Dioxa-3*H*-perfluorononanoic acid	ADONA	919005-14-4
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Ether sulfonic acids		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	113507-82-7

Fluorotelomer carboxylic acids		
3-Perfluoropropyl propanoic acid	3:3FTCA	356-02-5
2*H*,2*H*,3*H*,3*H*-Perfluorooctanoic acid	5:3FTCA	914637-49-3
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4

The estimated reporting limits (MRL) based upon the preparation/analysis parameters herein at the time of this revision are approximately 2.0 - 25.0 ng/L (ppt) for aqueous samples and 0.5 - 5.0 µg/kg for solids. The linear range for these PFAS can be extended by dilution. These MRLs are based upon a volume of 250 mL - 500 mL extracted for aqueous samples and 2 - 5 g for solids. Please refer to *Appendix 1: Target Compound Reporting Limits* for limits of detection and quantitation based on a 5 g extract and 500 mL extract for soils and waters, respectively. Please note, MDL/LOD values are based on the initial November 2022 study and are subject to change based on ongoing study data. The most up-to-date study data will be kept on file by the Quality Department and readily available in the test code section(s) of Element LIMS.

This method is "performance-based," which means that modifications may be made without additional EPA review to improve performance (e.g., overcome interferences, or improve the sensitivity, accuracy, or precision of the results) *provided that all* performance criteria in this method are met. Requirements for establishing equivalency are in Section 9.1.2 and include 9.1.2.2c. For Clean Water Act (CWA) uses, additional flexibility is described at 40 CFR 136.6. Changes in performance, sensitivity, selectivity, precision, recovery, etc., that result from modifications within the scope of 40 CFR Part 136.6, and Section 9.0 of this method must be documented, as well as how these modifications compare to the specifications in this method. Changes outside the scope of 40 CFR Part 136.6 and Section 9.0 of this method may require prior review or approval.

2. SUMMARY

Environmental samples are prepared and extracted using method-specific procedures. Sample extracts are subjected to cleanup procedures designed to remove interferences. Analyses of the sample extracts are conducted by HPLC-MS/MS in the multiple reaction monitoring (MRM) mode. Sample concentrations are determined by isotope dilution or extracted internal standard quantification (see Section 10.3) using isotopically labeled compounds added to the samples before extraction.

2.1 Extraction

2.1.1 Aqueous samples are spiked with isotopically labeled standards, extracted using solid-phase extraction (SPE) cartridges and undergo cleanup using carbon before analysis.

2.1.2 Solid samples are spiked with isotopically labeled standards, extracted into basic methanol, and cleaned up by carbon and SPE cartridges before analysis.

2.2 Analysis

2.2.1 Extracts are analyzed by HPLC-MS/MS in MRM mode. Extracts contain Non-extracted Internal Standards (NIS) to monitor instrument performance and are used for quantitative analysis.

2.2.2 Individual PFAS analytes are identified through peak analysis of the quantification and confirmation ions (Precursor and product ions) where applicable.

2.2.3 The concentration of each analyte is calculated using the isotope dilution technique. This approach corrects the target analyte concentration based on recovery of isotopic analogues and essentially behave like extracted internal standards (EIS). For QC purposes, the percent recoveries of the isotope dilution analogues are calculated using the integrated peak areas of isotope performance standards, which are added to the final extract and function as traditional internal standards (non-extracted internal standards), exclusively applied to the isotope dilution analogues.

3. DEFINITIONS

3.1 ANALYTICAL SEQUENCE – A set of samples that are analyzed on the same instrument continuously over a period, typically a 24 hours. An analytical sequence may consist of multiple extraction batches and various matrices and is bracketed by method specific quality control analyses.

3.2 CALIBRATION STANDARD (CAL) – A solution of the method analytes, isotope dilution analogues, and isotope performance standards (Internal standards) prepared from primary dilution and stock standards. The calibration standards are used to calibrate the instrument response with respect to analyte concentration.

3.3 CONTINUING CALIBRATION VERIFICATION (CCV) – A calibration standard containing target compounds, isotopic analogues, and internal standards. The CCV is analyzed periodically to verify the accuracy of an existing calibration.

3.4 EXTRACTION BATCH – A set of up to 20 Field Samples (not including quality control samples) extracted together by the same person(s) during a workday using the same lot of standards and reagents.

3.5 FIELD DUPLICATES – Separate samples collected at the same time and sampling location, shipped, and stored under identical conditions. Method precision, including

the contribution from sample collection procedures, is estimated from the analysis of Field Duplicates. Field Duplicates may be used to prepare duplicate QC samples.

3.6 FIELD BLANK (FB) – An aliquot of reagent water free of constituents of concern that is placed in a sample container in the during field sampling and treated as a sample in all respects. This includes shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FB is to determine if method analytes or other interferences are introduced to the sample from shipping, storage, and the field environment.

3.7 ISOTOPE DILUTION ANALOGUES - Isotopically labeled analogues of the method analytes that are added to the sample prior to extraction in a known amount. Note: Not all target PFAS currently have an isotopically labeled analogue. In these cases, an alternate isotopically labeled analogue is used as detailed in this SOP and reference method.

3.8 ISOTOPE DILUTION TECHNIQUE - An analytical technique for measuring analyte concentration using the ratio of the peak area of a native analyte to that of an isotopically labeled analogue. The analogue is added to a sample in a known amount and carried through the entire analytical procedure. The ration is used to determine a correction factor that is applied to the native compound's result.

3.9 ISOTOPE PERFORMANCE STANDARDS (Internal Standards) - Quality control compounds that are added to all standard solutions and extracts in a known amount and used to measure the relative response of the isotopically labelled analogues that are components of the same solution. For this method, the isotope performance standards are three isotopically labeled analogues of the method analytes. The isotope performance standards are indicators of instrument performance and are used to calculate the recovery of the isotope dilution analogues through the extraction procedure. In this method, the isotope performance standards are not used in the calculation of the recovery of the native analytes.

3.10 METHOD BLANK – An aliquot of reagent water to which known quantities of the method analytes and isotope dilution analogues are added. The results of the MBLK verify method performance in the absence of sample matrix.

3.11 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) – Aliquots of field samples that have been fortified with a known concentration of target compounds, prior to sample preparation and extraction, and analyzed to measure the effect of matrix interferences. The use of MS/MSD samples is generally not required in isotope dilution methods because the labeled compounds added to every sample provide more performance data than spiking a single sample in each preparation batch.

3.11 SAMPLE DUPLICATE (DUP) – A duplicate aliquot of a field sample analyzed in the same manner as a parent sample to measure reproducibility.

3.12 LIMIT OF QUANTITATION (LOQ) – The smallest concentration that produces a quantitative result with known and recorded precision and bias. The LOQ shall be set at or above the concentration of the lowest initial calibration standard (the lowest calibration standard must fall within the linear range). Determined by matrix through the entire preparation and analysis process.

3.13 METHOD DETECTION LIMIT (MDL) – The minimum measured concentration of a substance that can be reported with 99% confidence that the measured analyte concentration is distinguishable from method blank results (40 CFR 136, Appendix B).

3.14 MINIMUM LEVEL OF QUANTITATION (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence. It may be equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed. Alternatively, the ML may be established by multiplying the MDL (pooled or not pooled, as appropriate) by 3.18 and rounding the result to the number nearest to 1, 2, or 5 x 10n, where n is zero or an integer (see 68 FR 11770).

3.15 PRECURSOR ION – For the purpose of this method, the precursor ion is the deprotonated molecule ($[M-H]^-$) of the method analyte (except for HFPO-DA, in which the precursor ion is formed by decarboxylation). In MS/MS, the precursor ion is mass selected and fragmented by collisionally activated dissociation to produce distinctive product ions of smaller *m/z*.

3.16 PRIMARY DILUTION STANDARD (PDS) SOLUTION – A solution containing the analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.

3.17 PRODUCT ION – For the purpose of this method, a product ion is one of the fragment ions produced in MS/MS by collisionally activated dissociation of the precursor ion.

3.18 INITIAL CALIBRATION VERIFICATION (ICV) – A calibration standard prepared independently from the primary calibration solutions. For this method, the ICV is a repeat of the entire dilution scheme starting with the same stock materials (neat compounds or purchased stock solutions) used to prepare the primary calibration solutions. Independent sources and separate lots of the starting materials are not required, provided the laboratory has obtained the purest form of the starting materials

commercially available. The purpose of the ICV is to verify the integrity of the primary calibration standards.

3.19 QUANTITATIVE STANDARD - A quantitative standard of assayed concentration and purity traceable to a Certificate of Analysis.

3.20 STOCK STANDARD SOLUTION - A concentrated solution containing one or more method analytes prepared in the laboratory using assayed reference materials or purchased from a reputable commercial source with a Certificate of Analysis.

3.21 TECHNICAL GRADE STANDARD – As defined for this method, a technical-grade standard includes a mixture of the branched and linear isomers of a method analyte. For the purposes of this method, technical-grade standards are used to identify retention times of branched and linear isomers of method analytes.

3.22 ANALYTE – A PFAS compound included in this method. The analytes are listed in Table 1.

3.23 CALIBRATION STANDARD (CS) – A solution prepared from a secondary standard and/or stock solutions and used to calibrate the response of the LC-MS/MS instrument.

3.24 CONTINUING CALIBRATION VERIFICATION (CCV) STANDARD – The mid-point calibration standard that is used to verify calibration.

3.25 CFR – Code of Federal Regulations

3.26 EXTRACTED INTERNAL STANDARD (EIS) QUANTIFICATION – The response of the target compound is compared to the response of the labeled analog of another compound in the same LOC.

3.27 INSTRUMENT SENSITIVITY CHECK – solution used to check the sensitivity of the instrument. The solution contains the native compounds at the concentration of the LOQ.

3.28 IPR – INITIAL PRECISION AND RECOVERY; four aliquots of a reference matrix spiked with the analytes of interest and labeled compounds and analyzed to establish the ability of the laboratory to generate acceptable precision and recovery. An IPR is performed prior to the first time this method is used and any time the method or instrumentation is modified.

3.29 OPR - ONGOING PRECISION AND RECOVERY- – Ongoing precision and recovery standard (OPR); a method blank spiked with known quantities of analytes. The OPR is analyzed exactly like a sample. Its purpose is to ensure that the results produced by the

laboratory remain within the limits specified in this method for precision and recovery. Applies to OPR and LLOPR (low level OPR at **2x** the LOQ level).

3.30 SPE – SOLID PHASE EXTRACTION; a technique in which an analyte is extracted from an aqueous solution or a solid extract by passage over or through a material capable of reversibly adsorbing an analyte. Also termed liquid-solid extraction.

4. INTERFERENCES

LC-MS/MS data from blanks, samples, and spikes must be evaluated for interferences. If any interferences are present, take corrective action if necessary. Do not use aluminum foil because PFAAs can be potentially transferred from the aluminum foil to the glassware. Only aluminum foil rinsed with LC/MS grade methanol can be used where necessary.

4.1 PFAS have been used in a wide variety of manufacturing processes, and laboratory supplies should be considered potentially contaminated until they have been tested and shown to be otherwise. The materials and supplies used during the method validation process have been tested and shown to be clean. These items are listed in the Reagents section.

4.2 Method interferences may be caused by contaminants in solvents, reagents (including DI water), sample bottles and caps, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in the chromatograms. All items such as these must be routinely demonstrated to be free from interferences (less than 1/2 the Reporting Limit), under the conditions of the analysis by analyzing Method Blanks. Subtracting blank values from sample results is not permitted.

4.3 PTFE products can be a source of PFAS (PFOA) contamination. The use of PTFE in the procedure should be avoided. Polypropylene (PP) or polyethylene (PE, HDPE) products may be used in place of PTFE products to minimize PFOA contamination.

4.3.1 Standards and samples are injected from polypropylene autosampler vials with polypropylene or polyolefin snap caps, once. Multiple injections may be performed on Primers when conditioning the instrument for analysis.

4.3.2 Random evaporation losses have been observed with the polypropylene caps causing high Internal Std. recovery after the vial was punctured and sample re-injected. For this reason, it is best to inject standards and samples once in the analytical sequence, then recap with polyolefin caps for storage.

4.3.2 Teflon-lined screw caps have detected PFAS at low concentrations. Repeated injection from the same Teflon-lined screw cap have detected PFNA at increasing concentration as each repeated injection was performed, therefore, it is best to use polypropylene snap caps.

4.3.3 Aqueous samples should not come in contact with any glass containers or pipettes as PFAS analytes can potentially adsorb to glass surfaces. Standards dissolved in organic solvent may be purchased in glass ampoules. These standards in organic solvent are acceptable and subsequent transfers may be performed using glass syringes and pipets. Following extraction, the eluate must be collected in a polypropylene tube prior to concentration to dryness. Concentration to dryness in glass tubes may cause poor recovery.

4.4 LC/MS grade methanol must be used for all steps where methanol is used in this method. HPLC grade methanol has been demonstrated to be acceptable if tested prior to use.

4.5 Matrix interferences may be caused by contaminants that are co-extracted from a sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the sample.

4.5.1 Co-extracted Organic Material - Under normal HPLC conditions matrix effects due to co-extracted organic material enhanced the ionization of 4:2 FTS appreciably. Total organic carbon (TOC) is a good indicator of humic content of the sample.

4.5.2 Solid phase extraction cartridges may be a source of interferences. The analysis of field and laboratory reagent blanks can provide important information regarding the presence or absence of such interferences. SPE cartridges should be sealed while in storage to prevent ambient contamination of the SPE sorbent.

4.6 Contamination by carryover can occur whenever a high-concentration and low concentration samples are sequentially analyzed. To reduce carryover, the sample syringe in automatically rinsed with solvent between injections. These operations are programmed into the LC multi-sampler system.

4.7 Volumetric glassware and syringes are difficult to clean after being used for solutions containing high levels of PFOA. These items should be labeled for use only with similarly concentrated solutions or verified clean prior to re-use. To the extent possible, disposable labware is used.

4.8 Both branched and linear PFAS isomers can potentially be found in the environment. Linear and branched isomers are known to exist for PFOS, PFOA, PFHxS, and PFBS, based upon scientific literature. We have also seen branched isomers for PFHpA, NMeFOSAA, NEtFOSAA and PFNA. If multiple isomers are present for one of these PFAS they likely are adjacent peaks that completely resolve or not, but usually with a deflection point resolved during peak integration. The later of these peaks matches the retention time of its labeled linear analog. In general, earlier peaks are the branched isomers and are not the result of peak splitting.

Currently, all these species are available as linear isomers. Some available branched and linear reference standards of the technical mixtures for these specific PFAS are used to ensure that all appropriate peaks are included during peak integration. These species currently include PFOA, PFHxS, NMeFOSAA, and NEtFOSAA. These branched isomers elute before the linear isomer and are integrated and reported as total for those species. Others are also included at this time such as those listed in section 7.3.4.

4.9 In an attempt to reduce PFOS bias, it is required that *m/z* 499>80 transition be used as the quantitation transition.

5. SAMPLE HANDLING

5.1 **Aqueous Samples** - samples are collected by our clients in 250 or 500ml HDPE bottles with unlined HDPE or polypropylene caps and filled to the neck. Each sample submitted should be submitted in triplicate-with one used for determination of Suspended solids and possible pre-screening. Sub-sampling should be avoided whenever possible. When historical data are available indicating high levels of PFAS, sub-sampling may be an advisable option.

5.2 **Soil Samples** – samples are collected in wide mouth 125- or 250-mL HDPE bottles with PP unlined caps.

5.3 SAMPLE SHIPMENT AND STORAGE/HOLDING TIMES – Maintain all aqueous samples protected from light at 0 - 6 ºC from the time of collection until shipped to the laboratory. Samples must be shipped as soon as practical with sufficient ice to maintain the sample temperature below 6 ºC during transport. Samples are to be received by the

laboratory within 48 hours of collection. The laboratory must confirm that the sample temperature is 0 - 6 ºC upon receipt. Once received by the laboratory, the samples may be stored at ≤ -20 ºC, or at 0 - 6 ºC, until sample preparation. However, the allowable holding time for samples depends on the storage temperature, as described below:

5.3.1 Aqueous samples may be held in the laboratory for up to 90 days from collection, when stored at ≤ -20 ºC and protected from the light. When stored at 0 - 6 ºC and protected from the light, aqueous samples may be held for up to **28 days**, with the caveat that issues were observed with certain perfluorooctane sulfonamide ethanols and perfluorooctane sulfonamidoacetic acids after **7 days**. These issues are more likely to elevate the observed concentrations of other PFAS compounds via the transformation of these precursors if they are present in the sample.

5.3.2 Solid samples (soils and sediments) may be held for up to 90 days, if stored in the dark at either 0 - 6 ºC or ≤ -20 ºC, with the caveat that samples may need to be extracted as soon as possible (within 7 days) if NFDHA is designated as an important analyte by the customer.

5.4 **SAMPLE EXTRACT HOLDING TIMES** – Store sample extracts in the dark at less than 0 - 4 ºC until analyzed. If stored in the dark at less than 0 - 4 ºC, sample extracts may be stored for up to 90 days, with the caveat that issues were observed for some ether sulfonates after 28 days. These issues may elevate the observed concentrations of the ether sulfonates in the extract over time. Samples may need to be extracted as soon as possible if NFDHA is an important analyte.

6. APPARATUS AND MATERIALS (as listed or demonstrated equivalents)

6.1 250 - 500 mL polypropylene bottles with polypropylene caps. VWR Scientific or equivalent: Part no. 414004-125, 12 pk. Alternate: White PP unlined lid L238WH and 16oz. clarified PP single wall jar 70-400 neck, item J066-Containers and Packaging.com or equivalent.

6.2 Transport Tube: Virgin Polypropylene, White, Plastic, 10 mL Capacity, 16 mm OD, 93 mm Overall Lg, Self-Standing, 250 PK, Item 710Z420, Gamut.com (Grainger), with PP cap or equivalent.

6.3 Graduated cylinders, 50, 100, 250, 500 and 1000mL, Polypropylene, VWR Scientific or equivalent

6.4 Analytical Balance, 0.0001g., checked for accuracy each day of use with Class S weights, certified annually by an outside service.

6.5 Extract concentrators: Organomation Model N-EVAP 112, 24 position concentrator with water batch control and nitrogen supply controls or equivalent

6.6 3.1 Micron in-line filters, Promochrom only

6.7 1.0-2.0 mL polypropylene snap cap vials, Agilent part no. 5182-0567 or equivalent

6.8 Snap caps, polypropylene or olefin, 11 mm, 11/9k, Agilent Part no. 5182-0542

6.9 Solid Phase Extraction Tubes: for EPA 1633: WAX (weak anion exchange mixed mode polymeric sorbent – Phenomenex No. 8B-S038-HCH 200 mg or Waters Oasis 150 mg Cat. # 186002493. Must have a pKa > 8 to remain positively charged during the extraction. Alternate is Agilent Bond Elute WAX 200 mg-cat. No. 5610-2151

6.10 Syringes, Hamilton or equivalent 5.0 µL, 10 µL 25 µL, 100 µL, 250 µL, 500 µL, Teflon free

6.11 Solid Phase Extraction System-automated-Promochrom 8 position autosampler system for 6 mL capacity SPE tubes. System retrofit to remove all PTFE components and replaced with PEEK tubing or PFAS free tubing. Automated bottle rinsing feature required with 3.1 um in line PP filters.

6.12 Nitrogen Evaporation System- TurboVap nitrogen evaporation system operated at less than 55C.

6.13 LC/MS-MS system- Agilent 1260 or 1290 HPLC system interfaced to an Agilent 6470A or 6460C Triple Quadrupole system. The instrument control and qualitative/quantitative software is Mass Hunter versions B.8.0 and B.9.0 or later.

6.13.1 HPLC System-Agilent 1260 or 1290 Infinity II

6.13.1.1 The Agilent 1260 or 1290 Infinity II HPLC system is configured with temperature-controlled column oven compartment. 4 column configuration, temperature controlled (refrigerated) auto sampler

compartments, injection valve, proportioning valves, variable flow controls and variable injection capabilities.

6.13.1.2 The delay column (PFAS and other interference removal) is an Agilent Eclipse Plus C18, 4.6mm x 50 mm, 3.5 um-Part no. 959943-902 or equivalent.

6.13.1.3 The analytical column is a Restek Raptor C18 part no. 9304252 50mm x 2.1 mm ID, 1.8 u particle size or equivalent.

6.13.2 Agilent LC/MS-MS- Agilent 6470AAR/6460C

6.14.2.1 Agilent model 6470AAR/6460C triple Quadrupole system with Agilent Jet Stream ESI source. UHP nitrogen is used as cell gas and High purity nitrogen is delivered for the sheath gas from a Peak Scientific nitrogen generator system.

6.14 Vortex Mixer- Benchmark Industries or equivalent

6.15 Variable Speed shaker table, 18" x 12"- Orbital Shaker- Jiangau Tenlin Instr. Co., Ltd., Model no. TLSK-III 20-230 RPM, 0-999 min, or equivalent

6.16 Centrifuge, 50 mL, Premiere Model XC-2450 Series Centrifuge 6 x 50 mL, 3500 RPM max., or equivalent

6.17 Mechanical Pipettors- 10-100 µL; 100-1000 µL; 1000-5000 µL-4 E'S Scientific or equivalent, calibrated quarterly.

6.18 Vortex Mixer- Benchmark Industries or equivalent

6.19 pH paper, short range 6-8 and full range with 0.5 pH readability- VWR Scientific or equivalent

6.20 15 mL PP or HDPE Centrifuge tubes, Corning Part no. 430791

6.21 3 mL Disposable Transfer pipets, PE, VWR part no. 16001-176

6.22 1.0 mL polypropylene snap cap vials, Agilent part no. 5182-0567

6.23 Snap caps, polypropylene, 11 mm, 11/9k, Agilent Part no. 5182-0542

6.24 2mL self-standing PP microcentrifuge snap cap tubes, SKS Scientific part no. 0747-17

6.25 Collection tubes, 15 mL graduated PP or HDPE Centrifuge tubes, Corning Part no. 430791

6.26 Disposable 10 mg scoops, PP

6.27 Ultrasonic mixer

6.28 10 mL disposable syringes, PP or HDPE, luer fitting

6.29 13mm or 25 mm 0.2 um Nylon membrane filters, PALL Acrodisc or equivalent

7. REAGENTS AND STANDARDS (as listed or demonstrated equivalents)

7.1 ALL REAGENTS and STANDARDS MUST BE LOGGED INTO THE ELEMENT LIMS SYSTEM. This includes lot numbers, expiration, open and prepared dates, receipt date, Certification/traceability documents from supplier(s) if provided and preparer.

7.2 SOLVENTS and REAGENTS-all as listed or equivalents

7.2.1 Methanol, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1060354000 or equivalent (HPLC Plus grade is an acceptable alternate)

7.2.2 Water, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1153334000 or equivalent (HPLC plus grade is an acceptable alternate). Alternatively, York PFAS free water demonstrated ion and PFAS free can be used.

7.2.3 Acetic Acid, glacial. ACS grade or equivalent.

7.2.4 Ammonium Hydroxide, conc. Cert. ACS grade, 28-30% in water, Sigma Aldrich part no.1054231000, or equivalent

7.2.5 Methanolic Potassium Hydroxide (0.05 M) – add 3.3 g of KOH to 1L MeOH.

7.2.6 Sodium Hydroxide, pellets, ACS grade- Sigma Aldrich part no. 221465-500G, or equivalent

7.2.7 Potassium Hydroxide, pellets, ACS grade

7.2.8 Ammonium Acetate – ACS grade or better, Ammonium Acetate, HPLC or cert. ACS grade. Sigma Aldrich Part no. 73594-100-G-F or equivalent.

7.2.9 Ammonium Acetate 5 mM for HPLC in aqueous solution: HPLC gradient A-- Weigh 0.3854 g (+ 0.0005) Ammonium Acetate and add to 1-liter hypergrade Water. Mix until dissolved then sonicate for 5 mins. To remove air bubbles. Stability - 2 weeks.

7.2.10 **Methanolic Ammonium Hydroxide 0.3 %** - take 2.5 mL of conc. ammonium hydroxide into 247 mL MeOH (measure the 247 mL in a PP graduated cylinder-they are under QQ1 somewhere). Use a mechanical pippetor to add the 2.5 mL (not strictly quantitative FYI)-**Make 4 bottles of this**. *Used for soil extractions*. - 1 month shelf life.

7.2.11 **Methanolic Ammonium Hydroxide 1.0 %** - take 8.25 mL of conc. ammonium hydroxide into 242 mL MeOH (measure the 242 mL in a PP graduated cylinder-they are under QQ1 somewhere). Use a mechanical pipet to add the 8.25 mL (not strictly quantitative FYI)- **Make 4 bottles of this -***used in Promochrom*-1 month life.

7.2.12 **Aqueous Ammonium Hydroxide 3%-** take 24.8 mL of ammonium hydroxide and add 242 mL PFAS free water. 3-month life- *used for pH adjustment*

7.2.13 **Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid** – add ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL), store at room temperature, replace after 1 month. **This solution is used to prepare the instrument blank, calibration standards, and is used to dilute the extracts of samples that exceed the calibration range.**

7.2.14 **Formic Acid 0.1M-aqueous** – add 873 µL formic acid into 250 mL PFAS free water- **Make 2 bottles of this-***used to prepare 7.2.16 below.* 2-year life

7.2.15 **Formic Acid, 0.3M**-aqueous- add 2.62 mL (2619 µL) into 250 mL PFAS free water- **Make 4 bottles of this -***used in Promochrom*-2 year life

7.2.16 **Formic Acid methanolic 1:1, 0.1M formic acid**- mix equal volumes of Methanol and 0.1 M formic acid- **Make 4 bottles of this -***used in Promochrom*-2 year life

7.2.17 **Formic Acid 5% aqueous**- add 12.5 mL Formic acid into 250 mL PFAS free water. *Used for pH adjustment.* 2-year shelf life

7.3 **Stock Standards**

Stock Standards are purchased in mid to high concentration levels from Wellington Laboratories, Inc. Guelph, ONT, CA. Currently, Wellington is the preferred supplier of these materials. As a second source verification, prepare a mid-level from the stock independently from the preparation used for initial calibration. Document this preparation in Element. See Attachments 1,2, and 3 for detailed information.

7.3.1 Internal Standards (7-Non-Extracted –NIS)) used for the method are MPFOA, MPFOS, M3PFBA, MPFDA, MPFHxA, MPFHxS and MPFNA. These are purchased at 250 - 1000 ng/mL depending upon the ISTD in a

mixture. This mixture is purchased from Wellington Labs in 1.2 mL volumes with the following **part no.: MPFAC-HIF-IS**. Stored at 4C or less unopened this solution has a 5-year shelf life. Once opened, the life is one year from open date.

7.3.2 Isotopic Surrogate Analogs (24 isotopes) are purchased for the method described from Wellington Labs at 250-5000 ng/mL levels, depending upon the isotope. Part no. is **MPFAC-HIF-ES**.

7.3.3 Stock Standard mixtures of both linear and branched isomers of the EPA 1633 40 compound list are purchased from Wellington Labs at varying concentrations in 5 different mixtures under part nos. PFAC-MXJ, PFAS-MXI, PFAC-MXH, PFAC-MXG, PFAC-MXF.

7.3.4 Second source standard mixture of both linear and branched isomers of the EPA 1633 40 compound list is purchased from Absolute Standards at 2 µg/mL under part no. 65735.

7.3.5 Qualitative branched isomers mix- individual available branched and linear mixes for the following PFAS are used daily to allow for qualitative knowledge of the PFAS branched isomers so they are integrated/included in quantitative analysis: T-PFOA, lp-PFNA, br-FOSA, br-NEtFOSA, br-NMeFOSA, br-NEtFOSE and br-NMeFOSE. These are purchased at 50,000 ng/mL levels from Wellington Labs-the names above are the Catalogue nos. These have a 5-year life at stock concentrations.

Make a 100 ng/mL Intermediate mix by adding 2.0 µL of the individual stocks up to 1.0 mL with MeOH.

Make a working solution by taking 200 µL of the 100 ng/mL intermediate into 750 µL of cal matrix solution (7.2.13) and add 50 µL of 1:10 EIS mix.

Transfer 300 µL to an autosampler vials, add 3 µL of ISTD working mix, cap vortex, and store until needed. Shelf life is 1 year.

The summary below details the procurement requirements for this method - All from Wellington Laboratories, Inc. except the second source from Absolute Standards:

Description	Part nos.	Comes in
40 Compound Target 1633 list targets	PFAC-MXJ PFAS-MXI PFAC-MXH PFAC-MXG PFAC-MXF	4 Days – 1.2 mL
Isotopic Surrogates-24	MPFAC-HIF-ES	4 Days – 1.2 mL
EPA 1633 – 7 Internal Std.	MPFAC-HIF-IS	4 Days – 1.2 mL
Method 1633 PFCs – Cal Std.	65735	2 days – 1.2 mL

7.4 Preparation of Standards

7.4.1 Preparation of Working Standards and Intermediates from STOCK Materials

All stock standards are prepared by the vendor in methanol containing a bit of sodium hydroxide to prevent losses of target PFAS compounds due to potential esterification in methanolic solution. The stocks come prepared with 4 molar equivalents (a 3x excess) of sodium hydroxide for stocks at the 50 µg/mL levels. This insures their stability with respect to potential loss due to esterification. The basic solution ensures that any acidic sites on the glass ampules or acidic impurities in the methanol are neutralized to prevent ester formation and forms the sodium salt of the PFAS to stabilize it.

When preparing any intermediate level standards, the dilution must be prepared in alkaline methanol to prevent the above from occurring.

To do this, prepare a 5.0 mM NaOH in Hypergrade Methanol (or LC/MSMS grade) by dissolving 0.02 g. of sodium hydroxide into 100 mL of MeOH. This has a 2-week life.

For intermediate standards that are made to 10 mL final volume, add 100 µL of 5.0 mM NaOH/MeOH as part of the preparation. This results in a final concentration of NaOH at 0.05 mM.

For intermediate standards prepared to a final volume of 1.0 mL. add 10 µL of the 5.0 mM NaOH/MeOH.

For working calibration standards/CCV/SCV made to 500 µL final volume, using the mixture detailed in section 7.1.13 (MeOH/Water/acetic acid/ammonium hydroxide). This approximates the matrix of the final extracts for analysis.

7.4.2 Storage and Handling of Standards

All working standards should be stored at either room temperature or 4 °C provided the containers are sealed properly.

Stock Standards may be stored at 4 - 10 °C but before using must sit to allow equilibration to room temperature followed by either vigorous vortex mixing or sonication for 3-5 mins.

7.4.3 Detailed Standards Preparation Procedure-EPA 1633

7.4.4 Internal Standards-*See Attachment 1*

Internal Standards are purchased as a **stock mixture** at 250-1000 ng/mL.

These as transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.

7.4.4.1 Working level of Non-Extracted Internal Standard (NIS) – make a 1:1 dilution of the stock by taking 500 µL of the Stock and adding 500 µL MeOH.

Use as is by adding 3 µL to 300 µL volumes for QC samples, or calibration.

7.4.5 Isotopic Surrogates (Extracted Internal Standards)- *See Attachment 2*

7.4.5.1 Stock Surrogates are purchased as a mixture at 250-5000 ng/mL. These are transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.

Option 1- Use Stock as received and add 25 µL to all samples/QC to be extracted.

Option 2- Prepare **2** mL of Working EIS by preparing a 1:2 dilution to yield 125-2500 ng/mL for use as follows:

Take 1000 µL of the Surrogate Stock, plus 25 µL of 5 mM NaOH/MeOH and 975 µL MeOH to give 2.0 mL final volume**. 50 µL are added to ALL preparation blanks, samples, and QC**. This is sufficient for approx. 40 x 50 µL additions to all blanks, QC, and samples.

This corresponds to adding 5 to 100 ng of EIS compounds to the initial samples and QC. The final volume of extractions will typically be 5.0 ml so this yields 1-20 ng/mL of the isotope EISs in the final extract for analysis.

For calibration, the Stock mix at 250-5000 ng/mL is used by adding 100 uL up to 1.0 mL final volume to yield 25/500 ng/mL in each calibration level as directed in the calibration section 7.4.7.1.

7.4.6 Target Analytes- EPA 1633- *See Attachment 3*

The target analytes for this method are purchased commercially from Wellington Labs using the five part numbers described in Section 7.3.3. They contain the method target analytes only at varying concentrations. These mixtures are transferred from their glass ampules to snap cap vials that have been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry. Again, these are the nominal concentrations and the actual anion concentrations for those present as salts are listed in the documentation and are reflected in both Mass Hunter and Element.

Preparation of a 1.0 mL volume of a 10x intermediate of each of the 5 mixes for Calibration. Some of the higher levels on the curve use aliquots of the stock as shown in Figure 2.

Scale the volume accordingly if less is desired. Note that the EPA 1633 mixes come 1.2 mL per vial so this recipe may consume one vial quickly.

7.4.6.1 OPR and LLOPR - these are a mid-level blank spike and low-level blank spike (at 2x the LOQ). These are prepared as follows from the EPA 1633 Target mixtures (5 components) by taking 200 µL of each STOCK into a snap cap vial giving 1.0 mL final volume.

1. Element ID Y22B199 - PFAC-MXF mix 200 µL.
2. Element ID Y22B200 - PFAC-MXG mix 200 µL.
3. Element ID Y22B201 - PFAC-MXH mix 200 µL.
4. Element ID Y22B204 - PFAC-MXI mix 200 µL.
5. Element ID Y22B205 - PFAC-MXJ mix 200 µL.

For OPR (BS) at mid-level add 100 µL to each matrix for the batch OPR and for the **LLOPR add 20 µL** of the spike mix and process through all steps of the specific matrix preparation.

7.4.7 Second Source Standard

The Second Source intermediate standard is prepared in a similar manner to Target Analytes detailed in the previous section whereby a 10x intermediate is prepared by diluting 100 µL of stock obtained from Absolute Standards (2 µg/mL) in 1.0 mL of solvent. The final concentration of this standard is nominally 200 ng/mL.

7.4.8 Calibration

Calibration of the LC-MSMS systems is done by an eight-level calibration covering the range 0.2 to 1650 ng/mL, nominal. Various PFAS species are present as salts and at differing concentrations and these are reflected in Mass Hunter and Element as their actual concentrations. Six to eight levels are prepared depending upon the analyte. These levels are prepared as directed below using the internal standards, surrogates, and target analytes from above.
This is made to a final volume of 1000 µL in the matrix described in section 7.1.13 (MeOH/Water/acetic acid/ammonium hydroxide)

This preparation excludes the ISTD in the initial preparation. After preparation as directed, withdraw 300 µL of each level into a 500 µL PP vial and add 3 µL of ISTD before analysis, cap, and vortex to mix.
These are stored at <10C and are stable for 6 months when prepared as directed.

7.4.7.1 Calibration Curve Preparation - Based upon a final volume of 1.0 mL in CAL Matrix Solution*

See Attachment 4 for details.

EPA 1633 Calibration Standard Preparation
Rev 1.,0 10/03/22

For Final volume of 1.0 mL
Recipe uses both a 1:10 intermediate for some levels AND the Stock for other points as indicated
All standards in Stds refrig. Adjacent to QQQ1 N2 generator in box labeled EPA 1633 standards- all are opened, labeled and good to use.

	Stock: Y22B201 **1633 MXH Targets Intermediate @10x ***	*Stock: Y22B200* **1633 MXG Targets Intermediate at 10x***	*Stock: Y22B199* **1633 MXF Targets Intermediate at 10x***	*Stock: Y22B204* **1633 MXI Targets Intermediate at 10x***	*Stock: Y22B205* **1633 MXJ Targets Intermediate at 10x***	*Stock: Y22B198* **1633 EIS isotope Mix Intermediate at 10x**
Level	**uL of MXH 10x Interm.**	**ul of MXG interm.**	**ul of MXF interm.**	**ul of MXI interm.**	**ul of MXJ interm.**	**uL of EIS Interm.**
1	2	2	4	2	2.5	50
2	5	5	10	5	6.25	50
3	12.5	12.5	25	12.5	15.6	50
4	25	25	50	25	31.3	50
5	50	50	100	50	62.5	50
6	125	125	250	125	15.6 of Stock	50
7	25 of Stock	25 of Stock	50 of Stock	25 of Stock	31.2 of Stock	50
8	62.5 of STOCK	62.5 of STOCK	125 of STOCK	62.5 of STOCK	78.0 of Stock	50

* 100 uL up to 1 mL in MeOH

*CAL MATRIX: Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid – Prepared by adding ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL), store at room temperature, replace after 1 month. This solution is used to prepare the instrument blank and is used to dilute the extracts of samples that exceed the calibration range.

Amount of CAL Matrix to make up to 1.0 mL Final volumes:

CAL LEVEL	µL of CAL Matrix
1	937.5
2	918.8
3	871.9
4 *	793.7
5	637.5
6	309.0
7	843.8
8	609.5

INTERNAL STANDARD MIX (non-extracted IS-NIS). Mix 500 µL of STOCK ISTD at 250-1000 ng/mL with 500 µL of Methanol. This results in 125-500 ng/mL Intermediate ISTD. See 7.4.4.1.

Add 3.0 µL to 300 µL of each level 1-8 in a 500 µL PP autosampler vials and cap with polyolefin cap, vortex to mix and run. Add 3 µL to 300 µL of all sample/QC extracts before analysis.

*Level 4 is also used as the CCV for each analysis sequence run initially, then after every 10 samples and at the end of the sequence. Multiple vials should be prepared for this level.

7.4.9 Checking the Efficacy of the Surrogate/Spike Mixes

On a monthly basis the surrogate (EIS) and spike mixes from the vials used for spiking are assayed to ensure stability. These are prepared for the analysis by taking 3.0 µL of the surrogate (EIS) mix and 3 µL of the Spike mix into 294 µL MeOH/Water/Acetic Acid/Ammonium hydroxide from 7.1.13, then add 3 µL of NIS (ISTD). This yields a 1:100 dilution of the EIS and Spike mixes. Use 100 as the dilution factor in the Mass Hunter worklist.

7.4.10 Second Source - Initial Calibration Verification (ICV)

The initial calibration verification is prepared in a similar manner to calibration standards whereby 50 µL of intermediate stock is diluted in 1.0 mL of solvent. The final concentration of this standard is nominally 10 ng/mL.

8. PROCEDURE

8.1 Preventative and Routine Maintenance

HPLC/MS/MS Preventative Maintenance	
As Needed: Change pump seals. Change in-line filters in autosampler (HPLC). Check/replace in-line frit if excessive pressure or poor performance. Replace column if no change following in- line frit change. Clean needle. Replace or clean Capillary Replace fused silica tube in ESI interface. Clean lenses. Clean skimmer. Ballast rough pump 30 minutes. Check Nozzle flow pattern	**Daily (When in use)** Check solvent reservoirs for sufficient level of solvent. Verify that pump is primed, operating pulse free. (ripple < 1%) Check needle wash reservoir for sufficient solvent. Verify capillary heater temperature functioning. Verify vaporizer heater temperature. Verify rough pump oil levels. Verify turbo-pump functioning. Verify nitrogen pressure for auxiliary and sheath gasses. Possible Checktune
Semi-Annually Replace oil mist and odor elements. Replace activated alumina filter if applicable	**Annually** Vacuum system components including fans and fan covers. Clean/replace fan filters, if applicable.

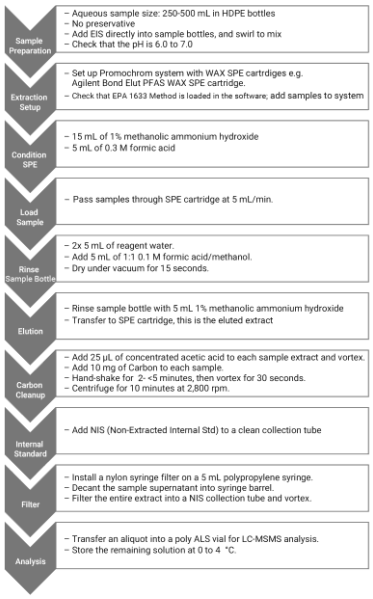
8.2 Sample Preparation (Extraction, Clean-up and Concentration)- Aqueous Matrices

A summary of the steps for the steps related to aqueous samples are shown in Figure 1.0 and in the summary below.

1. Determine % Suspended Solids – 10.0 mL $\pm$ 0.02 mL through a tared 0.2 um PP filter. Dry filter $\geq$ 12 hours @ 105C, cool in desiccator. Calc % TSS.
2. Check pH with short range pH paper to insure pH = 6.5 $\pm$ 0.5. Adjust as necessary with either 5% aqueous formic acid to lower pH or with 3% aqueous ammonium hydroxide to raise pH.
3. Weigh sample bottle as is to $\pm$ 0.1 g.-remove cap first since that will not be weighed later since autosampler caps are used.
4. Homogenize sample by inversion 3-4 x-place full volume on Promochrom System using WAX SPE cartridges.
5. Set up MBLK, OPR at 2x LOQ (low LCS) and mid-level OPR (mid-level LCS)-spike with 10 µL of Spike mix for LLOPR and 100 µL of spike mix for mid-OPR.
6. Spike all with 25 µL EIS solution (isotopic surrogates)

7. Follow Promochrom method for EPA 1633
8. Initiate SPE program EPA1633AQ on the Promochrom system
9. Once the program is finished there will be 5 ml in the collection tube. If less, make up to exactly 5.0 mL with MeOH.
10. Remove the sample bottle from the Promochrom system and weigh the empty bottle. That will determine the weight (volume for water) assume 1 g = 1.0 mL. Enter this value into the element bench sheet and the initial volume.
11. Add 25 µL of concentrated acetic acid to each collection tube and vortex to mix.
12. Add 10 mg of activated carbon to all samples and QC. Hand mix and vortex mix for no more than 2 minutes.
13. Centrifuge at 2800 rpm for approx. 10 minutes.
14. Filter the final volume through 0.2 um nylon filter using a syringe.
15. If the client provides only 250 mL of sample, in order to meet reporting limits, it may be required to concentrate the unfiltered extract by a factor of at least 2 on a TurboVap at 1.2 Liters/min with nitrogen at <55 ^{o}C. For example, if the final volume is 5.0 mL, concentrate to 2.0 mL final volume (2.5 x concentration). If 500 mL is provided, skip this step.
16. Enter the final volume achieved into the bench sheet in Element.
17. Transfer a portion of the final extract to a 2 mL snap cap, labeled.
18. Take a 300 µL portion of the extract into a 500 µL PP autosampler vial, add 3 µL of NIS (non-extracted internal std.). Cap, vortex, store at <6 ^{o}C.
19. Sample is ready for analysis.

Figure 1.0 Aqueous Sample Preparation Steps



8.2.1 To measure sample initial volume for aqueous samples, remove the cap and weight the bottle and record the weight in the sample weight. For MBLK, LLOPR and OPR use 250-500 mL volumes). After SPE processing, be sure the empty bottle is dry and weight to determine the amount of sample in grams (essentially equal to volume in mL). Use that number for the initial volume in Element LIMS.

8.2.2 For every 20 field samples (Field blanks are considered field samples in as they are treated as such), a blank (MBLK), blank spikes, (2 levels-LLOPR and OPR as BS1 and BS2 respectively. A matrix spike is not necessary since isotope dilution is used. If an MS/MSD is required by a specific project, spike 100 µL of the mid-level BS mix (OPR).

8.2.3 All polypropylene equipment including graduated cylinders and sample transfer lines/reservoirs should be washed prior to using with extraction solvent (Methanol).

8.2.4 Add 25 µL of EIS (isotopic surrogates) (250/5000 ng/mL) to each sample and QC sample, recap, and invert to mix well.

8.2.5 Add, 20 µl (low level spike), 100 µL (mid-level spike)

8.2.6 Using the Promochrom automated system, run a cleaning run. Be sure the reservoirs of LC/MS grade methanol and HPLC plus grade water or equivalent are full. Prime all lines and align all components.

8.2.7. Load in the EPA1633 method and adjust the sample volume to 10 mL more than the highest volume container measured by visual comparison to a calibrated bottle of the same size. Please refer to *Appendix 2: Promochrom Method* detailing the automated SPE extraction method on the Promochrom system.

8.2.8 The SPE method solvents for extractions are as follows:

- Solvent 1 = MeOH
- Solvent 2 = H_2O
- Solvent 3 = 0.3 M Formic acid,
- Solvent 4 = 1:1 0.1M Formic Acid/MeOH,
- Solvent 5 = MeOH with 1% ammonium hydroxide (“Basic MeOH”)
  W1 = Aqueous waste, W2 = Organic waste

8.2.9 Place labeled 15 mL graduated collection vessels in the sample collection tray and use Element labels to identify the vials at this point. Print 2 sets of labels for each since they will be used after the concentration step as well. These are graduated.

8.2.10 Connect the bottles to the automated system.

8.2.12 Initiate the EPA1633Aq SPE Extraction Program. Each run is approximately 1 hour 45 minutes.

8.2.13 **Evaporation Options** - Aqueous Samples

N-EVAP systems

8.2.13.1 The resulting 5 mL extracts are not further concentrated unless Work Plan reporting limits need to be lower than standard RLs. When this is required by the Work Plan, the extracts and QC are transferred to the N-EVAP concentrator systems operated at 50-55 degrees C (never more than 55C) in their original collection vials. The nitrogen flow is initiated at 1.2 ml/min and adjusted on each individual sample to provide a gentle stream causing a slight disturbance at the surface of the methanol extracts.

8.2.13.2 As this evaporation proceeds the walls of each vessel are rinsed with methanol when the volume is approximately 2.5 mL and then again when the volume is reduced to just below 2.0 mL. Then Bring up the final volume to 2.5 mL. This is a 2x concentration when needed.

8.2.14 Swirl final extract, make up to 2.0 mL with methanol. Using a disposable polypropylene pipet, carefully transfer to a 2 mL PP snap cap vial.

8.2.15 Withdraw an aliquot of 300 µL into a 500 µL autosampler vial (PP) and add 3.0 µL of ISTD (NIS) mix.

8.2.16 Cap with polyolefin flexible caps and vortex to mix.

8.2.17 Store Extracts at <6°C until analysis.

8.3 Sample Preparation (Extraction, Clean-up, and Concentration) - Soil Matrices

1. Determine % solids: use 5 grams; dry at 110C $\geq$ 12 hours.
2. Mix sample with a stainless-steel spatula to homogenize-exclude Sticks, vegetation, rocks and the like.
3. Remove 5.0 g. from the homogenized sample container. Add to a tared 50 mL centrifuge tube. Determine the weight $\pm$ 0.01 g.
4. Prepare QC using clean matrix (Ottawa Sand) wetted with 1 mL PFAS free water in 50 mL centrifuge tubes.
5. For all samples, QC blanks and LCSs (LLOPR and ML OPR) and a 25 µL aliquot of EIS onto the soil. The current Element standard ID is Y22J305. For the OPRs add

appropriate amount of spike solution (20 µL for LLOPR and 100 µL for OPR. The current Element Std ID is Y22J304.

6. Swirl the samples to mix then let sit for 30 minutes.
7. Add 10 mL of 0.3% methanolic ammonium hydroxide to each centrifuge tube.
8. Vortex to mix then shake on the shaker table for 30 minutes.
9. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
10. Transfer the supernatant liquid to a clean 50 mL centrifuge tube
11. Add 15 mL of 0.3% methanolic ammonium hydroxide to each of the original centrifuge tubes.
12. Vortex to mix then shake on the shaker table for 30 minutes.
13. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
14. Transfer the supernatant liquid to the centrifuge tubes from 10.0 above.
15. Add another 5 mL of 0.3% methanolic ammonium hydroxide to each of the original centrifuge tubes.
16. Vortex to mix then shake on shaker table for 30 minutes.
17. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
18. Transfer the supernatant liquid to the centrifuge tubes from 10.0 above.
19. Add 10 mg of activated carbon to the combined extract using a 10 mg scoop and hand swirl for 2 minutes (never more than 5 minutes of losses of Target PFAS will occur)
20. Centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes
21. Immediately Decant into a 50 mL centrifuge tube.
22. Place in TurboVap or on the N-EVAP system and concentrate at 55 deg. C to a final volume of approx. 7 mL at a nitrogen flow of 1.2 mL/min.
23. Add 35-40 mL of PFAS free water to the tube and vortex to mix.
24. Check the pH= 6.5 $\pm$ 0.5 if not adjust accordingly using 5% formic acid to lower pH or 3% aqueous ammonium hydroxide to raise pH to within this range.
25. Set up the soil EPA 1633 method on the Promochrom be sure volume is set to 50 ml for sample size. Please refer to *Appendix 2: Promochrom Method* detailing the automated SPE extraction method on the Promochrom system.
26. Place samples and QC centrifuge tubes on the autosampler
27. Once the program is finished, note the final volume and use that in the Element bench sheet as final volume. Should be 5.0 mL. If less make up to 5.0 mL with MeOH.
28. Add 25 µL of concentrated acetic acid to each collection tube and vortex to mix.
29. Add 10 mg of carbon to all samples and QC and mix for 2 minutes (no more than 5 minutes).
30. Immediately centrifuge at 2800 rpm for 10 minutes.

31. Filter the extract through a 0.2 um nylon membrane using a syringe and filter into a 2 mL snap cap vial.
32. When ready for analysis, remove 300 µL of extract and transfer to a 500 µL autosampler vial. Add 3 µL of NIS (internal standard), vortex to mix. Cap with polyolefin flexible caps and vortex to mix.
33. Store Extracts at <6°C until analysis
34. Samples/QC are now ready for analysis.

8.4 Sample Analysis--Running Samples/QC - Acquisition Method

The acquisition method is detailed in Attachment 4 (HPLC) and Attachment 5 (MS/MS) of this SOP. The method is an HPLC with dynamic MRM method with precursor and product ions with specific acquisition parameters to maximize sensitivity and specificity. This list may be modified to add other PFAS target analytes as necessary.

8.3.1 The triple Quadrupole (QQQ) system must be optimized for each target analyte (including surrogates and internal standards) using the Mass Hunter Optimizer program. This program determines the most abundant precursor and product ions for each compound and their abundances. These data are then used to build an MRM (multiple reaction monitor) method for acquisition. This is done initially or after any major maintenance procedures are performed to the triple quadrupole system. A high-level standard is used for this in the $[M-H]^-$ mode or M-COOH for HFPO-DA.

8.3.2 The MS/MS is checked for tuning on a weekly basis (if necessary) before analysis using the Tune context by selecting the CHECKTUNE radio button. This is done only in negative ion mode since that is what we are operating under. If the Checktune fails, run the Autotune program-note: this takes approx. 45 mins. in negative mode. After autotune or any tuning adjustment, a re-calibration of the instrument is required.

8.3.3 Before any QC or samples can be run, the HPLC must be allowed to purge for at least thirty minutes. This purge must be done using the initial mobile phase conditions used in the method must be allowed to run for 15 minutes or until pressure has stabilized (ripple must be < 1%)

8.3.4 An instrument sequence (Worklist) is then made. It should begin with a blank, a primer (5 ng/mL) followed by a blank with ISTD to establish system cleanliness.

8.3.5 After a successful initial calibration has been completed, the analytical sequence for a batch of samples analyzed during the same time period is as follows. Standards and sample extracts must be brought to room temperature and

vortexed prior to aliquoting into an instrument vial in order to ensure homogeneity of the extract.

8.3.6 **Analysis Sequence**

1. Instrument Blank *
2. Instrument Sensitivity Check –**LOQ Standard Level (SEQ-CAL 1) S/N > 3:1**
3. Calibration Verification Standard (CCV)
4. Qualitative Identification Standards –Branched PFAS
   PFOA, PFNA, PFOSA, NMeFOSA, NEtFOSA, NEtFOSE, and NMeFOSE.
5. Instrument Blank (SEQ-CCB) *
6. Method Blank (Batchxxxx-BLK1)
7. Low-level OPR (LLOPR) (Batchxxxx-BS1)
8. OPR (Batchxxxx-BS2)
9. Field Samples (10 or fewer)
10. Calibration Verification Standard (SEQ-CCVn)
11. Instrument Blank (SEQ-CCBn) *
12. Field Samples (10 or fewer)
13. Calibration Verification Standard (SEQ-CCVn)
14. Instrument Blank (SEQ-CCBn) *

* Contains solvent system for calibration, NIS, and EIS

8.3.7 The run can end with a script to put the instrument into standby mode.

8.4 Daily Sample Preparation/Analysis Sequence

- Prepare extracts for analysis by placing a 300 µl aliquot of sample extract containing 3 µL of internal standards into a PP auto-sampler vial. Apply Polyolefin cap.
- Confirm that the samples loaded on the auto-sampler were entered correctly in the injection log. Make any necessary corrections.
- Run instrument CCV checks at the RL (0.25-0.5 ng/mL), then at a mid-level and high level rotating every ten samples (5, 25 ng/mL) and ending with a mid-level CCV.
- Enter the Worklist (injection sequence) into the instrument software and load samples onto the auto-sampler in the order shown above in Section 8.3.6

8.5 Data Review

The Agilent Mass Hunter Quantitation program is used to review all data. All identifications are based upon retention time (RT) of the transition of the precursor to product ion represented by a peak. Retention times should not vary

more than ± 0.5 minutes as compared to the initial CCV analyzed for an analytical sequence. All positive detections of target PFAS must be less than the high point concentration of the calibration curve.

8.5.1 Since certain PFAS species are manufactured by different processes the presence of branched as well as linear isomers may be found. To properly quantitate these species, the analyst must sum the related branched and linear isomers. This affects the following species: PFOS, PFHxS, PFOA, PFNA, PFOSA, NMeFOSA, NEtFOSA, NEtFOSE, and NMeFOSE.

8.5.2 Any detection greater than the upper limit of the calibration curve requires dilution into the upper half of the curve, where possible.

9. CALIBRATION

9.1 Initial Calibration

The initial calibration covers the range 0.20 ng/mL to 1560 ng/mL nominal conc. or higher depending upon the linearity of the PFAS species. After acquisition, the data are quantitated in Mass Hunter and the default calibration model for target compounds is generated using Quadratic regression, FORCED through the origin where applicable. All same level species (EIS) used average response factor model. Depending upon the response and accuracy at each level as shown in the Mass Hunter program, use Linear, Forced, weighted (1/x) or quadratic, Forced, with or without weighting to achieve the best fit which is based upon the best accuracy on a compound-by-compound basis. In any case, the correlation coefficient must be greater than 0.990. Average Response Factor (RF) or Relative Standard Deviation (RSD) should be $\leq$ 20% where used.

9.1.1 The calibration levels as shown in Section 7.4.7 use 8 levels. All points are included in the calibration with the exception of some species that saturate at levels 7 and 8.

9.2 Calibration Verification

9.2.1 Relative Standard Error (RSE): For calibrations using an average RF curve fit, the relative standard deviation (RSD) is the measure of relative error. However, if a quadratic regression is used RSE should be calculated for calibration curve. RSE is calculated by the Mass Hunter software. The RSE for all method analytes should be ≤ 20% to establish instrument linearity.

9.2.2 An independently prepared Initial Calibration Verification must be run immediately following initial calibration. The concentration of this standard should be in the middle of the calibration range (e.g., 5.0 ng/mL) and prepared from a separate preparation as that of the calibration. Unless project-specific data quality objectives are required, the values from the second-source check should be ± 30% of the expected concentration.

9.2.2.1 **Corrective Action**: Quantitative sample analyses should not proceed for a failing ICV. Recalibrate and re-run the ICV if necessary.

An independently prepared Initial Calibration Verification must be run immediately following initial calibration. The concentration of this standard should be in the middle of the calibration range (e.g., 5.0 ng/mL) and prepared from a separate preparation as that of the calibration. Unless project-specific data quality objectives are required, the values from the second-source check should be ± 30% of the expected concentration.

Corrective Action: Quantitative sample analyses should not proceed for a failing ICV. Recalibrate and re-run the ICV if necessary.

9.3 Continuing Calibration Verification

The first CCV is at a mid-level and analyzed every 10 client samples including a closing CCV.

The mid-Level CCV must be ± 30% of the true value.

Corrective Action: If any of the required calibration check criteria fail, the system must be evaluated, and any appropriate instrument repair or maintenance must be performed. Sample data are unacceptable and must be rerun. Reinjection of the standard may be done. If the calibration check standard still fails, the system must be recalibrated.

10. Quality Control

10.1 Initial Demonstration of Capability (IDOC)

10.1.1 The initial demonstration requirement of EPA 1633 must be acceptable before analysis of samples may begin. To establish the ability to generate acceptable precision and recovery, the laboratory must perform the following operations for each sample matrix type to which the method will be applied by that laboratory.

The IDOC includes the following key elements:

- Initial Demonstration of Precision and Recovery (IPR)
- MDL determination

10.1.2 Initial Demonstration of Precision and Recovery-IPR

- Extract, concentrate, and analyze four aliquots of aqueous and soil matrices spiked with 100 µL of the native spike solution OPR Mix Y22J304, 50 µL of the EIS solution no. Y22J305. At least one method blank, matching the matrix being analyzed, must be prepared with the IPR batches by matrix. All sample processing steps that are used for processing samples, including preparation and extractions, cleanup and concentration, must be included in this test.

- Using results of the set of four analyses, compute the average percent recovery (R) of the extracts and the relative standard deviation (RSD) of the concentration for each target and EIS compound.
- For each native and isotopically labeled compound, compare RSD and % recovery with the corresponding limits for initial precision and recovery in Table 5. If RSD and R for all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin. *Note these acceptance criteria are not finalized and are based upon a single lab validation. Data for this table is derived from the single-laboratory validation study and are only provided as examples for this draft method. The data will be updated to reflect the inter-laboratory study results in a subsequent revision. Therefore, these criteria will change after inter-laboratory validation. Several sections of this method state that Table 5 criteria are required, this is standard language that will be applicable when the method is finalized.*

10.1.3 MDL Determination

MDL Determination –In order to perform the MDL study, 7 total extractions are performed on 3 different days (Extraction Day 1= 3 LRBs and 3 LFBs, Extraction Day 2 is 2 of each, and Extraction Day 3 is also 2 of each).

The levels extracted represent approx. 3-5 x the expected LOQ.

Once extracted, the analyses are conducted on 3 separate days the MDL is determined according to the EPA MDL protocol defined in Definition and

Procedure of the Determination of the Method Detection Limit, Revision 2 Dec. 2016 as detailed below:

Make all computations as specified in the analytical method and express the final results in the method-specified reporting units.

Calculate the sample standard deviation (SD) of the replicate spiked sample measurements and the sample standard deviation of the replicate method blank measurements from all instruments to which the MDL will be applied.

Compute the MDLs (the MDL based on spiked samples) as follows:

MDL_s = 3.143 x SD (for seven replicates; SD = Standard Deviation)

Compute the MDL_b (MDL based on method blanks-LRBs) as follows:

- If none of the blanks give numerical results, then the MDL_b does not apply.
- If only some of the blanks (but not all) give a result, set the MDL_b to the highest result found.
- If ALL method blanks show a detection, then use the following calculation to determine MDL_b:

MDL_b = Average of Blank Detections + (3.143 x Std. Dev.)

Calculate the final MDL by selecting the greater of MDL_s or MDL_b.

10.2 On-going QC Requirements

Preparation Batches are defined at the sample preparation step. Batches should be kept together through the whole analytical process as far as possible, but it is not mandatory to analyze prepared extracts on the same instrument or in the same sequence.

The quality control batch is a set of up to 20 samples of the same matrix processed using the same procedure and reagents within the same time period. The quality control batch may contain a matrix spike/matrix spike duplicate (MS/MSD), two laboratory control samples (LCS-LLOPR and OPR) and a method blank. Laboratory generated QC samples (Blank, LLOPR, OPR, MS/MSD) do not count toward the maximum 20 samples in a batch. Field QC samples are included in the batch count. In some cases, at client request, the MS/MSD may be replaced with a matrix spike and sample duplicate.

10.2.1 METHOD BLANK - One method blank must be extracted with every prep batch of similar matrix, not to exceed twenty (20) samples. For aqueous samples the matrix is Lab reagent water. For Soils the method blank matrix is

Ottawa sand. Criteria:

- The method blank must not contain any analyte at or above 1/2 the LOQ (Reporting Limit).

- Re-extraction and reanalysis of samples associated with an unacceptable method blank is required when reportable concentrations are determined in the samples.

10.2.2 LABORATORY CONTROL SAMPLES (LCS- also called OPR and LLOPR) must be extracted with every process batch of similar matrix, not to exceed twenty (20) samples. The LCS is an aliquot of laboratory matrix (e.g., water for aqueous spiked with analytes of known identity and concentration and isotopic surrogate analogs. The OPRs must be processed in the same manner and at the same time as the associated samples. Recovery for Aqueous low level OPR target analytes are 40-150% until more data are derived. For all other Aqueous OPR levels recovery targets are 50-150%. These data are based upon EPA 1633 draft ranges that will change and are not used for acceptance/rejection but are reported until such time that fully validated acceptance ranges are provided in the final version of the method.

10.2.3 Matrix spike/Matrix spike duplicate (MS/MSD or MS/MSD). These are not typically required since each sample contains isotopic PFAS analogues that correct for any matrix effects. If the client requests them, then they are processed accordingly but are not a requirement of this method. If done they are by matrix, not to exceed twenty (20) samples. An MS/MSD pair is aliquots of a selected field sample spiked with analytes of known identity and concentration. The MS/MSD pair must be processed in the same manner and at the same time as the associated samples. Spiked analytes with recoveries or precision outside of the Laboratory control limits are flagged accordingly. Until enough statistical data per matrix is available, no criteria are offered. If a specific QA Project Plan has required limits, this is preempted. Any outliers must be qualified accordingly.

10.2.4 Initial calibration verification (ICV) –A second source standard is not required for this method. A second independently prepared mid-level standard is prepared and used for this purpose and analyzed after the ICAL. The concentration should be at the mid-range of the curve and must recover within 70-130 % of expected value.

Corrective actions for the ICV include:

- Rerun the ICV
- Remake or acquire a new ICV.
- Evaluate the instrument conditions.

- Evaluate the initial calibration standards.
- Rerun the initial calibration.

10.2.5 Internal Standard- The Non-extracted Internal Standard (NIS) is added to each field and QC sample prior to analysis. The IS response (peak area) must not deviate by more than 50-200% from the mean response (peak area) of the initial calibration. If the areas are low for all the field samples and QC samples in the batch, it suggests a loss of instrument sensitivity, while low areas in only some field or QC samples suggests a possible bad injection.

Corrective action includes:

- Reinject the questionable samples.
- Verifying the CCV NIS areas are compliant with the range, if so, this suggests either matrix effects or may require a small dilution to mitigate interference if only some of the NIS compounds are affected.
- Qualify affected data.

10.3 Initial Demonstration of Capability (IDC)

Initial Demonstration of Capability involves the following processes listed ion Table 1.0 as follows.

Table 1.0 - Initial Demonstration of Capability (IDC)

Requirement	Specification and Frequency	Acceptance Criteria
Initial Demonstration of Precision and Recovery (IPR)	Extract, concentrate, and analyze four aliquots of the matrix (aqueous and soil) spiked with target native standard solution, EIS solution and finally the NIS (ISTD). Extract a method blank of each matrix with each matrix IPR batch. All steps that are used for processing samples, including preparation and extraction must be included.	Using results of the set of four analyses, compute the average percent recovery (R) of the extracts and the relative standard deviation (RSD) of the concentration for each target and EIS compound.
		For each native and isotopically labeled compound, compare RSD and % recovery with the corresponding limits for initial precision and recovery in Table 5. If RSD and R for all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin.
Method Detection Limit (MDL)	Method detection limit (MDL) - Each laboratory must also establish MDLs for all the analytes using the MDL procedure at 40 CFR Part 136, Appendix B. An MDL determination must be performed for all target compounds.	The minimum level of quantification (ML) can be calculated by multiplying the MDL by 3.18 and rounding to the nearest integer

Calibration Verification (ICV or SCV) *Section 9.1.5*	Analyze a mid-level ICV, each time a new calibration is performed or at a minimum, quarterly. The ICV must be an independent dilution beginning with the common starting materials used for ICAL. No 2nd source is required due to availability.	Results must be 70-130% of true value.

10.4 **QC Requirements**

Ongoing QC requirements are detailed in Table 3.0 as follows.

Table 3.0 QC Requirements

Summary of Quality Control		
Method Reference	**Requirement**	**Specification and Frequency**
Section 10.1	Mass Calibration	Annually and on as-needed basis
Section 10.1.7	Mass Calibration Verification	After mass calibration
Section 10.3	Initial Calibration (ICAL)	Minimum 6 calibration standards for linear models and 7 calibration standards for non-linear models.
Sections 10.2.2, 14.4	Retention Time (RT) window	After ICAL and at the beginning of analytical sequence
Sections 7.3.1, 9.4	Extracted Internal Standard (EIS) Analytes	All CAL standards, batch QC and field samples
Sections 7.3.2	Non-extracted Internal Standards (NIS)	All CAL standards, batch QC and field samples
Sections 7.3.4, 10.3.1, 13.3	Instrument Sensitivity Check (ISC)	Daily, prior to analysis
Section 14.2	Calibration Verification (CV) (CCV)	At the beginning and every 10 samples and at the end
Section 14.6	Instrument Blank	Daily prior to analysis and after high standards
Sections 9.1.3, 9.5, 14.7	Method Blank (MB)	One per preparation batch
Section 14.5	Ongoing Precision Recovery (OPR)	One per preparation batch
Section 11.0	Limit of Quantitation Verification (LLOPR)	Prior to analyzing samples
Section 11.0	Matrix Spike (MS/MSD)	One per preparation batch (if required) Normally not needed, since Isotope dilution is employed

11.0 DATA REVIEW, CALCULATIONS AND REPORTING

Samples concentrations are determined using either linear regression or quadratic regression FORCED through the origin. Weighted ($1/x$ or $1/x^2$) may assist with low level accuracy and is recommended where necessary. All calibration curves have greater than 6 points. Any target analyte exceeding the calibration range will require dilution.

11.1 Data interpretation

All sample data calculations are performed by the Agilent Mass Hunter software in ng/mL and then final data are calculated considering final extract volumes and the initial sample volumes extracted which are entered into the Element bench sheet.

11.2 Linear and Branched Isomers are addressed in Section 8.5 and are reported for the noted species as Total which is a sum of the linear and branched isomers for affected species.

11.3 All Data are uploaded into Element LIMS and all final concentration calculations and associated recoveries are detailed. All pdfs of Mass Hunter Quant reports are uploaded to the Element Raw Data drive for association with ICALs and all batch and analysis sequence runs. Data are set to Analyzed status once uploaded and initially reviewed, then locked.

11.4 The Data is then evaluated using the York Qualinator ^{TM} data review tool which evaluates all data CCVs, QC, ISTDS, Recoveries, etc. and automatically assigns outlier qualifiers for review and acceptance by the reviewer. The accepted data are then uploaded to Element and final reviewed in Laboratory Data Entry/Review module. Once reviewed, the status is set to Reviewed indicating the data are ready to be Reported by the Reporting Group.

12. HEALTH AND SAFETY

12.1 General safety considerations and requirements are detailed in the York Laboratory Safety and Health Standard Operating Procedure No. Safety011600.

Specific safety rules applying to the conduct of this analysis requiring the following:

- When handling standards and samples, latex gloves are required.
- Also, when handling neat materials, a fume hood and safety glasses are required.
- When handling samples, gloves and glasses are required.
- Highly odorous samples must be handled in a fume hood.
- Refer to SDSs for specific safety/health information.

12.2 The analysts must exercise normal care and be supervised and trained to work in an analytical chemistry laboratory. The analysts will be handling fragile glassware, needles, syringes, volatile and flammable chemicals, toxic chemicals, and corrosive chemicals.

- No smoking or open flames are allowed.
- No food or food products may be brought into the laboratory.

Solvents should not be left uncovered on the laboratory benches.
All solvent transfers should be done in the hoods.

Hood doors must be kept in a position which yields approx. 100 fpm face velocity.
Solvent evaporation must be done in the hood with exhaust elevated and in the rear.

Waste containers that had solvents must be vented to a hood until all solvents have evaporated.

Safety glasses are provided and must always be worn in the laboratory.
Gloves are provided and must be worn when working with chemicals.
Laboratory coats are provided and should be worn to protect the analysts' clothes.
Syringes and needles must be kept in their original cases when not in use.
Care must be exercised in using and handling syringes to avoid injury.
Report any sticking with a needle immediately to your supervisor.

12.3 Specific Safety Concerns

12.3.1 Preliminary toxicity studies indicate that PFAS could have significant toxic effects. In the interest of keeping exposure levels as low as reasonably achievable, PFAS must be handled in the laboratory as hazardous and toxic chemicals.

12.3.2 Exercise caution when using syringes with attached filter disc assemblies. Application of excessive force has, upon occasion, caused a filter disc to burst during the process.

12.3.3 Laboratory procedures such as repetitive use of pipets, repetitive transferring of extracts and manipulation of filled separatory funnels and other glassware represent a significant potential for repetitive motion or other ergonomic injuries. Laboratory associates performing these procedures are in the best position to realize when they are at risk for these types of injuries.

12.3.4 Eye protection, laboratory coat, and nitrile gloves must be worn while handling samples, standards, solvents, and reagents. Disposable gloves that have been contaminated will be removed and discarded; other gloves will be cleaned immediately.

12.3.5 Perfluorocarboxylic acids are acids and are not compatible

with strong bases.

12.3.6 Primary Materials Used- The following is a list of the materials used in this method, which have a serious or significant hazard rating. NOTE: This list does not include all materials used in the method. The table contains a summary of the primary hazards listed in the SDS for each of the materials listed in the table. A complete list of materials used in the method can be found in the reagents and materials section. Employees must review the information in the SDS for each material before using it for the first time or when there are major changes to the SDS.

Methanol	-Flammable Poison -Irritant	200 ppm (TWA)	A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Symptoms of overexposure may include headache, drowsiness and dizziness. Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure. Irritant to the eyes.
Acetic Acid, Glacial	-Flammable liquid and vapor. -Irritation	10 ppm TWA; 25 mg/m3 TWA	**Eye:** Causes severe eye irritation. Contact with liquid or vapor causes severe burns and possible irreversible eye damage. **Skin:** Causes skin burns. May be harmful if absorbed through the skin. Contact with the skin may cause blackening and hyperkeratosis of the skin of the hands. **Ingestion:** May cause severe and permanent damage to the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause polyuria, oliguria (excretion of a diminished amount of urine in relation to the fluid intake) and anuria (complete suppression of urination). Rapidly absorbed from the gastrointestinal tract. **Inhalation:** Effects may be delayed. Causes chemical burns to the respiratory tract. Exposure may lead to bronchitis, pharyngitis, and dental erosion. May be absorbed through the lungs. **Chronic:** Chronic exposure to acetic acid may cause erosion of dental enamel, bronchitis, eye irritation, darkening of the skin, and chronic inflammation of the respiratory tract. Acetic acid can cause occupational asthma. One case of a delayed asthmatic response to glacial acetic acid has been reported in a person with bronchial asthma. Skin sensitization to acetic acid is rare, but has
Ammonium Hydroxide, conc. 28-30%	- Inhalation hazard - Skin Corrosion -Eye Damage and Irritation	OSHA PEL: 35 mg/m3 ; 50 ppm OSHA TWA: 18 mg/m3; 25 ppm	Ammonia is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. The extent of injury produced by exposure to ammonia depends on the duration of the exposure, the concentration of the liquid or vapor and the depth of inhalation. Exposure Routes: Inhalation (vapors), skin and/or eye contact (vapors, liquid), ingestion (liquid).

Formic Acid, conc.	-Flammable liquid and vapor -Harmful if swallowed -Causes severe skin burns and eye damage -Toxic if inhaled -May cause respiratory irritation	OSHA TWA: 5 ppm or 9 mg/m3 OSHA PEL: 10 ppm	Formic acid is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. The extent of injury produced by exposure to ammonia depends on the duration of the exposure, the concentration of the liquid or vapor and the depth of inhalation. Exposure Routes: Inhalation (vapors), skin and/or eye contact (vapors, liquid), ingestion (liquid).

13. WASTE MANAGEMENT/POLLUTION PREVENTION

Neat Materials

Waste management procedures require the prudent use of neat materials. The ordering of neat standards and materials must be done to minimize unused material which would result in storage or handling of excess material. Quantities ordered should be sufficient to provide for necessary standards with consideration to shelf life. When ordering a unique material for a standard, be sure to order the smallest practical quantity.

Solvents

The solvents used at York for this procedure include isopropanol and Methanol. These solvents are used for sample extraction or LC cleanup, all amounts are either consumed during concentration or placed in one-liter amber jars in the hood areas for evaporation. Any remaining solvent/water is transferred to a drum designated for solvent waste.

Acids and Bases

The acids and bases used for this procedure include Acetic Acid and Formic Acid. The bases used are Ammonium hydroxide, sodium hydroxide and potassium hydroxide. Store concentrated base and acids separately whether waste or neat material.

Samples

Unused or remaining water samples are returned to the sample control room for continued storage for proper disposal by the sample control group.

14. REFERENCES

1. EPA METHOD 1633 Draft 3 December, 2022- Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS; EPA 821-D-22-001

15. REVISION HISTORY

Revision 1.0	10/24/2022	First issue.
Revision 1.1	02/10/2023	Modified LLOPR in Section 7.4.6.1 to reflect 2x the MRL
Revision 1.2	06/23/2023	Added *Appendix 1: Target Compound Reporting Limits*. Updated Section 9.2 to add acceptable limits for ICAL RSE. Described the Promochrom extraction method in Sections 8.2, 8.3, and added *Appendix 2: Promochrom Method*. Redefined analytical batch as analytical sequence. Updated Reference to EPA 1633 Draft 3. Added reference to and preparation procedures for a second source standard in Section 7. Revised qualitative identification requirements for analytes in Section 8. Minor formatting edits.

Appendix 1 – Target Compound Reporting Limits

Target Compoud	Soil		Water	
	MDL/LOD	RL/LOQ	MDL/LOD	RL/LOQ
	µg/kg	µg/kg	ng/L	ng/L
Perfluorobutanesulfonic acid (PFBS)	0.111	0.177	0.47	1.77
Perfluorohexanoic acid (PFHxA)	0.053	0.200	0.35	2.00
Perfluoroheptanoic acid (PFHpA)	0.105	0.200	0.71	2.00
Perfluorohexanesulfonic acid (PFHxS)	0.179	0.183	0.68	1.83
Perfluorooctanoic acid (PFOA)	0.172	0.200	0.42	2.00
Perfluorooctanesulfonic acid (PFOS)	0.167	0.186	0.82	1.86
Perfluorononanoic acid (PFNA)	0.189	0.200	0.52	2.00
Perfluorodecanoic acid (PFDA)	0.191	0.200	0.75	2.00
Perfluoroundecanoic acid (PFUnA)	0.198	0.200	1.13	2.00
Perfluorododecanoic acid (PFDoA)	0.163	0.200	0.88	2.00
Perfluorotridecanoic acid (PFTrDA)	0.125	0.200	0.74	2.00
Perfluorotetradecanoic acid (PFTA)	0.103	0.200	0.69	2.00
N-MeFOSAA	0.148	0.200	0.79	2.00
N-EtFOSAA	0.194	0.200	1.03	2.00
Perfluoropentanoic acid (PFPeA)	0.109	0.400	0.23	4.00
Perfluoro-1-octanesulfonamide (FOSA)	0.146	0.200	0.88	2.00
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.155	0.200	0.91	1.91
Perfluoro-1-decanesulfonic acid (PFDS)	0.191	0.193	1.32	1.93
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.595	0.760	1.06	7.60
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.755	0.768	2.05	7.68
Perfluoro-n-butanoic acid (PFBA)	0.109	0.800	0.33	8.00
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	0.139	0.356	0.50	3.56
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	0.193	0.400	2.14	4.00
Perfluoro-4-oxapentanoic acid (PFMPA)	0.062	0.400	0.25	4.00
Perfluoro-5-oxahexanoic acid (PFMBA)	0.096	0.400	0.37	4.00
Perfluoro-1-pentanesulfonate (PFPeS)	0.157	0.188	0.76	1.88
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	0.595	0.750	1.79	7.50
HFPO-DA (Gen-X)	0.608	0.800	3.23	8.00
11CL-PF3OUdS	0.311	0.756	1.38	7.56
9CL-PF3ONS	0.246	0.748	0.70	7.48
ADONA	0.174	0.756	0.53	7.56
Perfluorododecanesulfonic acid (PFDoS)	0.169	0.194	0.93	1.94
Perfluoro-1-nonanesulfonic acid (PFNS)	0.124	0.192	0.86	1.92
3-Perfluoropropyl propanoic acid (FPrPA or 3:3FTCA)	0.634	1.000	2.03	5.00
3-Perfluoropentyl propanoic acid (FPePA or 5:3 FTCA)	2.098	5.000	7.33	25.00
3-Perfluoroheptyl propanoic acid (FHpPA or 7:3FTCA)	1.500	5.000	9.47	25.00
N-MeFOSE	0.611	2.000	3.99	20.00
N-MeFOSA	0.180	0.200	1.58	2.00
N-EtFOSE	0.697	2.000	3.99	20.00
N-EtFOSA	0.198	0.200	1.80	2.00

Appendix 2: Promochrom Method

Step	Action	Inlet 1	Inlet 2	Flow (mL/min)	Volume (mL)	Target
1	Elute	1% Basic Methanol	-	8	15	Waste
2	Elute	0.3M Formic Acid	-	8	5	Waste
3	Add Sample	Sample Inlet	-	10	60 or 510*	Waste
4	Rinse Sample	Water	Air (20%)	70	2.5	Sample Container
5	Add Sample	Sample Inlet	-	5	5	Waste
6	Rinse Sample	Water	Air (20%)	70	5	Sample Container
7	Add Sample	Sample Inlet	-	5	5	Waste
8	Rinse Sample	Water	Air (20%)	70	5	Sample Container
9	Add Sample	Sample Inlet	-	5	5	Waste
10	Rinse Sample	1:1 0.1M Formic Acid/Methanol	Air (20%)	70	1.3	Sample Container
11	Add Sample	Sample Inlet	-	5	3	Waste
12	Rinse Sample	1:1 0.1M Formic Acid/Methanol	Air (20%)	70	5	Sample Container
13	Add Sample	Sample Inlet	-	5	5	Waste
14	Air Purge	SPE Cartridge	-	5	5 Minutes	
15	Add Sample	Sample Inlet	-	5	5	Waste
16	Blow N2	Sample Inlet	-	5	1 Minute	
17	Rinse Sample	1% Basic Methanol	Air (20%)	70	1.3	Sample Container
18	Collect	Sample Inlet	-	5	3	Centrifuge Tube
19	Rinse Sample	1% Basic Methanol	Air (20%)	70	5	Sample Container
20	Collect	Sample Inlet	-	5	5	Centrifuge Tube
21	Collect	Sample Inlet	-	5	5	Centrifuge Tube

*60 mL is used for soil matrices and 510 mL is used for aqueous matrices.

Attachment 1 – Non-Extracted Internal Standards (NIS)

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B197**

Description:	MPFAC-HIF-IS-EPA 1633 ISTD STOCK	Prepared:	02/16/2022
Standard Type:	Other	Expires:	09/07/2026
Solvent:	Methanol/Water (<1%)	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	MPFACHIFIS0921
Vendor:	Wellington Laboratories		

Comments: Stock ISTD for EPA method 1633

Analyte	CAS Number	Concentration	Units
M3PFBA		1	ug/mL
MPFDA		0.25	ug/mL
MPFHxA		0.5	ug/mL
MPFHxS		0.474	ug/mL
MPFNA		0.25	ug/mL
MPFOA		0.5	ug/mL
MPFOS		0.479	ug/mL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

MPFAC-HIF-IS

Mass-Labelled Perfluoroalkyl Substance Injection Standard Solution/Mixture

PRODUCT CODE:	MPFAC-HIF-IS
LOT NUMBER:	MPFACHIFIS0921
SOLVENT(S):	Methanol/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	09/07/2021
LAST TESTED: (mm/dd/yyyy)	09/07/2021
EXPIRY DATE: (mm/dd/yyyy)	09/07/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

MPFAC-HIF-IS is a solution/mixture of five mass-labelled (^{13}C) perfluoroalkylcarboxylic acids (C_4, C_8, C_9-C_{10}) and two mass-labelled (^{18}O and ^{13}C) perfluoroalkanesulfonates (C_6 and C_8). The components and their concentrations are given in Table A.

The individual mass-labelled perfluoroalkylcarboxylic acids and mass-labelled perfluoroalkanesulfonates all have chemical purities of >98% and isotopic purities of ≥99% per ^{13}C or >94% per ^{18}O.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Table A: **MPFAC-HIF-IS; Components and Concentrations (ng/mL, ± 5% in methanol/water (<1%))**

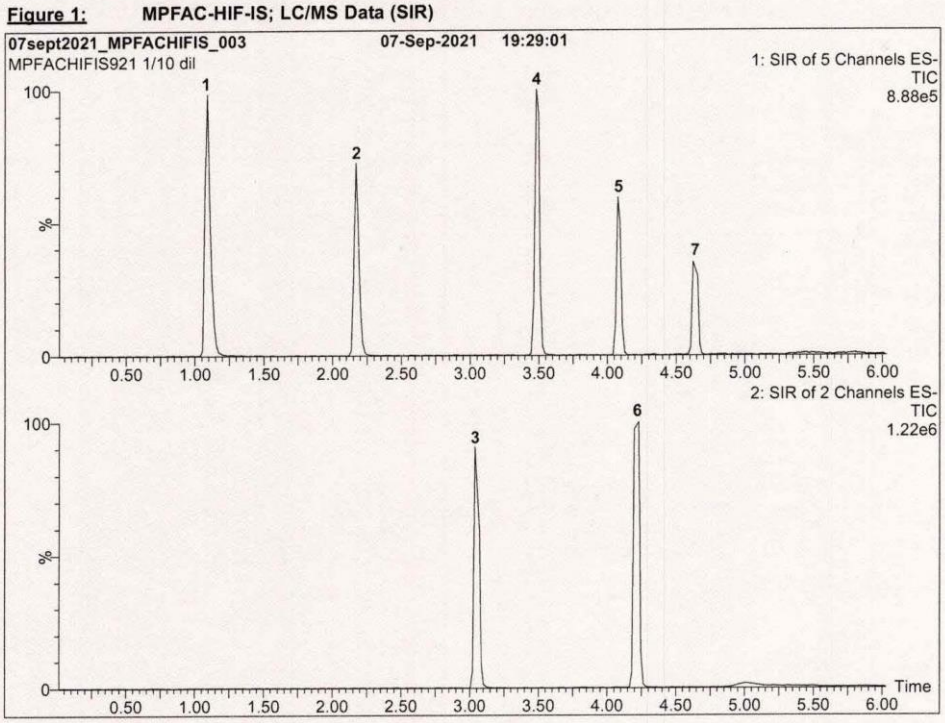
Compound	Acronym	Concentration (ng/mL)		Peak Assignment in Figure 1
Perfluoro-n-(2,3,4-$^{13}C_3$)butanoic acid	M3PFBA	1000		1
Perfluoro-n-(1,2-$^{13}C_2$)hexanoic acid	MPFHxA	500		2
Perfluoro-n-(1,2,3,4-$^{13}C_4$)octanoic acid	MPFOA	500		4
Perfluoro-n-(1,2,3,4,5-$^{13}C_5$)nonanoic acid	MPFNA	250		5
Perfluoro-n-(1,2-$^{13}C_2$)decanoic acid	MPFDA	250		7
Compound	**Acronym**	**Concentration* (ng/mL)**		**Peak Assignment in Figure 1**
		as the salt	**as the acid**	
Sodium perfluoro-1-hexane($^{18}O_2$)sulfonate	MPFHxS	500	474	3
Sodium perfluoro-1-(1,2,3,4-$^{13}C_4$)octanesulfonate	MPFOS	500	479	6

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 10/13/2021 (mm/dd/yyyy)

B.G. Chittim, General Manager

Figure 1: **MPFAC-HIF-IS; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

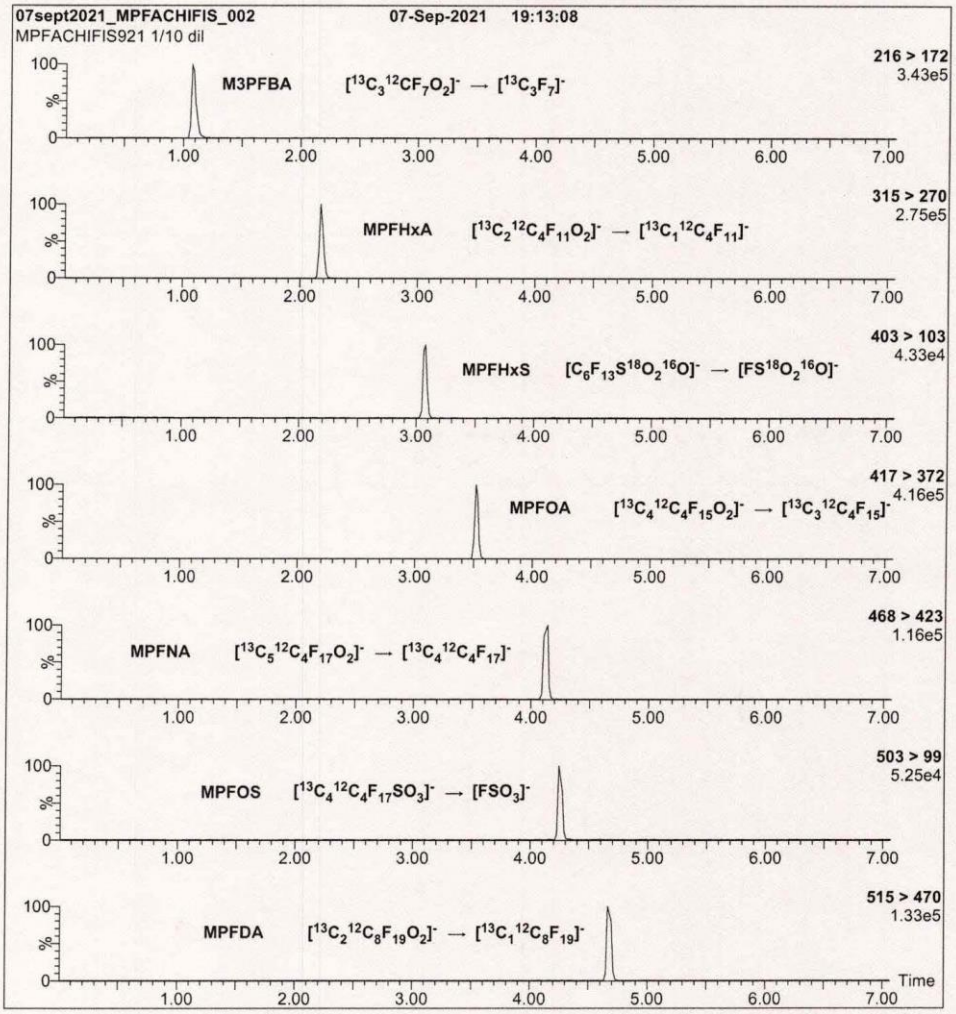
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (2-6)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFIS0921 (4 of 5)
rev1

Figure 2: **MPFAC-HIF-IS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (MPFAC-HIF-IS)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:

Collision Gas (mbar) = 3.18e-3
Collision Energy (eV) = 4-64 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFIS0921 (5 of 5)
rev1

Attachment 2 – Extracted Internal Standards (EIS)

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B198**

Description:	MPFAC-HIF-ES-EPA 1633 STOCK EIS mix	Prepared:	02/17/2022
Standard Type:	Other	Expires:	08/06/2024
Solvent:	MeOH/IPA/1% H2O	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	MPFACHIFES0821
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
d3-N-MeFOSAA		1	ug/mL
d5-N-EtFOSAA		1	ug/mL
d7-N-MeFOSE		5	ug/mL
d9-N-EtFOSE		5	ug/mL
d-N-EtFOSA		0.5	ug/mL
d-N-MeFOSA		0.5	ug/mL
M2-4:2FTS		0.938	ug/mL
M2-6:2FTS		0.951	ug/mL
M2-8:2FTS		0.96	ug/mL
M2PFTeDA		0.25	ug/mL
M3HFPO-DA		2	ug/mL
M3PFBS		0.466	ug/mL
M3PFHxS		0.474	ug/mL
M4PFHpA		0.5	ug/mL
M5PFHxA		0.5	ug/mL
M5PFPeA		1	ug/mL
M6PFDA		0.25	ug/mL
M7PFUdA		0.25	ug/mL
M8FOSA		0.5	ug/mL
M8PFOA		0.5	ug/mL
M8PFOS		0.479	ug/mL
M9PFNA		0.25	ug/mL
MPFBA		2	ug/mL
MPFDoA		0.25	ug/mL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

MPFAC-HIF-ES

Mass-Labelled Per- and Poly-fluoroalkyl Substance Extraction Standard Solution/Mixture

PRODUCT CODE:	MPFAC-HIF-ES
LOT NUMBER:	MPFACHIFES0821
SOLVENT(S):	Methanol/Isopropanol (1%)/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	08/05/2021
LAST TESTED: (mm/dd/yyyy)	08/16/2021
EXPIRY DATE: (mm/dd/yyyy)	08/16/2024
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

MPFAC-HIF-ES is a solution/mixture of ten mass-labelled (^{13}C) perfluoroalkylcarboxylic acids (C_4-C_{12}, C_{14}), three mass-labelled (^{13}C) perfluoroalkanesulfonates (C_4, C_8, and C_8), three mass-labelled (one ^{13}C and two ^{2}H) perfluoro-1-octanesulfonamides, three mass-labelled (^{13}C) fluorotelomer sulfonates (4:2, 6:2, and 8:2), two mass-labelled (^{2}H) perfluorooctanesulfonamidoacetic acids, two mass-labelled (^{2}H) perfluorooctanesulfonamidoethanols, and mass-labelled (^{13}C) hexafluoropropylene oxide dimer acid. The components and their concentrations are given in Table A.

The individual mass-labelled perfluoroalkylcarboxylic acids, mass-labelled perfluoroalkanesulfonates, mass-labelled fluorotelomer sulfonates, perfluoro-1-($^{13}C_8$)octanesulfonamide, and mass-labelled hexafluoropropylene oxide dimer acid all have chemical purities of >98% and isotopic purities of ≥99%. The individual mass-labelled perfluorooctanesulfonamidoacetic acids, mass-labelled perfluorooctanesulfonamidoethanols, and two mass-labelled (^{2}H) perfluoro-1-octanesulfonamides all have chemical purities of >98% and isotopic purities of ≥98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

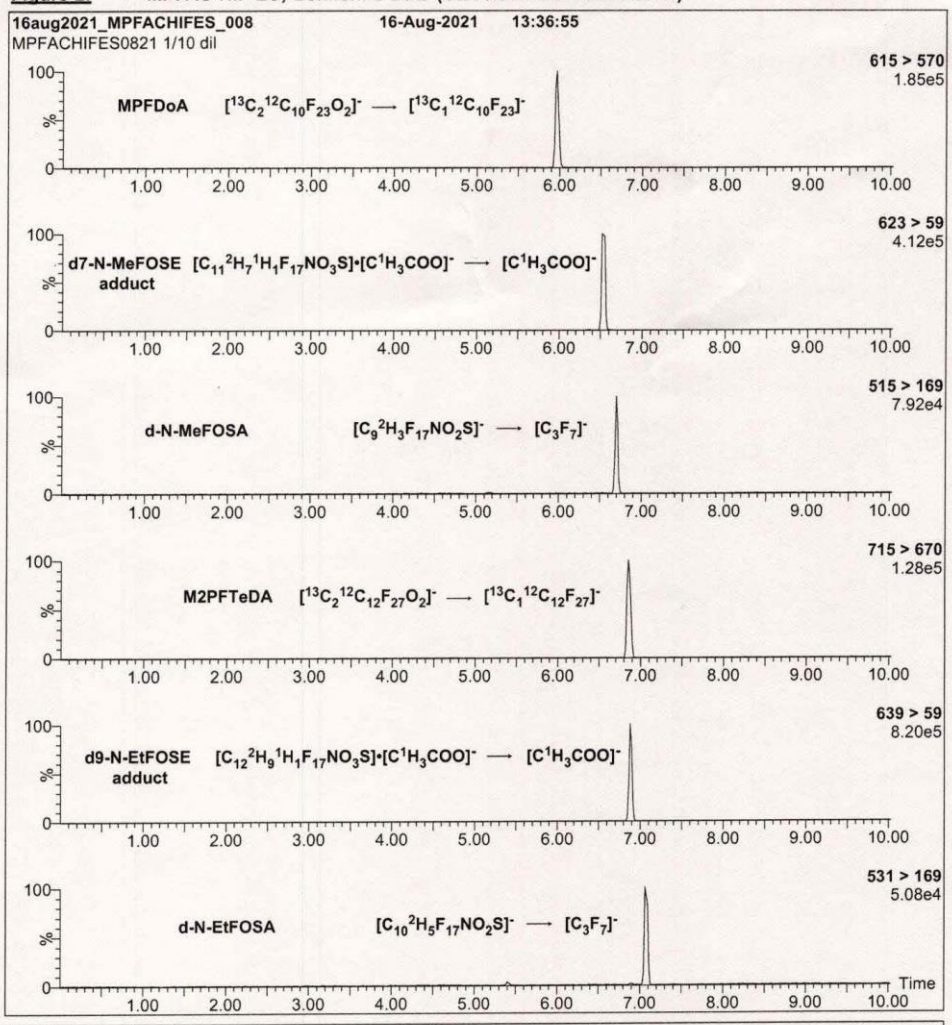
ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (2 of 7)
rev1

Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (MPFAC-HIF-ES)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:

Collision Gas (mbar) = 3.41e-3
Collision Energy (eV) = 4-64 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (7 of 7)
rev1

Table A: **MPFAC-HIF-ES; Components and Concentrations (ng/mL, ± 5% in Methanol/Isopropanol (1%)/Water (<1%))**

Compound	Acronym	Concentration (ng/mL)	Peak Assignment in Figure 1
Perfluoro-n-($^{13}C_4$)butanoic acid	MPFBA	2000	1
Perfluoro-n-($^{13}C_5$)pentanoic acid	M5PFPeA	1000	2
Perfluoro-n-(1,2,3,4,6-$^{13}C_5$)hexanoic acid	M5PFHxA	500	5
Perfluoro-n-(1,2,3,4-$^{13}C_4$)heptanoic acid	M4PFHpA	500	7
Perfluoro-n-($^{13}C_8$)octanoic acid	M8PFOA	500	10
Perfluoro-n-($^{13}C_9$)nonanoic acid	M9PFNA	250	11
Perfluoro-n-(1,2,3,4,5,6-$^{13}C_6$)decanoic acid	M6PFDA	250	14
Perfluoro-n-(1,2,3,4,5,6,7-$^{13}C_7$)undecanoic acid	M7PFUdA	250	17
Perfluoro-n-(1,2-$^{13}C_2$)dodecanoic acid	MPFDoA	250	19
Perfluoro-n-(1,2-$^{13}C_2$)tetradecanoic acid	M2PFTeDA	250	22
Perfluoro-1-($^{13}C_8$)octanesulfonamide	M8FOSA	500	18
N-methyl-d_3-perfluoro-1-octanesulfonamide	d-N-MeFOSA	500	21
N-ethyl-d_5-perfluoro-1-octanesulfonamide	d-N-EtFOSA	500	24
N-methyl-d_3-perfluoro-1-octanesulfonamidoacetic acid	d3-N-MeFOSAA	1000	15
N-ethyl-d_5-perfluoro-1-octanesulfonamidoacetic acid	d5-N-EtFOSAA	1000	16
2-(N-methyl-d_3-perfluoro-1-octanesulfonamido)ethan-d_4-ol	d7-N-MeFOSE	5000	20
2-(N-ethyl-d_5-perfluoro-1-octanesulfonamido)ethan-d_4-ol	d9-N-EtFOSE	5000	23
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)($^{13}C_3$)propanoic acid	M3HFPO-DA	2000	6

Compound	Acronym	Concentration* (ng/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Sodium perfluoro-1-(2,3,4-$^{13}C_3$)butanesulfonate	M3PFBS	500	466	3
Sodium perfluoro-1-(1,2,3-$^{13}C_3$)hexanesulfonate	M3PFHxS	500	474	8
Sodium perfluoro-1-($^{13}C_8$)octanesulfonate	M8PFOS	500	479	12
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)hexanesulfonate	M2-4:2FTS	1000	938	4
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)octanesulfonate	M2-6:2FTS	1000	951	9
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)decanesulfonate	M2-8:2FTS	1000	960	13

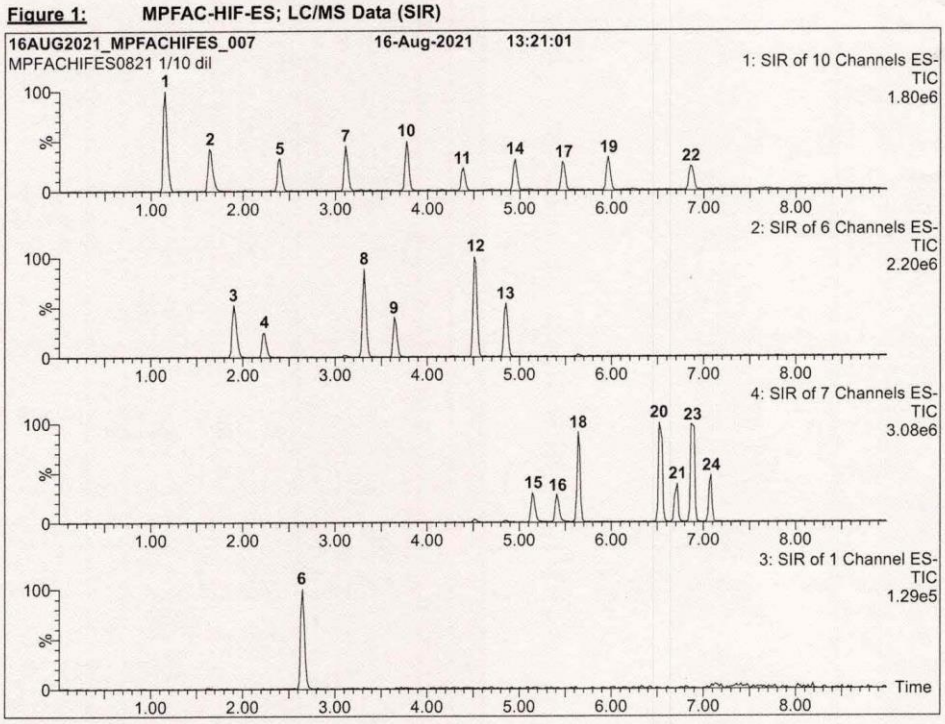
* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 10/13/2021 (mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (3 of 7)
rev1

Figure 1: **MPFAC-HIF-ES; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

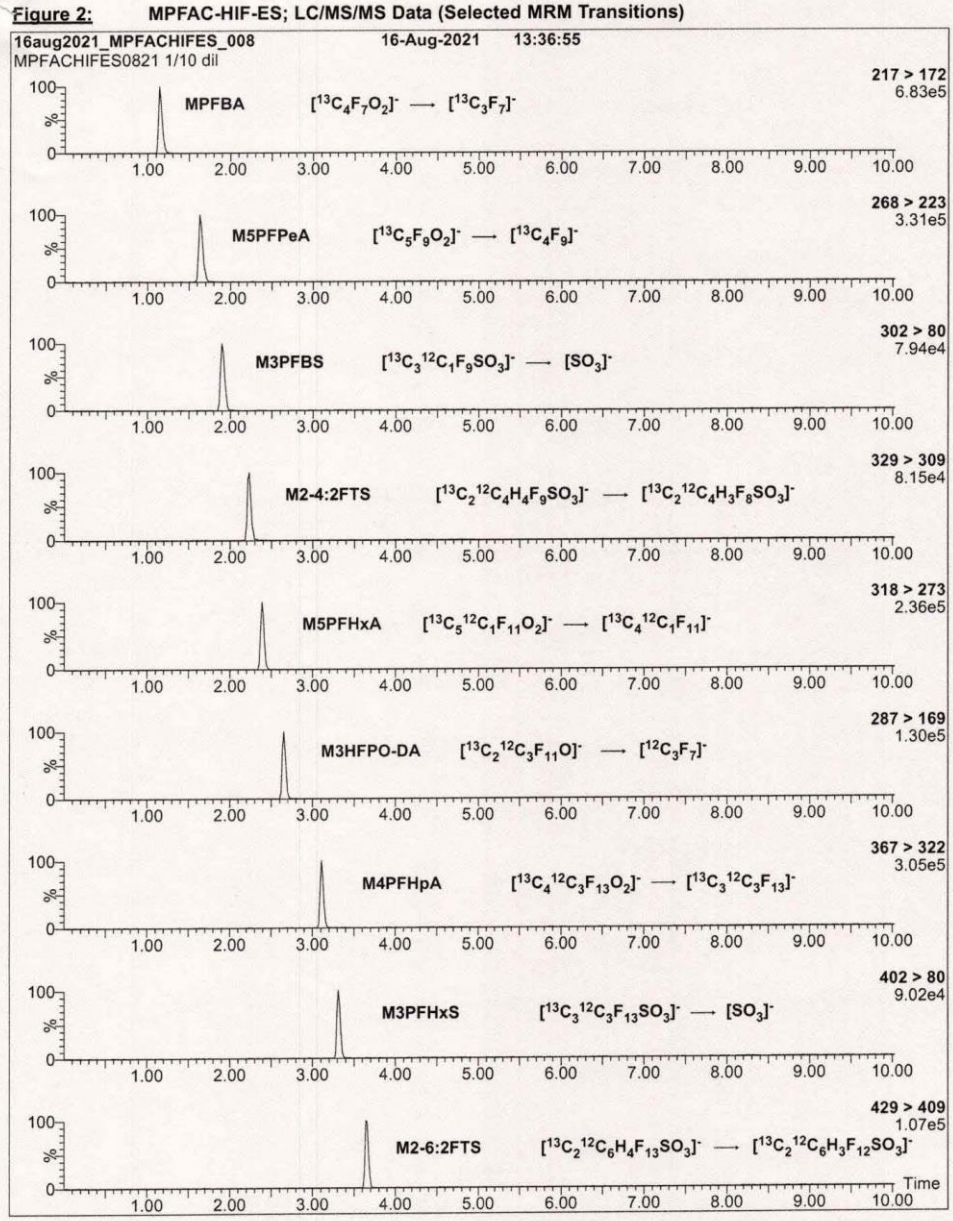
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (2-44)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (4 of 7)
rev1

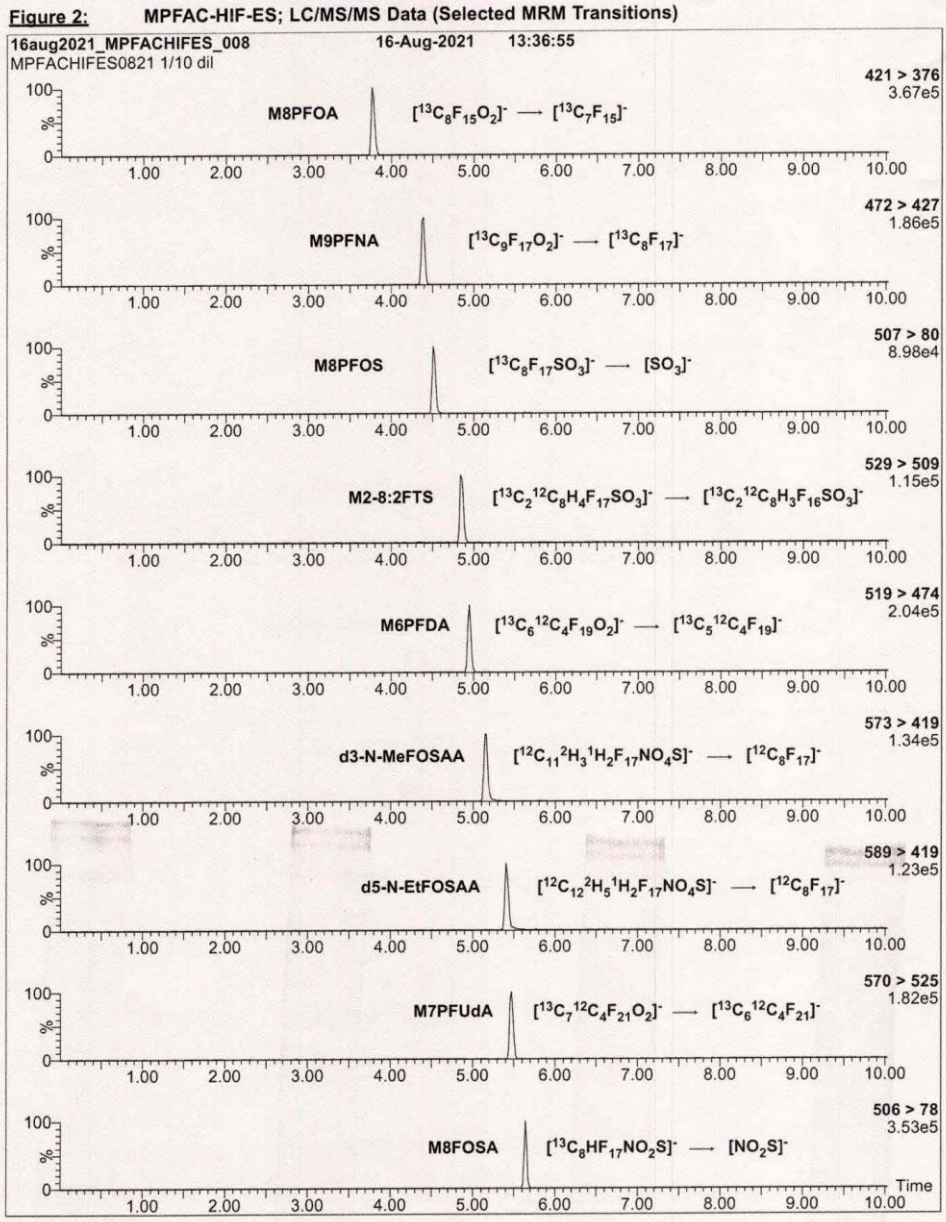
Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**



Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (5 of 7)
rev1

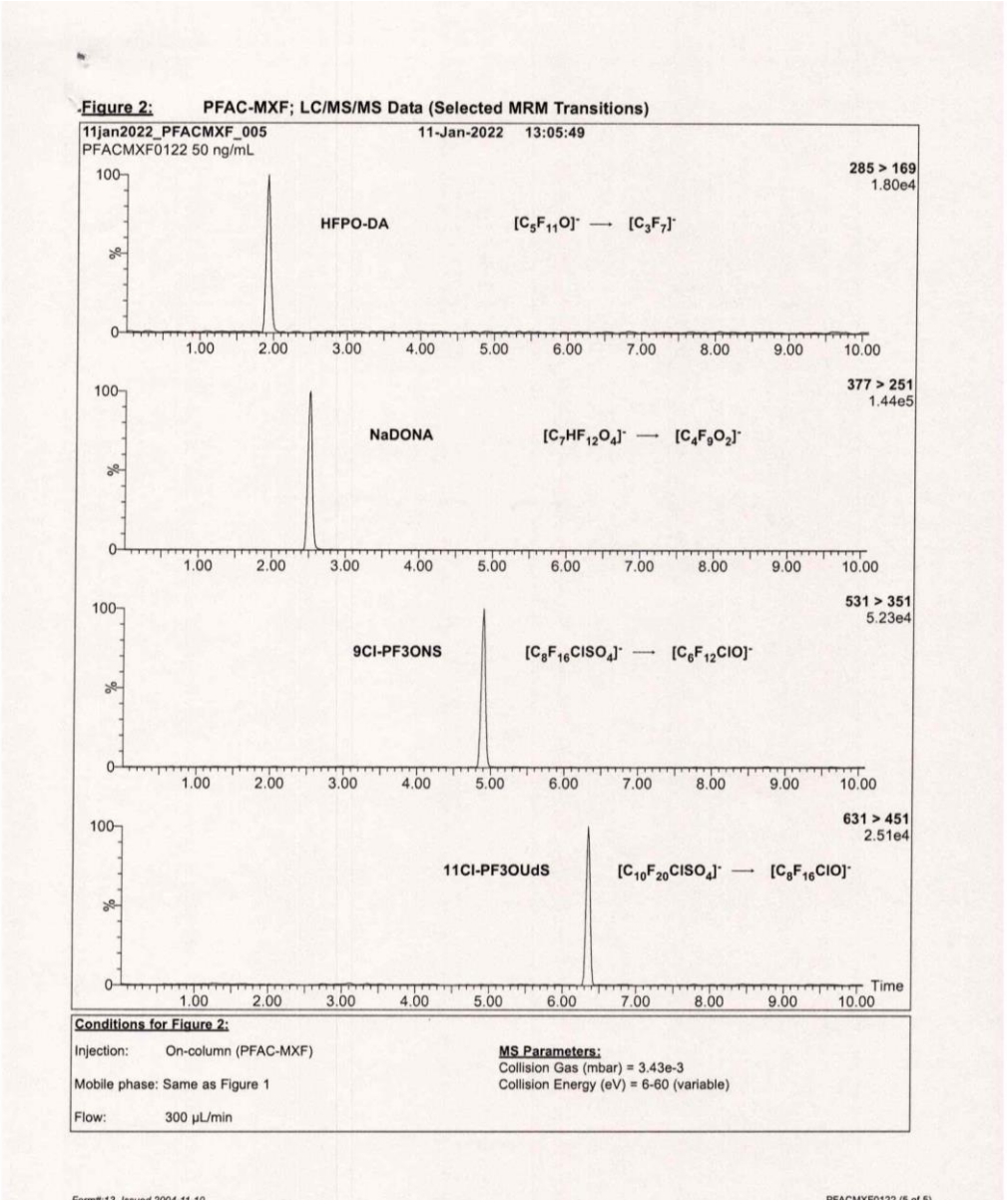
Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**



Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (6 of 7)
rev1

Attachment 3 – Target Analyte



Mixtures

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (2 of 5)
rev0

Table A: **PFAC-MXF; Components and Concentrations (ng/mL; ± 5% in Methanol/Water (<1%))**

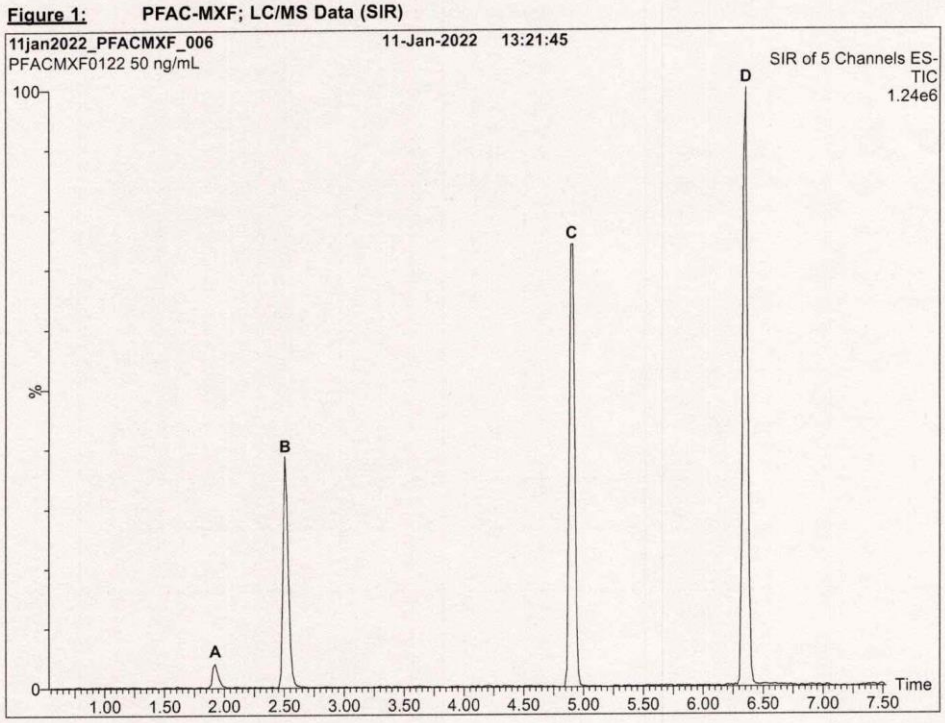
Compound	Acronym	Concentration* (ng/ml)	Peak Assignment in Figure 1
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000	A

Compound	Acronym	Concentration* (ng/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	B
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1870	C
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1890	D

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 01/12/2022
(mm/dd/yyyy)
B.G. Chittim, General Manager

Figure 1: **PFAC-MXF; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% H_2O / 55% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min
before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (15-74)
Desolvation Temperature (°C) = 325
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (4 of 5)
rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B199**

Description:	PFAC-MXF-Native Repl.STOCK EPA 1633 PFAS	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**01/11/2025**
Solvent:	MeOH/H20	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXF0122
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
11CL-PF3OUdS	763051-92-9	1.89	ug/mL
9CL-PF3ONS	756426-58-1	1.87	ug/mL
ADONA	919005-14-4	1.89	ug/mL
HFPO-DA (Gen-X)	13252-13-6	2	ug/mL

Reviewed By Date

Page 1 of 1

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXF

Native Replacement PFAS Solution/Mixture

PRODUCT CODE:	PFAC-MXF
LOT NUMBER:	PFACMXF0122
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/10/2022
LAST TESTED: (mm/dd/yyyy)	01/11/2022
EXPIRY DATE: (mm/dd/yyyy)	01/11/2025
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXF is a solution/mixture of sodium dodecafluoro-3H-4,8-dioxanonanoate (NaDONA), the major and minor components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and GenX (HFPO-DA). The components and their concentrations are given in Table A.

The individual native components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Table A: **PFAC-MXI; Components and Concentrations (µg/mL; ± 5% in methanol)**

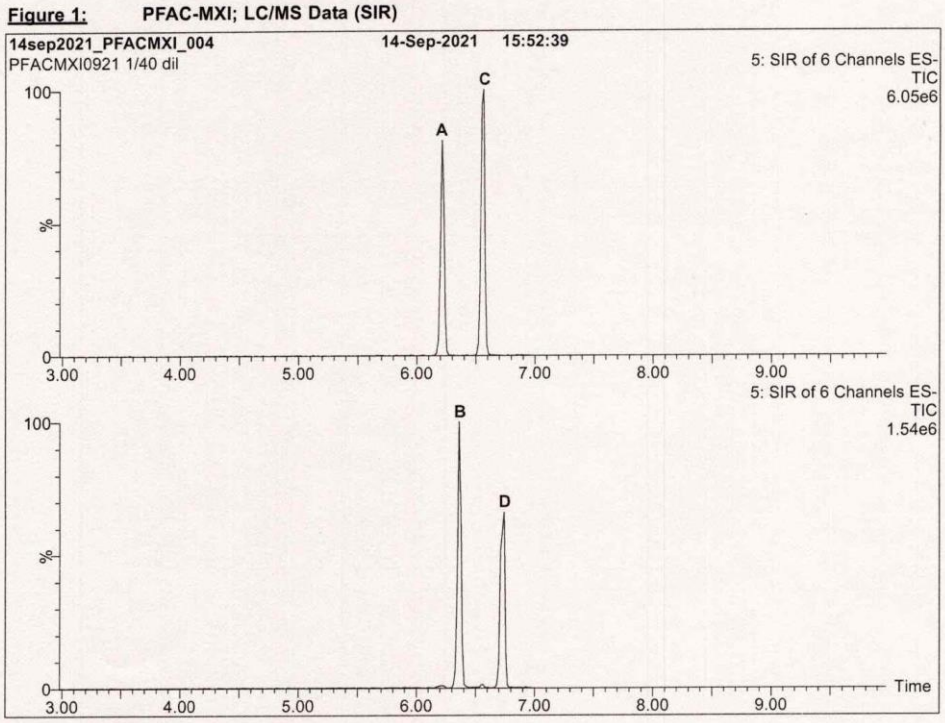
Compound	Acronym	Concentration (µg/mL)	Peak Assignment in Figure 1
N-methylperfluoro-1-octanesulfonamide	N-MeFOSA	1.00	B
N-ethylperfluoro-1-octanesulfonamide	N-EtFOSA	1.00	D
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	N-MeFOSE	10.0	A
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol	N-EtFOSE	10.0	C

Certified By: _____ **Date:** 09/23/2021
(mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (3 of 5)
rev0

Figure 1: **PFAC-MXI; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

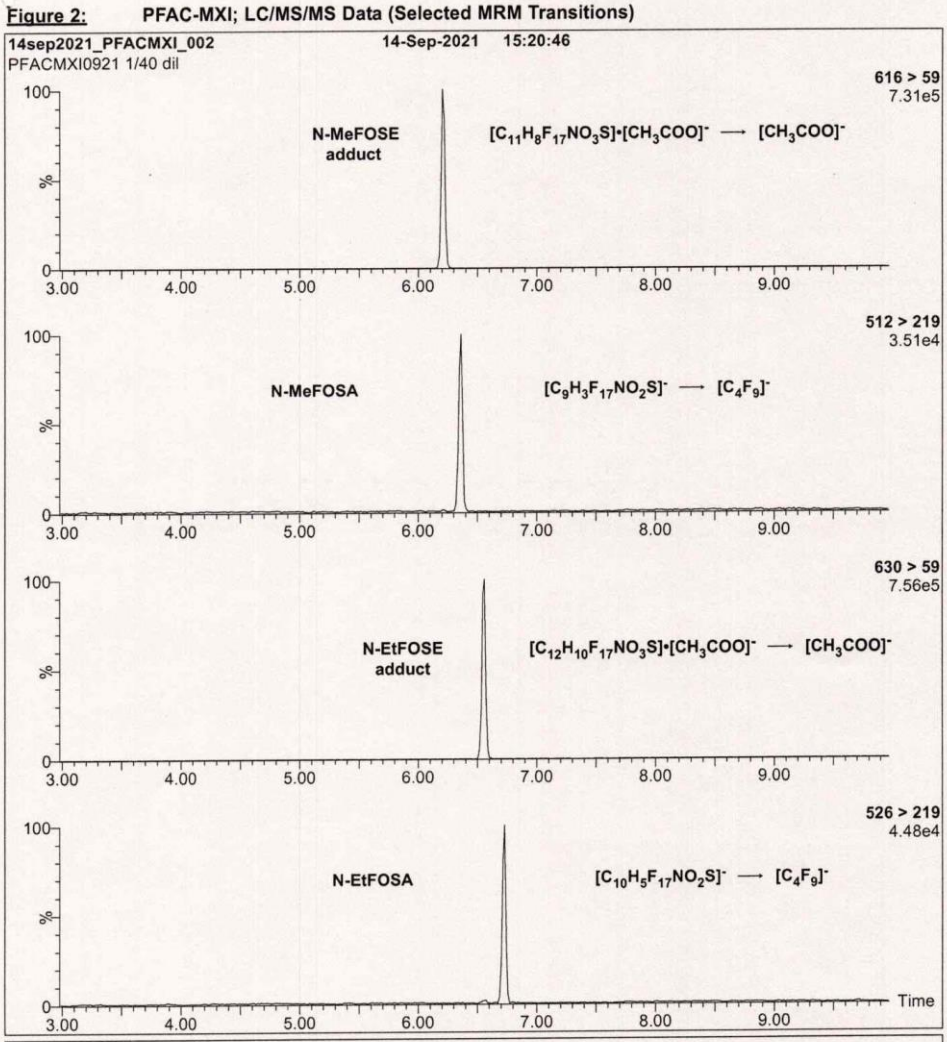
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (4 of 5)
rev0

Figure 2: **PFAC-MXI; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXI)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (5 of 5)
rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B204**

Description:	PFAC-MXI-EPA 1633 Stock	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**02/17/2023**
Solvent:	Methanol	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXI0921
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
N-EtFOSA	4151-50-2	1	ug/mL
N-EtFOSE	1691-99-2	10	ug/mL
N-MeFOSA	31506-32-8	1	ug/mL
N-MeFOSE	24448-09-7	10	ug/mL

Reviewed By Date

Page 1 of 1

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXI

Native Perfluorooctanesulfonamide and Perfluorooctanesulfonamidoethanol Solution/Mixture

PRODUCT CODE:	PFAC-MXI
LOT NUMBER:	PFACMXI0921
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	09/08/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

PFAC-MXI is a solution/mixture of two native perfluorooctanesulfonamides (FOSAs) and two native perfluorooctanesulfonamidoethanols (FOSEs). The components and their concentrations are given in Table A.

The individual components have a chemical purity of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

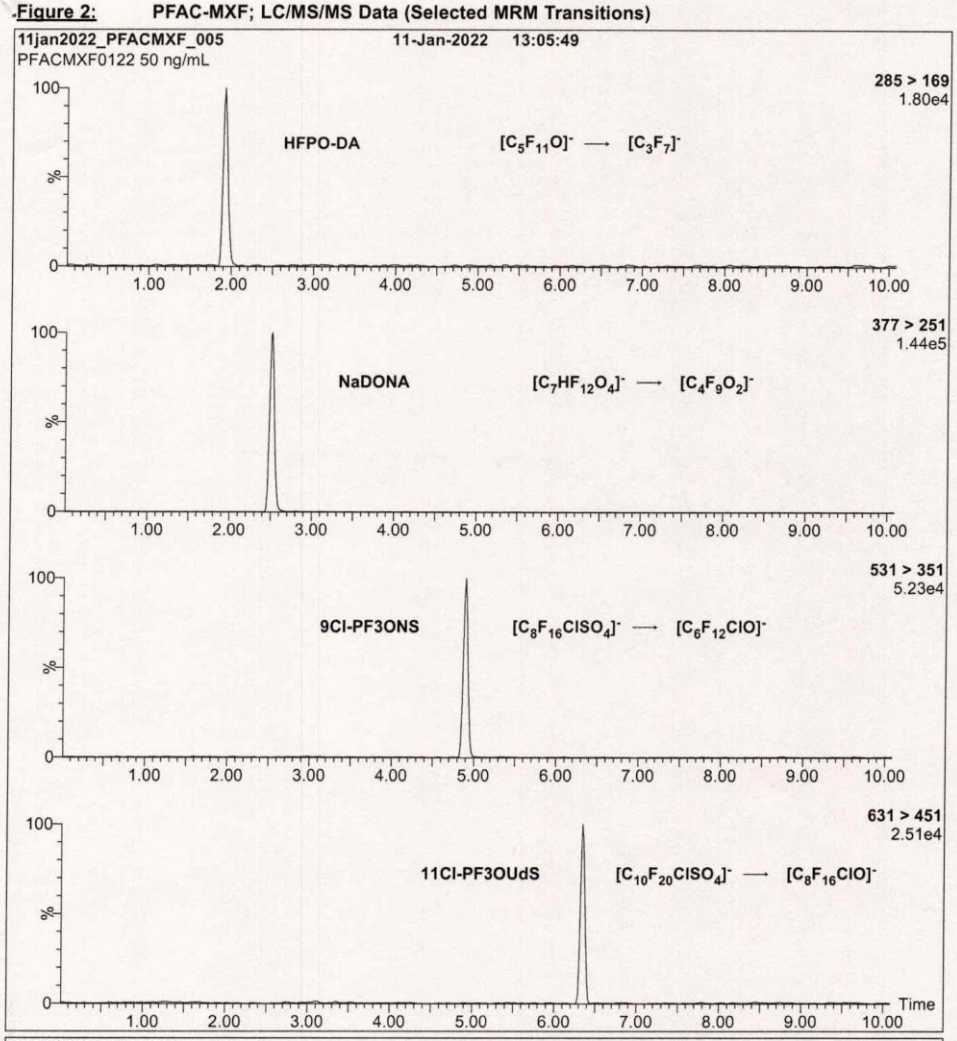
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 2: **PFAC-MXF; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXF)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (5 of 5)
rev0

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (2 of 5)
rev0

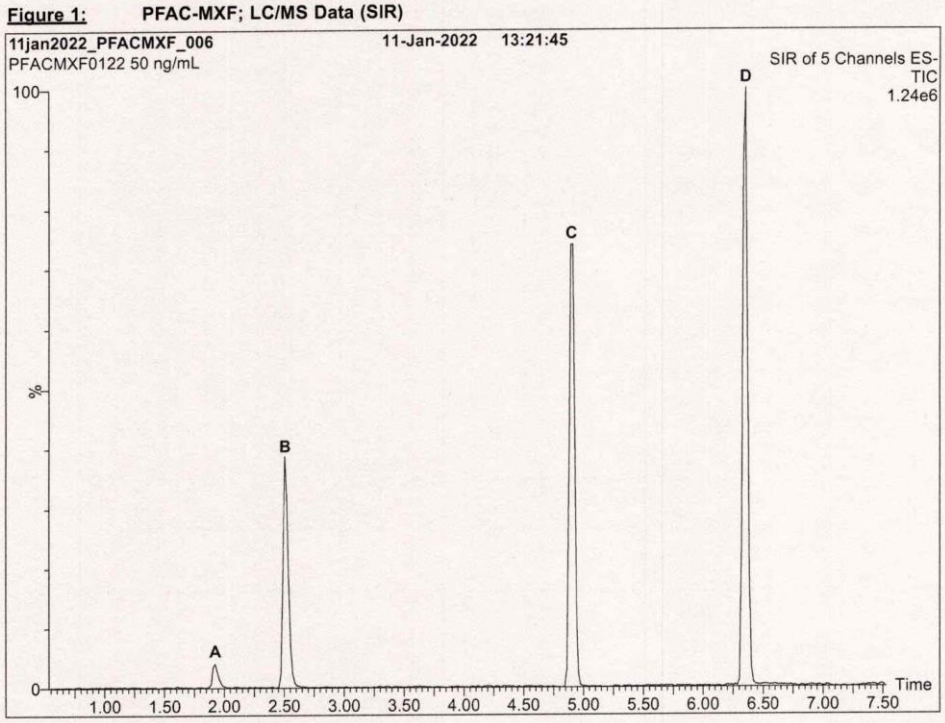
Table A: **PFAC-MXF; Components and Concentrations (ng/mL; ± 5% in Methanol/Water (<1%))**

Compound	Acronym	Concentration* (ng/ml)		Peak Assignment in Figure 1
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000		A
Compound	**Acronym**	**Concentration* (ng/mL)**		**Peak Assignment in Figure 1**
		as the salt	**as the acid**	
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	B
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1870	C
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1890	D

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 01/12/2022 (mm/dd/yyyy)
B.G. Chittim, General Manager

Figure 1: **PFAC-MXF; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% H_2O / 55% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min
before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (15-74)
Desolvation Temperature (°C) = 325
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (4 of 5)
rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B199**

Description:	PFAC-MXF-Native Repl.STOCK EPA 1633 PFAS	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**01/11/2025**
Solvent:	MeOH/H20	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXF0122
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
11CL-PF3OUdS	763051-92-9	1.89	ug/mL
9CL-PF3ONS	756426-58-1	1.87	ug/mL
ADONA	919005-14-4	1.89	ug/mL
HFPO-DA (Gen-X)	13252-13-6	2	ug/mL

Reviewed By Date

Page 1 of 1

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXF

Native Replacement PFAS Solution/Mixture

PRODUCT CODE:	PFAC-MXF
LOT NUMBER:	PFACMXF0122
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/10/2022
LAST TESTED: (mm/dd/yyyy)	01/11/2022
EXPIRY DATE: (mm/dd/yyyy)	01/11/2025
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXF is a solution/mixture of sodium dodecafluoro-3H-4,8-dioxanonanoate (NaDONA), the major and minor components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and GenX (HFPO-DA). The components and their concentrations are given in Table A.

The individual native components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

Table A: **PFAC-MXJ; Components and Concentrations (µg/mL; ± 5% in methanol)**

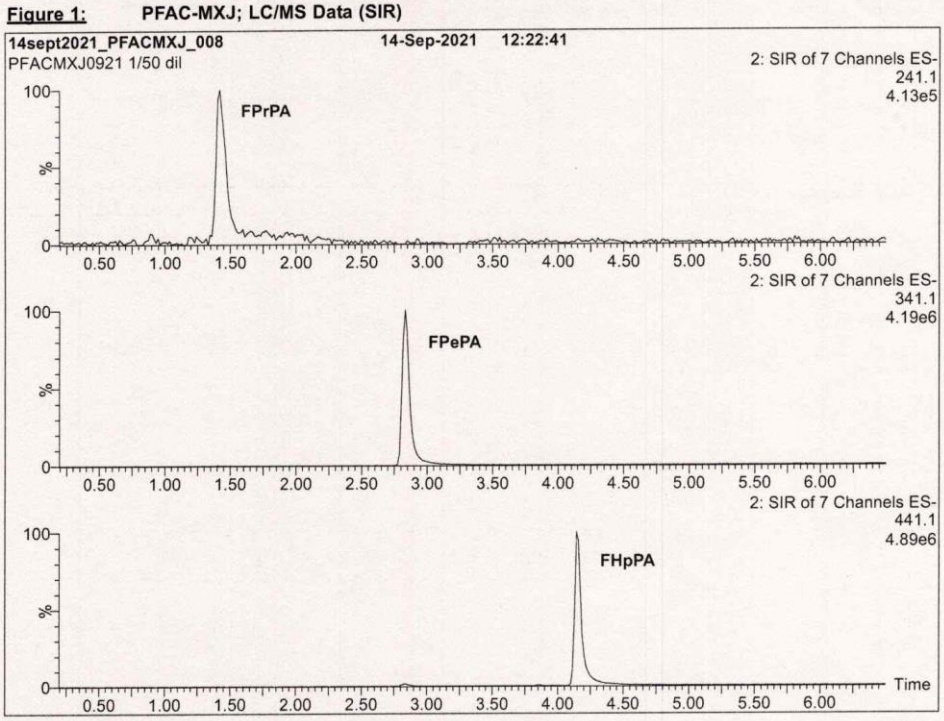
Compound	Acronym	Concentration (µg/mL)
3-Perfluoropropyl propanoic acid	FPrPA	4.00
3-Perfluoropentyl propanoic acid	FPePA	20.0
3-Perfluoroheptyl propanoic acid	FHpPA	20.0

Certified By: _____ **Date:** 10/02/2021
(mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXJ0921 (3 of 5)
rev1

Figure 1: **PFAC-MXJ; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

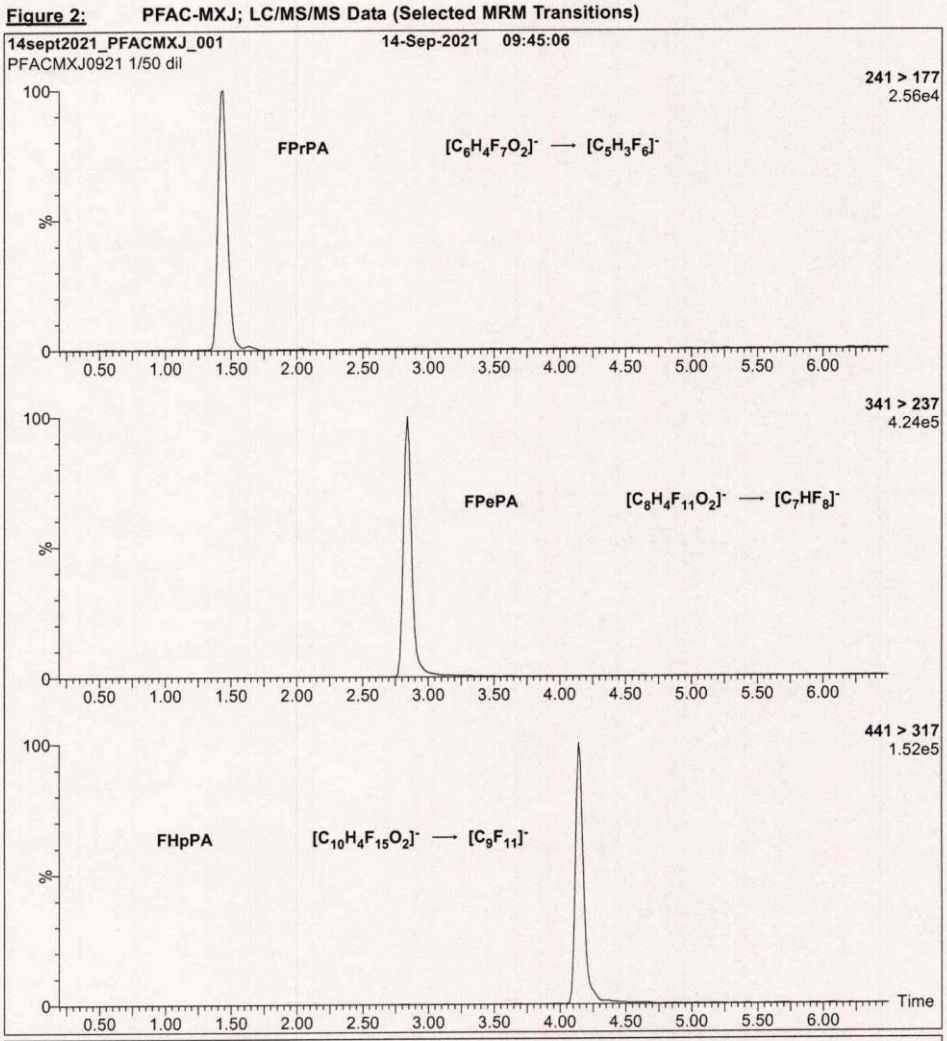
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXJ0921 (4 of 5)
rev1

Figure 2: **PFAC-MXJ; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXJ)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXJ0921 (5 of 5)
rev1

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B205**

Description:	PFAC-MXJ-EPA 1633 Stock mix	Prepared:	02/17/2022
Standard Type:	Other	Expires:	09/14/2026
Solvent:	Methanol	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXJ0921
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
3-Perfluoroheptyl propanoic acid (FHpPA	812-70-4	20	ug/mL
3-Perfluoropentyl propanoic acid (FPePA)	914637-49-3	20	ug/mL
3-Perfluoropropyl propanoic acid (FPrPA)	356-02-2	4	ug/mL

Reviewed By Date

Page 1 of 1

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXJ

Native X:3 Fluorotelomer Carboxylic Acid Solution/Mixture

PRODUCT CODE:	PFAC-MXJ
LOT NUMBER:	PFACMXJ0921
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	09/08/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

PFAC-MXJ is a solution/mixture of three native X:3 fluorotelomer carboxylic acids. The components and their concentrations are given in Table A.

The individual components have a chemical purity of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

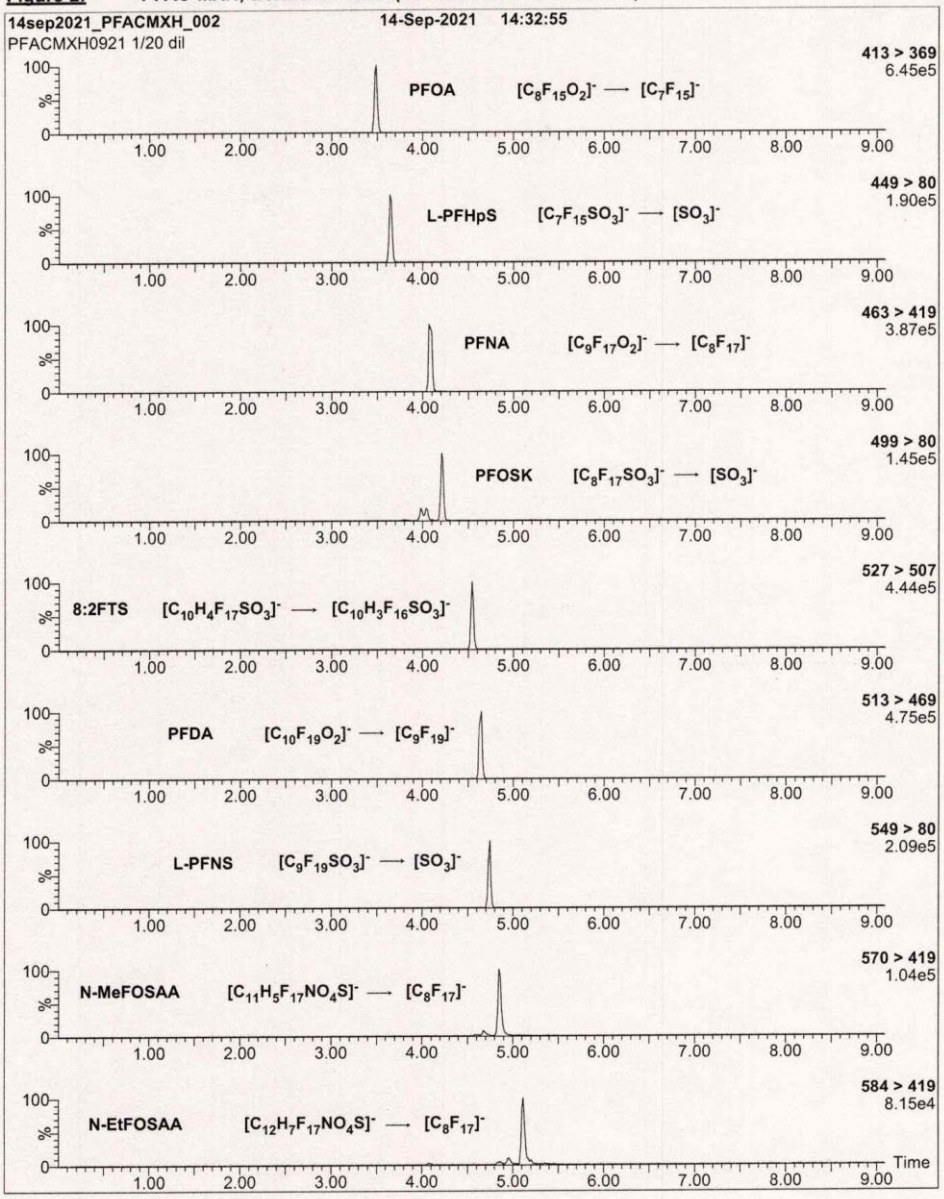
ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXJ0921 (2 of 5)
rev1

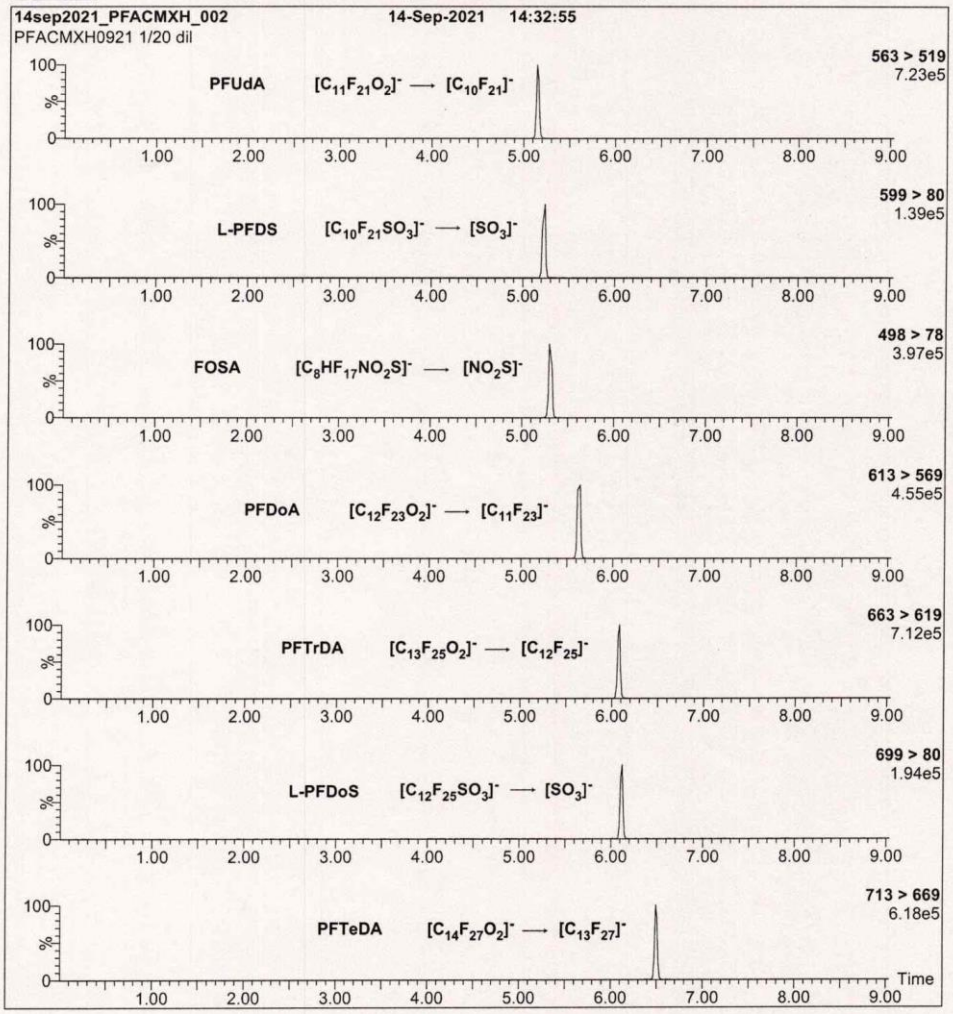
Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**



Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXH0921 (10 of 11)
rev0

Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXH)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

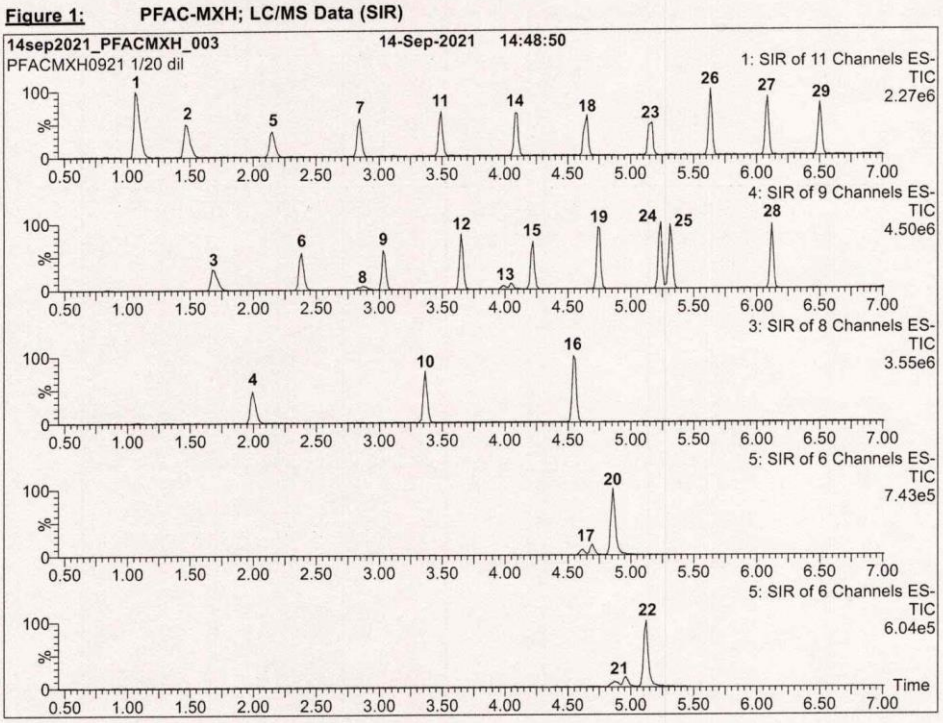
PFACMXH0921 (11 of 11)
rev0

Table E: **PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	1.2	21.1
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	0.6	
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	1.9	
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	2.2	
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	4.5	
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0	
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3C(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.2	
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2C(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.03	
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.4	
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.07	

* Percent of total perfluorooctanesulfonate isomers only.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Figure 1: **PFAC-MXH; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for 2 min
before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

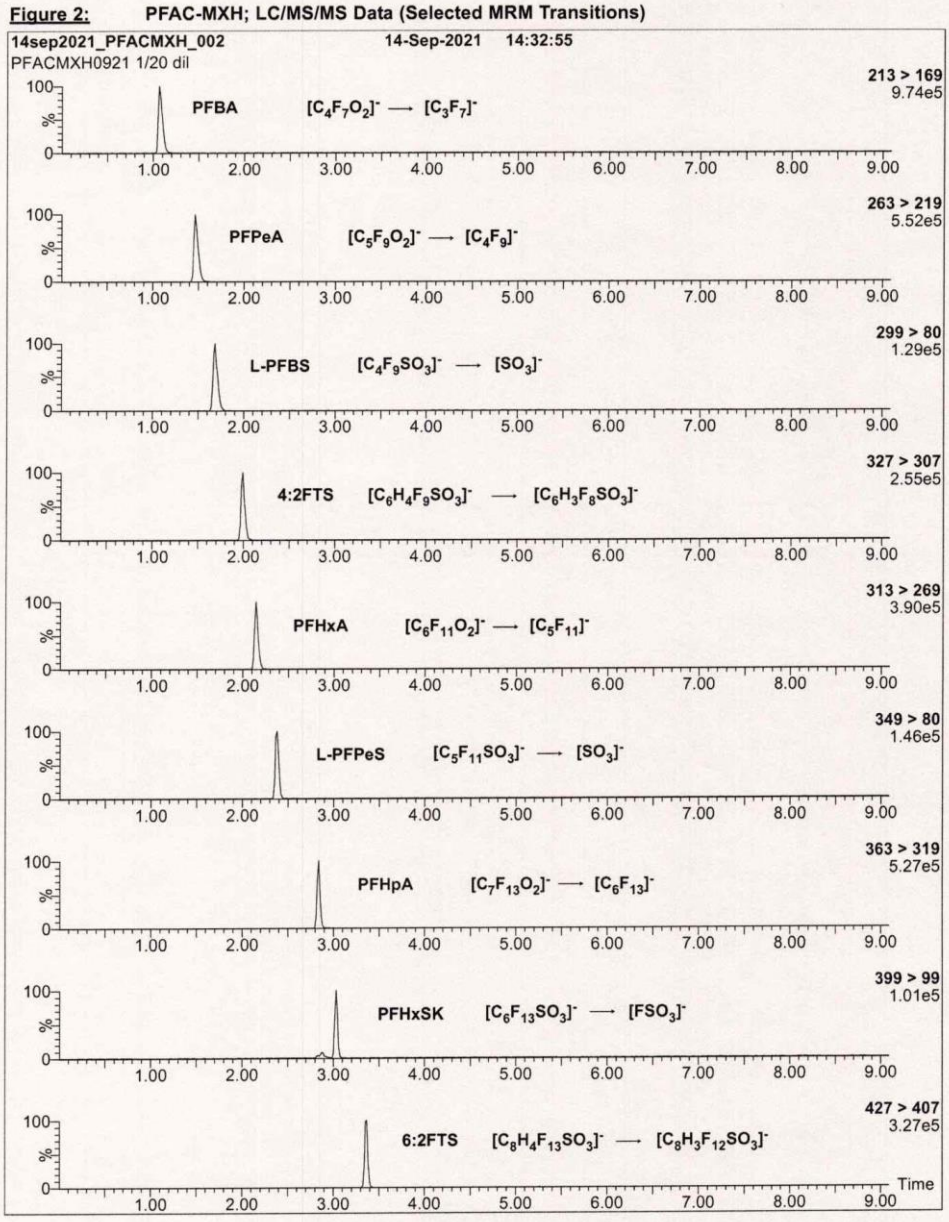
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXH0921 (8 of 11)
rev0

Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**



Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXH0921 (9 of 11)
rev0

Table B: **br-NMeFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	N-methylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2N(CH_3)CH_2CO_2H$	76.0	76.0
2	N-methylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_3)(CF_2)_2SO_2N(CH_3)CH_2CO_2H$	0.7	24.0
3	N-methylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_3)(CF_2)_3SO_2N(CH_3)CH_2CO_2H$	2.0	
4	N-methylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_3)(CF_2)_4SO_2N(CH_3)CH_2CO_2H$	6.0	
5	N-methylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_3)(CF_2)_5SO_2N(CH_3)CH_2CO_2H$	14.0	
6	N-methylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	$CF_3C(CF_3)_2(CF_2)_4SO_2N(CH_3)CH_2CO_2H$	0.2	
7	Other Unidentified Isomers		1.1	

* Percent of total N-methylperfluorooctanesulfonamidoacetic acid isomers only.

Table C: **br-NEtFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	N-ethylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2N(C_2H_5)CH_2CO_2H$	77.5	77.5
2	N-ethylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_3)(CF_2)_2SO_2N(C_2H_5)CH_2CO_2H$	2.3	22.5
3	N-ethylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_3)(CF_2)_3SO_2N(C_2H_5)CH_2CO_2H$	2.2	
4	N-ethylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_3)(CF_2)_4SO_2N(C_2H_5)CH_2CO_2H$	5.4	
5	N-ethylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_3)(CF_2)_5SO_2N(C_2H_5)CH_2CO_2H$	10.4	
6	N-ethylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	$CF_3C(CF_3)_2(CF_2)_4SO_2N(C_2H_5)CH_2CO_2H$	0.3	
7	N-ethylperfluoro-4,5-dimethylhexanesulfonamidoacetic acid	$CF_3CF(CF_3)CF(CF_2)_3SO_2N(C_2H_5)CH_2CO_2H$	0.3	
8	N-ethylperfluoro-3,5-dimethylhexanesulfonamidoacetic acid	$CF_3CF(CF_3)CF_2CF(CF_2)_2SO_2N(C_2H_5)CH_2CO_2H$	0.3	
9	Other Unidentified Isomers		1.3	

* Percent of total N-ethylperfluorooctanesulfonamidoacetic acid isomers only.

Table D: **PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	81.1	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	2.9	18.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	1.4	
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	5.0	
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	8.9	
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3C(CF_3)CF_2CF_2SO_3^-K^+$	0.2	
7	Other Unidentified Isomers		0.5	

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXH

Native Per- and Poly-fluoroalkyl Substance Solution/Mixture

PRODUCT CODE:	PFAC-MXH
LOT NUMBER:	PFACMXH0921
SOLVENT(S):	Methanol / Isopropanol (2%) / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	09/09/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXH is a solution/mixture of eleven native linear perfluoroalkylcarboxylic acids (C_4-C_{14}), eight native perfluoroalkanesulfonates (C_4, C_5, C_7, C_9, C_{10} and C_{12} linear; C_6 and C_8 linear and branched), three native fluorotelomer sulfonates (4:2, 6:2, and 8:2), two native linear and branched perfluorooctanesulfonamidoacetic acids, and perfluoro-1-octanesulfonamide (FOSA). The components and their concentrations are given in Table A.

The individual components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Table B: Isomeric Components and Percent Composition of br-NMeFOSAA
Table C: Isomeric Components and Percent Composition of br-NEtFOSAA
Table D: Isomeric Components and Percent Composition of PFHxSK
Table E: Isomeric Components and Percent Composition of PFOSK
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Table A: **PFAC-MXH; Components and Concentrations (µg/mL, ± 5% in methanol / isopropanol (2%) / water (<1%))**

Compound	Acronym	Concentration* (µg/mL)	Peak Assignment in Figure 1
Perfluoro-n-butanoic acid	PFBA	4.00	1
Perfluoro-n-pentanoic acid	PFPeA	2.00	2
Perfluoro-n-hexanoic acid	PFHxA	1.00	5
Perfluoro-n-heptanoic acid	PFHpA	1.00	7
Perfluoro-n-octanoic acid	PFOA	1.00	11
Perfluoro-n-nonanoic acid	PFNA	1.00	14
Perfluoro-n-decanoic acid	PFDA	1.00	18
Perfluoro-n-undecanoic acid	PFUdA	1.00	23
Perfluoro-n-dodecanoic acid	PFDoA	1.00	26
Perfluoro-n-tridecanoic acid	PFTrDA	1.00	27
Perfluoro-n-tetradecanoic acid	PFTeDA	1.00	29
Perfluoro-1-octanesulfonamide	FOSA	1.00	25
N-methylperfluorooctanesulfonamidoacetic acid [a]	N-MeFOSAA: linear isomer	0.760	20
	N-MeFOSAA: ∑ branched isomers	0.240	17
N-ethylperfluorooctanesulfonamidoacetic acid [b]	N-EtFOSAA: linear isomer	0.775	22
	N-EtFOSAA: ∑ branched isomers	0.225	21

Compound	Acronym	Concentration* (µg/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Potassium perfluoro-1-butanesulfonate	L-PFBS	1.00	0.887	3
Sodium perfluoro-1-pentanesulfonate	L-PFPeS	1.00	0.941	6
Potassium perfluorohexanesulfonate [c]	PFHxSK: linear isomer	0.811	0.741	9
	PFHxSK: ∑ branched isomers	0.189	0.173	8
Sodium perfluoro-1-heptanesulfonate	L-PFHpS	1.00	0.953	12
Potassium perfluorooctanesulfonate [d]	PFOSK: linear isomer	0.788	0.732	15
	PFOSK: ∑ branched isomers	0.211	0.196	13
Sodium perfluoro-1-nonanesulfonate	L-PFNS	1.00	0.962	19
Sodium perfluoro-1-decanesulfonate	L-PFDS	1.00	0.965	24
Sodium perfluoro-1-dodecanesulfonate	L-PFDoS	1.00	0.970	28
Sodium 1H,1H,2H,2H-perfluorohexanesulfonate	4:2FTS	4.00	3.75	4
Sodium 1H,1H,2H,2H-perfluorooctanesulfonate	6:2FTS	4.00	3.80	10
Sodium 1H,1H,2H,2H-perfluorodecanesulfonate	8:2FTS	4.00	3.84	16

[a] See Table B for percent composition of linear and branched N-MeFOSAA isomers.
[b] See Table C for percent composition of linear and branched N-EtFOSAA isomers.
[c] See Table D for percent composition of linear and branched PFHxSK isomers.
[d] See Table E for percent composition of linear and branched PFOSK isomers.

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 09/23/2021 (mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXH0921 (3 of 11)
rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B201**

Description:	PFAC-MXH STOCK PFAS EPA 1633	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**09/14/2026**
Solvent:	MeOH/IPA/H2O	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXH0921
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
1H,1H,2H,2H-Perfluorodecanesulfonic acid	39108-34-4	3.84	ug/mL
1H,1H,2H,2H-Perfluorohexanesulfonic acid	757124-72-4	3.75	ug/mL
1H,1H,2H,2H-Perfluorooctanesulfonic acid	27619-97-2	3.8	ug/mL
N-EtFOSAA	2991-50-6	1	ug/mL
N-MeFOSAA	2355-31-9	1	ug/mL
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	0.965	ug/mL
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	0.953	ug/mL
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	0.962	ug/mL
Perfluoro-1-octanesulfonamide (FOSA)	754-91-6	1	ug/mL
Perfluoro-1-pentanesulfonate (PFPeS)	2706-91-4	0.941	ug/mL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	0.887	ug/mL
Perfluorodecanesulfonic acid(PFDS)	335-77-3	0.965	ug/mL
Perfluorodecanoic acid (PFDA)	335-76-2	1	ug/mL
Perfluorododecanoic acid (PFDoA)	307-55-1	1	ug/mL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	ug/mL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.914	ug/mL
Perfluorohexanoic acid (PFHxA)	307-24-4	1	ug/mL
Perfluoro-n-butanoic acid (PFBA)	375-22-4	4	ug/mL
Perfluorononanoic acid (PFNA)	375-95-1	1	ug/mL
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.928	ug/mL
Perfluorooctanoic acid (PFOA)	335-67-1	1	ug/mL
Perfluoropentanoic acid (PFPeA)	2706-90-3	1	ug/mL
Perfluorotetradecanoic acid (PFTA)	376-06-7	1	ug/mL
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	ug/mL
Perfluoroundecanoic acid (PFUnA)	2058-94-8	1	ug/mL

Reviewed By Date

Page 1 of 1

Attachment 4 – Calibration Concentrations, nominal

Calibration Solutions (ng/mL) Compound CS1 (LOQ) CS2 Perfluoroalkyl carboxylic			CS3	CS4 (CV[1])	CS5	CS6	CS7[2]
acids							
PFBA	0.8	2	5	10	20	50	250
PFPeA	0.4	1	2.5	5	10	25	125
PFHxA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFUnA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTrDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTeDA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluoroalkyl sulfonic acids							
PFBS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFPeS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHxS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoS	0.2	0.5	1.25	2.5	5	12.5	62.5
Fluorotelomer sulfonic acids							
4:2FTS	0.8	2	5	10	20	50	NA
6:2FTS	0.8	2	5	10	20	50	NA
8:2FTS	0.8	2	5	10	20	50	NA
Perfluorooctane sulfonamides							
PFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NMeFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamidoacetic acids							
NMeFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamide ethanols							
NMeFOSE	2	5	12.5	25	50	125	625
NEtFOSE	2	5	12.5	25	50	125	625
Per- and polyfluoroether carboxylic acids							
HFPO-DA	0.8	2	5	10	20	50	250
ADONA	0.8	2	5	10	20	50	250
PFMPA	0.4	1	2.5	5	10	25	125
PFMBA	0.4	1	2.5	5	10	25	125
NFDHA	0.4	1	2.5	5	10	25	125
Ether sulfonic acids							
9Cl-PF3ONS	0.8	2	5	10	20	50	250
11Cl-PF3OUdS	0.8	2	5	10	20	50	250
PFEESA	0.4	1	2.5	5	10	25	125

Calibration Solutions (ng/mL) Compound							
CS1 (LOQ)	**CS2 Fluorotelomer carboxylic**		**CS3**	**CS4 (CV[1])**	**CS5**	**CS6**	**CS7[2]**
acids							
3:3FTCA	1.0	2.5	6.26	12.5	25	62.4	312
5:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
7:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
Extracted Internal Standard (EIS) Analytes							
$^{13}C_4$-PFBA	10	10	10	10	10	10	10
$^{13}C_5$-PFPeA	5	5	5	5	5	5	5
$^{13}C_5$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFHpA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_9$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_6$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_7$-PFUnA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDoA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFTeDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_3$-PFBS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_3$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_2$-4:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-6:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-8:2FTS	5	5	5	5	5	5	5
$^{13}C_8$-PFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_5-NEtFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSAA	5	5	5	5	5	5	5
D_5-NEtFOSAA	5	5	5	5	5	5	5
D_7-NMeFOSE	25	25	25	25	25	25	25
D_9-NEtFOSE	25	25	25	25	25	25	25
$^{13}C_3$-HFPO-DA	10	10	10	10	10	10	10
Non-extracted Internal Standard (NIS) Analytes							
$^{13}C_3$-PFBA	5	5	5	5	5	5	5
$^{13}C_2$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_5$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{18}O_2$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5

[1] This calibration point is used as the calibration verification (CV)

[2] A minimum of six contiguous calibrations standards are required for linear models and a minimum of seven calibration standards are required for second-order models.

Attachment 5 -HPLC Method Parameters

HPLC Acquisition Method Report

Stroke A
- **Automatic Stroke Calculation A**: Yes

Compress A
- **Compressibility Mode A**: Compressibility Value Set
- **Compressibility A**: 70 10e-6/bar

Compress B
- **Compressibility Mode B**: Compressibility Value Set
- **Compressibility B**: 90 10e-6/bar

Stop Time
- **Stoptime Mode**: Time set
- **Stoptime**: 10.00 min

Post Time
- **Posttime Mode**: Time set
- **Posttime**: 1.50 min

Injection
- Injection with needle wash
- 3.00 µL

Solvent Composition

	Channel	Name 1	Name 2	Selected	Used	Percent
1	A	Water 5mM ammonium acetate		Ch. 1	Yes	90.00 %
2	B	Methanol		Ch. 1	Yes	10.00 %

Timetable

	Time	A	B	Flow
1	3.50 min	50.00 %	50.00 %	0.400 mL/min
2	8.00 min	10.00 %	90.00 %	0.400 mL/min
3	8.50 min	90.00 %	10.00 %	0.400 mL/min

Name: **Column Comp.** Module: **G1316C**

Left Temperature Control
- **Temperature Control Mode**: Temperature Set
- **Temperature**: 50.0 °C

Enable Analysis Left Temperature
- **Enable Analysis Left Temperature On**: Yes
- **Enable Analysis Left Temperature Value**: 0.8 °C

Right Temperature Control
- **Right temperature Control Mode**: Temperature Set
- **Right temperature**: 50.0 °C

Enable Analysis Right Temperature
- **Enable Analysis Right Temperature On**: Yes
- **Enable Analysis Right Temperature Value**: 0.8 °C

Stop Time
- **Stoptime Mode**: As pump/injector

Post Time
- **Posttime Mode**: Off

Timetable

Valve Position: Position 1 (Port 1 -> 2)

Ready when front door open: Yes

Attachment 6 - Triple Quadrupole Acquisition Method

Acquisition Method Report

Agilent Technologies

Acquisition Method Info

Method Name PFAS1633_ACQ_092922.m

Method Path D:\MassHunter\methods\PFAS1633_ACQ_092922.m

Method Description EPA 1633_Target PFAS Isotope Dilution_Acquisition

Device List

HiP Sampler
Binary Pump
Column Comp.
QQQ

MS QQQ Mass Spectrometer

Ion Source	AJS ESI	**Tune File**	D:\MassHunter\Tune\QQQ\G6460C\atunes.TUNE.XML
Stop Mode	No Limit/As Pump	**Stop Time (min)**	1
Time Filter	On	**Time Filter Width (min)**	0.07
LC->Waste Pre Row	N/A	**LC->Waste Post Row**	N/A

Time Segments

Index	Start Time (min)	Scan Type	Ion Mode	Div Valve	Delta EMV	Store	Cycle Time (ms)	Triggered?	MRM Repeats
1	0	DynamicMRM	ESI+Agilent Jet Stream	To MS	350	Yes	550	Yes	3

Time Segment 1

Scan Segments

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
11-Cl-PF3OUdS	No	631	Unit/Enh (6490)	451	Unit/Enh (6490)	Yes	No	170	33	4	7.62	3	Negative
1H,1H,2H,2H-perfluoro-1-decanesulfonate (8 2F TS)	No	527	Unit/Enh (6490)	507	Unit/Enh (6490)	Yes	No	170	28	4	7.14	3	Negative
1H,1H,2H,2H-perfluoro-1-decanesulfonate (8 2F TS)	No	527	Unit/Enh (6490)	80.9	Unit/Enh (6490)	Yes	No	170	40	4	7.14	3	Negative
1H,1H,2H,2H-perfluoro-1-hexanesulfonate (4 2F TS)	No	327	Unit/Enh (6490)	307	Unit/Enh (6490)	Yes	No	162	20	4	4.788	3	Negative
1H,1H,2H,2H-perfluoro-1-hexanesulfonate (4 2F TS)	No	327	Unit/Enh (6490)	80.9	Unit/Enh (6490)	Yes	No	162	36	4	4.788	3	Negative
1H,1H,2H,2H-perfluoro-1-octanesulfonate (6 2F TS)	No	427	Unit/Enh (6490)	407	Unit/Enh (6490)	Yes	No	162	24	4	6.168	3	Negative
1H,1H,2H,2H-perfluoro-1-octanesulfonate (6 2F TS)	No	427	Unit/Enh (6490)	79.7	Unit/Enh (6490)	Yes	No	162	48	4	6.168	3	Negative
3:3FTCA	No	241	Unit/Enh (6490)	177	Unit/Enh (6490)	Yes	No	74	4	4	3.4	3	Negative
3-3FTCA	No	241	Unit/Enh (6490)	117	Unit/Enh (6490)	Yes	No	74	44	4	3.4	3	Negative

Report generation date: 18-Oct-2022 09:01:43 AM

Page 1 of 8

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
5-3FTCA	No	341	Unit/Enh (6490)	237	Unit/Enh (6490)	Yes	No	84	12	4	5.73	3	Negative
5-3FTCA	No	341	Unit/Enh (6490)	217	Unit/Enh (6490)	Yes	No	84	24	4	5.73	3	Negative
7-3FTCA	No	441	Unit/Enh (6490)	337	Unit/Enh (6490)	Yes	No	76	12	4	6.7	3	Negative
7-3FTCA	No	441	Unit/Enh (6490)	317	Unit/Enh (6490)	Yes	No	76	24	4	6.7	3	Negative
9-Cl-PF3ONS	No	531	Unit/Enh (6490)	351	Unit/Enh (6490)	Yes	No	175	29	4	6.89	3	Negative
ADONA	No	377	Unit/Enh (6490)	251	Unit/Enh (6490)	Yes	No	103	9	4	5.62	3	Negative
ADONA	No	377	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	103	37	4	5.62	3	Negative
d3-NMeFOSA	No	515	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	134	20	4	7.17	3	Negative
d3-N-MeFOSAA	No	572.99	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.17	3	Negative
d5-NEtFOSA	No	531	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	150	20	4	8.52	3	Negative
d5-NEtFOSA	No	531	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	150	20	4	8.52	3	Negative
d5-N-EtFOSAA	No	589.02	Unit/Enh (6490)	530.9	Unit/Enh (6490)	Yes	No	130	20	4	7.36	3	Negative
d5-N-EtFOSAA	No	589.02	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.36	3	Negative
d7-NMeFOSE	No	623	Unit/Enh (6490)	310	Unit/Enh (6490)	Yes	No	150	15	4	8.28	3	Negative
d7-NMeFOSE	No	623	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	88	15	4	8.28	3	Negative
d9-NEtFOSE	No	639	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	150	15	4	8.6	3	Negative
HFPO-DA	No	285	Unit/Enh (6490)	169.1	Unit/Enh (6490)	Yes	No	100	20	4	4.95	3	Negative
M2-4-2FTS	No	329	Unit/Enh (6490)	309	Unit/Enh (6490)	Yes	No	156	20	4	4.787	3	Negative
M2-4-2FTS	No	329	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	156	28	4	4.787	3	Negative
M2-6-2FTS	No	429	Unit/Enh (6490)	409	Unit/Enh (6490)	Yes	No	162	24	4	6.01	3	Negative
M2-6-2FTS	No	429	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	162	40	4	6.01	3	Negative
M2-8-2FTS	No	529	Unit/Enh (6490)	509	Unit/Enh (6490)	Yes	No	165	28	4	6.98	3	Negative
M2-8-2FTS	No	529	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	165	40	4	6.98	3	Negative
M2PFTeDA	No	715	Unit/Enh (6490)	670	Unit/Enh (6490)	Yes	No	62	12	4	8.25	3	Negative
M3-HFPO-DA	No	287	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	90	5	4	4.99	3	Negative
M3PFBA	Yes	216	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	90	5	4	1.2	2	Negative
M3PFBS	No	302	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	114	32	4	3.94	3	Negative
M3PFBS	No	302	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	114	40	4	3.94	3	Negative
M3PFHxS	No	402	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	165	40	4	5.55	3	Negative
M3PFHxS	No	402	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	165	48	4	5.55	3	Negative
M4PFHpA	No	367	Unit/Enh (6490)	322	Unit/Enh (6490)	Yes	No	124	8	4	5.601	3	Negative
M5PFHxA	No	318	Unit/Enh (6490)	273	Unit/Enh (6490)	Yes	No	70	4	4	5.47	3	Negative
M5PFHxA	No	318	Unit/Enh (6490)	120	Unit/Enh (6490)	Yes	No	70	4	4	5.47	3	Negative
M6PFDA	No	519	Unit/Enh (6490)	473.9	Unit/Enh (6490)	Yes	No	59	8	4	6.99	3	Negative
M7PFUdA	No	570	Unit/Enh (6490)	525	Unit/Enh (6490)	Yes	No	64	8	4	7.38	3	Negative
MPFDA	Yes	514.98	Unit/Enh (6490)	469.8	Unit/Enh (6490)	Yes	No	94	5	4	6.972	2	Negative
MPFHxA	Yes	314.99	Unit/Enh (6490)	269.8	Unit/Enh (6490)	Yes	No	86	4	4	4.705	2	Negative
MPFHxA	Yes	314.99	Unit/Enh (6490)	120	Unit/Enh (6490)	Yes	No	86	4	4	4.705	2	Negative
MPFHxS	Yes	403	Unit/Enh (6490)	103	Unit/Enh (6490)	Yes	No	110	37	4	5.63	2	Negative
MPFHxS	Yes	403	Unit/Enh (6490)	84	Unit/Enh (6490)	Yes	No	110	40	4	5.63	2	Negative
MPFNA	Yes	468	Unit/Enh (6490)	423	Unit/Enh (6490)	Yes	No	66	4	4	6.541	2	Negative
MPFOA	Yes	417	Unit/Enh (6490)	372	Unit/Enh (6490)	Yes	No	84	4	4	6.03	2	Negative
MPFOS	Yes	502.96	Unit/Enh (6490)	99	Unit/Enh (6490)	Yes	No	148	48	4	6.57	3	Negative

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
MPFOS	Yes	502.96	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	148	54	4	6.57	3	Negative
NEtFOSA	No	526	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	120	20	4	8.528	3	Negative
NEtFOSA	No	526	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	120	20	4	8.528	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	525.9	Unit/Enh (6490)	Yes	No	130	20	4	7.521	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.521	3	Negative
NEtFOSE	No	630	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	120	20	4	8.301	3	Negative
NFDHA	No	295	Unit/Enh (6490)	201.1	Unit/Enh (6490)	Yes	No	92	2	4	4.641	3	Negative
NFDHA	No	295	Unit/Enh (6490)	84.9	Unit/Enh (6490)	Yes	No	92	34	4	4.641	3	Negative
NMeFOSA	No	512	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	120	20	4	8.298	3	Negative
NMeFOSA	No	512	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	120	20	4	8.298	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	511.9	Unit/Enh (6490)	Yes	No	150	20	4	7.335	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	418.9	Unit/Enh (6490)	Yes	No	150	20	4	7.335	3	Negative
NMeFOSE	No	616	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	120	20	4	8.301	3	Negative
Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)	No	506	Unit/Enh (6490)	78	Unit/Enh (6490)	Yes	No	162	48	4	7.59	3	Negative
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)	No	507	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	174	48	4	6.59	3	Negative
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)	No	507	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	174	54	4	6.59	3	Negative
Perfluoro-1-decanesulfonate (L-PFDS)	No	598.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	156	50	4	7.546	3	Negative
Perfluoro-1-decanesulfonate (L-PFDS)	No	598.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	100	60	4	7.546	3	Negative
Perfluoro-1-heptanesulfonate (L-PFHpS)	No	448.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	162	48	4	6.252	3	Negative
Perfluoro-1-heptanesulfonate (L-PFHpS)	No	448.9	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	162	48	4	6.252	3	Negative
Perfluoro-1-octanesulfonamide (FOSA)	No	497.9	Unit/Enh (6490)	478	Unit/Enh (6490)	Yes	No	156	100	4	7.651	3	Negative
Perfluoro-1-octanesulfonamide (FOSA)	No	497.9	Unit/Enh (6490)	78	Unit/Enh (6490)	Yes	No	156	40	4	7.651	3	Negative
Perfluoro-1-pentanesulfonate (L-PFPeS)	No	348.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	36	4	5.042	3	Negative
Perfluoro-1-pentanesulfonate (L-PFPeS)	No	348.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	40	4	5.042	3	Negative

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
Perfluorobutanesulfonic acid (PFBS)	No	298.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	32	4	4.042	3	Negative
Perfluorobutanesulfonic acid (PFBS)	No	298.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	36	4	4.042	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	468.8	Unit/Enh (6490)	Yes	No	90	8	4	7.158	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	268.8	Unit/Enh (6490)	Yes	No	90	16	4	7.158	3	Negative
Perfluorododecanesulfonic acid (PFDoS)	No	699	Unit/Enh (6490)	99	Unit/Enh (6490)	Yes	No	100	60	4	7.984	3	Negative
Perfluorododecanesulfonic acid (PFDoS)	No	699	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	156	50	4	7.984	3	Negative
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	568.8	Unit/Enh (6490)	Yes	No	90	12	4	7.876	3	Negative
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	168.7	Unit/Enh (6490)	Yes	No	90	28	4	7.876	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	318.8	Unit/Enh (6490)	Yes	No	90	8	4	5.601	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	168.9	Unit/Enh (6490)	Yes	No	90	16	4	5.601	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	40	4	5.685	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	44	4	5.685	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	268.9	Unit/Enh (6490)	Yes	No	70	4	4	4.856	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	119	Unit/Enh (6490)	Yes	No	70	20	4	4.856	3	Negative
Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)	No	615	Unit/Enh (6490)	570	Unit/Enh (6490)	Yes	No	53	8	4	7.71	3	Negative
Perfluoro-n-[13C4]butanoic acid (MPFBA)	No	217	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	59	4	4	1.22	3	Negative
Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)	No	268	Unit/Enh (6490)	223	Unit/Enh (6490)	Yes	No	62	4	4	3.44	3	Negative
Perfluoro-n-[13C8]octanoic acid (M8PFOA)	No	421	Unit/Enh (6490)	376	Unit/Enh (6490)	Yes	No	59	4	4	6.05	3	Negative
Perfluoro-n-[13C8]octanoic acid (M8PFOA)	No	421	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	59	16	4	6.05	3	Negative

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)	No	472	Unit/Enh (6490)	427	Unit/Enh (6490)	Yes	No	59	8	4	6.56	3	Negative
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)	No	472	Unit/Enh (6490)	223	Unit/Enh (6490)	Yes	No	59	16	4	6.56	3	Negative
Perfluoro-n-butanoic acid (PFBA)	No	213	Unit/Enh (6490)	169.9	Unit/Enh (6490)	Yes	No	70	4	4	1.246	3	Negative
Perfluorononanesulfonate (L-PFNS)	No	548.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	159	48	4	7.174	3	Negative
Perfluorononanesulfonate (L-PFNS)	No	548.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	159	48	4	7.174	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	90	8	4	6.718	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	218.8	Unit/Enh (6490)	Yes	No	90	16	4	6.718	3	Negative
Perfluoro-n-pentanoic acid (PFPeA)	No	263	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	62	4	4	3.526	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	44	4	6.743	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	84	4	6.743	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	368.8	Unit/Enh (6490)	Yes	No	90	8	4	6.202	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	168.9	Unit/Enh (6490)	Yes	No	90	16	4	6.202	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	669	Unit/Enh (6490)	Yes	No	110	12	4	8.414	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	168.8	Unit/Enh (6490)	Yes	No	110	28	4	8.414	3	Negative
Perfluorotridecanoic acid (PFTrDA)	No	663	Unit/Enh (6490)	618.8	Unit/Enh (6490)	Yes	No	90	12	4	8.164	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	519	Unit/Enh (6490)	Yes	No	90	8	4	7.538	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	90	24	4	7.538	3	Negative
PFEESA	No	315	Unit/Enh (6490)	135	Unit/Enh (6490)	Yes	No	112	26	4	4.464	3	Negative
PFEESA	No	315	Unit/Enh (6490)	83	Unit/Enh (6490)	Yes	No	112	14	4	4.464	3	Negative
PFMBA	No	279	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	75	18	4	4.011	3	Negative
PFMPA	No	229	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	59	6	4	2.15	3	Negative

Scan Parameters

Data Stg	Threshold
Centroid	0

Acquisition Method Report

Agilent Technologies

Source Parameters

Parameter	Value (+)	Value (-)
Gas Temp (°C)	230	230
Gas Flow (l/min)	5	5
Nebulizer (psi)	15	15
SheathGasHeater	350	350
SheathGasFlow	12	12
Capillary (V)	3500	2500
VCharging	500	0

Chromatograms

Chrom Type	Label	Offset	Y-Range
TIC	TIC	0	10000000

Instrument Curves

Actual

Name: HiP Sampler **Module: G4226A**

Auxiliary	
Draw Speed	100.0 µL/min
Eject Speed	400.0 µL/min
Draw Position Offset	1.5 mm
Wait Time After Drawing	1.2 s
Sample Flush Out Factor	5.0
Vial/Well bottom sensing	Yes
Injection	
Injection Mode	Injection with needle wash
Injection Volume	3.00 µL
Needle Wash	
Needle Wash Location	Flush Port
Wash Time	10.0 s
High throughput	
Automatic Delay Volume Reduction	No
Overlapped Injection	
Enable Overlapped Injection	No
Valve Switching	
Valve Movements	0
Valve Switch Time 1	
Switch Time 1 Enabled	No
Valve Switch Time 2	
Switch Time 2 Enabled	No
Valve Switch Time 3	
Switch Time 3 Enabled	No
Valve Switch Time 4	
Switch Time 4 Enabled	No
Stop Time	
Stoptime Mode	As pump/No limit
Post Time	
Posttime Mode	Off

Name: Binary Pump **Module: G4220A**

Flow	0.400 mL/min
Use Solvent Types	No
Stroke Mode	Synchronized
Low Pressure Limit	0.00 bar
High Pressure Limit	600.00 bar
Max. Flow Ramp Up	100.000 mL/min²
Max. Flow Ramp Down	100.000 mL/min²
Expected Mixer	No check

Report generation date: 18-Oct-2022 09:01:44 AM Page 6 of 8

ATTACHMENT F

ELAP Certifications

LANGAN

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Fuel Additives

Methyl tert-butyl ether	EPA 524.2
Naphthalene	EPA 524.2

Metals I

Arsenic, Total	EPA 200.8 Rev. 5.4
Barium, Total	EPA 200.7 Rev. 4.4
Cadmium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Chromium, Total	EPA 200.7 Rev. 4.4
Copper, Total	EPA 200.7 Rev. 4.4
Iron, Total	EPA 200.7 Rev. 4.4
Lead, Total	EPA 200.8 Rev. 5.4
Manganese, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Mercury, Total	EPA 245.1 Rev. 3.0
Selenium, Total	EPA 200.8 Rev. 5.4
Silver, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Zinc, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals II

Aluminum, Total	EPA 200.7 Rev. 4.4
Antimony, Total	EPA 200.8 Rev. 5.4
Beryllium, Total	EPA 200.7 Rev. 4.4
Molybdenum, Total	EPA 200.8 Rev. 5.4
Nickel, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Serial No.: 68592

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Metals II

Thallium, Total	EPA 200.8 Rev. 5.4
Vanadium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals III

Calcium, Total	EPA 200.7 Rev. 4.4
Magnesium, Total	EPA 200.7 Rev. 4.4
Potassium, Total	EPA 200.7 Rev. 4.4
Sodium, Total	EPA 200.7 Rev. 4.4

Miscellaneous

1,4-Dioxane	EPA 522
Turbidity	EPA 180.1 Rev. 2.0

Non-Metals

Alkalinity	SM 21-23 2320B (-97)
Calcium Hardness	EPA 200.7 Rev. 4.4
Chloride	EPA 300.0 Rev. 2.1
Color	SM 21-23 2120B (-01)
Fluoride, Total	EPA 300.0 Rev. 2.1
Orthophosphate (as P)	SM 19, 21-23 4500-P E (-99)
Solids, Total Dissolved	SM 21-23 2540C (-97)
Specific Conductance	EPA 120.1 Rev. 1982
Sulfate (as SO4)	EPA 300.0 Rev. 2.1

Volatile Aromatics

1,2,3-Trichlorobenzene	EPA 524.2
1,2,4-Trichlorobenzene	EPA 524.2
1,2,4-Trimethylbenzene	EPA 524.2
1,2-Dichlorobenzene	EPA 524.2

Serial No.: 68592

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Volatile Aromatics

1,3,5-Trimethylbenzene	EPA 524.2
1,3-Dichlorobenzene	EPA 524.2
1,4-Dichlorobenzene	EPA 524.2
2-Chlorotoluene	EPA 524.2
4-Chlorotoluene	EPA 524.2
Benzene	EPA 524.2
Bromobenzene	EPA 524.2
Chlorobenzene	EPA 524.2
Ethyl benzene	EPA 524.2
Hexachlorobutadiene	EPA 524.2
Isopropylbenzene	EPA 524.2
n-Butylbenzene	EPA 524.2
n-Propylbenzene	EPA 524.2
p-Isopropyltoluene (P-Cymene)	EPA 524.2
sec-Butylbenzene	EPA 524.2
Styrene	EPA 524.2
tert-Butylbenzene	EPA 524.2
Toluene	EPA 524.2
Total Xylenes	EPA 524.2

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 524.2
1,1,1-Trichloroethane	EPA 524.2
1,1,2,2-Tetrachloroethane	EPA 524.2
1,1,2-Trichloroethane	EPA 524.2
1,1-Dichloroethane	EPA 524.2
1,1-Dichloroethene	EPA 524.2
1,1-Dichloropropene	EPA 524.2

Serial No.: 68592

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

1,2,3-Trichloropropane	EPA 524.2
1,2-Dichloroethane	EPA 524.2
1,2-Dichloropropane	EPA 524.2
1,3-Dichloropropane	EPA 524.2
2,2-Dichloropropane	EPA 524.2
Bromochloromethane	EPA 524.2
Bromomethane	EPA 524.2
Carbon tetrachloride	EPA 524.2
Chloroethane	EPA 524.2
Chloromethane	EPA 524.2
cis-1,2-Dichloroethene	EPA 524.2
cis-1,3-Dichloropropene	EPA 524.2
Dibromomethane	EPA 524.2
Dichlorodifluoromethane	EPA 524.2
Methylene chloride	EPA 524.2
Tetrachloroethene	EPA 524.2
trans-1,2-Dichloroethene	EPA 524.2
trans-1,3-Dichloropropene	EPA 524.2
Trichloroethene	EPA 524.2
Trichlorofluoromethane	EPA 524.2
Vinyl chloride	EPA 524.2

Serial No.: 68592

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrylates

Acrolein (Propenal)	EPA 8260D
	EPA 8260C
	EPA 624.1
Acrylonitrile	EPA 8260D
	EPA 8260C
	EPA 624.1
Methyl methacrylate	EPA 8260D
	EPA 8260C

Amines

1,2-Diphenylhydrazine	EPA 8270D
	EPA 8270E
2-Nitroaniline	EPA 8270D
	EPA 8270E
3-Nitroaniline	EPA 8270D
	EPA 8270E
4-Chloroaniline	EPA 8270D
	EPA 8270E
4-Nitroaniline	EPA 8270D
	EPA 8270E
Aniline	EPA 625.1
	EPA 8270D
	EPA 8270E
Carbazole	EPA 625.1
	EPA 8270D
	EPA 8270E
Diphenylamine	EPA 8270D
	EPA 8270E

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Amines

Pyridine	EPA 625.1
	EPA 8270D
	EPA 8270E

Benzidines

3,3'-Dichlorobenzidine	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzidine	EPA 625.1
	EPA 8270D
	EPA 8270E

Chlorinated Hydrocarbon Pesticides

4,4'-DDD	EPA 8081B
	EPA 608.3
4,4'-DDE	EPA 8081B
	EPA 608.3
4,4'-DDT	EPA 8081B
	EPA 608.3
Aldrin	EPA 8081B
	EPA 608.3
alpha-BHC	EPA 8081B
	EPA 608.3
alpha-Chlordane	EPA 8081B
beta-BHC	EPA 8081B
	EPA 608.3
Chlordane Total	EPA 8081B
	EPA 608.3

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Chlorinated Hydrocarbon Pesticides

delta-BHC	EPA 8081B
	EPA 608.3
Dieldrin	EPA 8081B
	EPA 608.3
Endosulfan I	EPA 8081B
	EPA 608.3
Endosulfan II	EPA 8081B
	EPA 608.3
Endosulfan sulfate	EPA 8081B
	EPA 608.3
Endrin	EPA 8081B
	EPA 608.3
Endrin aldehyde	EPA 8081B
	EPA 608.3
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
	EPA 608.3
Heptachlor epoxide	EPA 8081B
	EPA 608.3
Lindane	EPA 8081B
	EPA 608.3
Methoxychlor	EPA 8081B
	EPA 608.3
Mirex	EPA 8081B
Toxaphene	EPA 8081B
	EPA 608.3

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
	EPA 8270E
1,2,4-Trichlorobenzene	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Chloronaphthalene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachlorobenzene	EPA 8270D
	EPA 8270E
Hexachlorobutadiene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachlorocyclopentadiene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachloroethane	EPA 625.1
	EPA 8270D
	EPA 8270E
Pentachlorobenzene	EPA 8270D
	EPA 8270E

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
	SM 6640B-2006

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Chlorophenoxy Acid Pesticides

2,4-D	EPA 8151A
Dicamba	EPA 8151A

Demand

Biochemical Oxygen Demand	SM 5210B-2016
Carbonaceous BOD	SM 5210B-2016
Chemical Oxygen Demand	SM 5220D-2011

Fuel Oxygenates

Di-isopropyl ether	EPA 8260D
	EPA 8260C
Ethanol	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-amyl alcohol	EPA 8260D
	EPA 8260C
tert-amyl methyl ether (TAME)	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
tert-butyl ethyl ether (ETBE)	EPA 8260D
	EPA 8260C

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Bromophenylphenyl ether	EPA 625.1

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Haloethers

4-Bromophenylphenyl ether	EPA 8270D
	EPA 8270E
4-Chlorophenylphenyl ether	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-chloroethyl)ether	EPA 625.1
	EPA 8270D
	EPA 8270E

Low Level Halocarbons

1,2,3-Trichloropropane, Low Level	EPA 8011
1,2-Dibromo-3-chloropropane, Low Le	EPA 8011
1,2-Dibromoethane, Low Level	EPA 8011

Low Level Polynuclear Aromatics

Acenaphthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Acenaphthylene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Anthracene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(a)anthracene Low Level	EPA 8270D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Low Level Polynuclear Aromatics

Benzo(a)anthracene Low Level	EPA 8270E
	EPA 8270E SIM
Benzo(a)pyrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(b)fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(g,h,i)perylene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(k)fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Chrysene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Fluorene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Low Level Polynuclear Aromatics

Indeno(1,2,3-cd)pyrene Low Level	EPA 8270E
	EPA 8270E SIM
Naphthalene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Phenanthrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Pyrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM

Metals I

Barium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Cadmium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Calcium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Chromium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Metals I

Chromium, Total	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Copper, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Iron, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Lead, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Magnesium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Manganese, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Metals I

Manganese, Total	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Nickel, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Potassium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Silver, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Sodium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

Metals II

Aluminum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Metals II

Aluminum, Total	EPA 200.8, Rev. 5.4 (1994)
Antimony, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Arsenic, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Beryllium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Chromium VI	EPA 7196A
	SM 3500-Cr B-2011
Mercury, Total	EPA 245.1, Rev. 3.0 (1994)
	EPA 245.2 (Issued 1974, Rev. 1983)
	EPA 7470A
	EPA 7473
Vanadium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Metals II

Vanadium, Total	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Zinc, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

Metals III

Cobalt, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Molybdenum, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Thallium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Tin, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Titanium, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Mineral

Alkalinity	SM 2320B-2011
Calcium Hardness	EPA 200.7, Rev. 4.4 (1994)
Chloride	EPA 300.0, Rev. 2.1 (1993)
Fluoride, Total	EPA 300.0, Rev. 2.1 (1993)
Hardness, Total	SM 2340B-2011
Sulfate (as SO4)	EPA 300.0, Rev. 2.1 (1993)

Miscellaneous

Boron, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Bromide	EPA 300.0, Rev. 2.1 (1993)
Color	SM 2120B-2011
Cyanide, Total	SM 4500-CN E-2016
Oil and Grease Total Recoverable	EPA 1664A
Phenols	EPA 420.1 (Rev. 1978)
Specific Conductance	EPA 120.1 (Rev. 1982)
Sulfide (as S)	SM 4500-S2- F-2011
Surfactant (MBAS)	SM 5540C-2011
Turbidity	EPA 180.1, Rev. 2.0 (1993)

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	EPA 625.1
	EPA 8270D
	EPA 8270E
2,6-Dinitrotoluene	EPA 625.1
	EPA 8270D
	EPA 8270E
Isophorone	EPA 625.1

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Nitroaromatics and Isophorone

Isophorone	EPA 8270D
	EPA 8270E
Nitrobenzene	EPA 625.1
	EPA 8270D
	EPA 8270E

Nitrosoamines

N-Nitrosodimethylamine	EPA 625.1
	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 625.1
	EPA 8270D
	EPA 8270E
N-Nitrosodiphenylamine	EPA 625.1
	EPA 8270D
	EPA 8270E

Nutrient

Ammonia (as N)	SM 4500-NH3 D-2011 or E-2011
Kjeldahl Nitrogen, Total	SM 4500-N Org D-2011
	SM 4500-NH3 D-2011 or E-2011
Nitrate (as N)	EPA 300.0, Rev. 2.1 (1993)
Nitrate-Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
Orthophosphate (as P)	EPA 300.0, Rev. 2.1 (1993)
	SM 4500-P E-2011

Organophosphate Pesticides

Atrazine	EPA 8270D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Organophosphate Pesticides	
Atrazine	EPA 8270E
Parathion ethyl	EPA 8270D
	EPA 8270E
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Diethyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Dimethyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Di-n-butyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Di-n-octyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A
	EPA 608.3
Aroclor 1221 (PCB-1221)	EPA 8082A
	EPA 608.3
Aroclor 1232 (PCB-1232)	EPA 8082A
	EPA 608.3
Aroclor 1242 (PCB-1242)	EPA 8082A
	EPA 608.3
Aroclor 1248 (PCB-1248)	EPA 8082A
	EPA 608.3
Aroclor 1254 (PCB-1254)	EPA 8082A
	EPA 608.3
Aroclor 1260 (PCB-1260)	EPA 8082A
	EPA 608.3
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A

Polynuclear Aromatics

Acenaphthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Acenaphthylene	EPA 625.1
	EPA 8270D
	EPA 8270E
Anthracene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(a)anthracene	EPA 625.1

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Polynuclear Aromatics

Benzo(a)anthracene	EPA 8270D
	EPA 8270E
Benzo(a)pyrene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(b)fluoranthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(g,h,i)perylene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(k)fluoranthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Chrysene	EPA 625.1
	EPA 8270D
	EPA 8270E
Dibenzo(a,h)anthracene	EPA 625.1
	EPA 8270D
	EPA 8270E
Fluoranthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Fluorene	EPA 625.1
	EPA 8270D
	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 625.1

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Polynuclear Aromatics

Indeno(1,2,3-cd)pyrene	EPA 8270D
	EPA 8270E
Naphthalene	EPA 625.1
	EPA 8270D
	EPA 8270E
Phenanthrene	EPA 8270D
	EPA 8270E
Pyrene	EPA 625.1
	EPA 8270D
	EPA 8270E

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270D
	EPA 8270E
2,4,5-Trichlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2,4,6-Trichlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2,4-Dichlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2,4-Dimethylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2,4-Dinitrophenol	EPA 8270E
2-Chlorophenol	EPA 625.1

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Priority Pollutant Phenols

2-Chlorophenol	EPA 8270D
	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Nitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Chloro-3-methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Nitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
Cresols, Total	EPA 8270D
	EPA 8270E
Pentachlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
Phenol	EPA 625.1
	EPA 8270D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Priority Pollutant Phenols	
Phenol	EPA 8270E
Residue	
Settleable Solids	SM 2540 F-2015
Solids, Total	SM 2540 B-2015
Solids, Total Dissolved	SM 2540 C-2015
Solids, Total Suspended	SM 2540 D-2015
Semi-Volatile Organics	
1,1'-Biphenyl	EPA 8270D
	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
2-Methylnaphthalene	EPA 8270D
	EPA 8270E
Acetophenone	EPA 8270D
	EPA 8270E
alpha-Terpineol	EPA 625.1
	EPA 8270E
Benzaldehyde	EPA 8270D
	EPA 8270E
Benzoic Acid	EPA 8270D
	EPA 8270E
Benzyl alcohol	EPA 8270D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Semi-Volatile Organics

Benzyl alcohol	EPA 8270E
Caprolactam	EPA 8270D
	EPA 8270E
Dibenzofuran	EPA 8270D
	EPA 8270E

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Aromatics

Benzene	EPA 624.1
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
Ethyl benzene	EPA 8260D
	EPA 8260C
	EPA 624.1
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C
	EPA 624.1
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
	EPA 624.1
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Aromatics

Styrene	EPA 8260D
	EPA 8260C
	EPA 624.1
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
	EPA 624.1
Total Xylenes	EPA 8260D
	EPA 8260C
	EPA 624.1

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1-Dichloroethane	EPA 8260D
	EPA 8260C

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

1,1-Dichloroethane	EPA 624.1
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromochloromethane	EPA 8260D
	EPA 8260C

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

Bromodichloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromoform	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromomethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Carbon tetrachloride	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloroform	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
	EPA 624.1

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

Dibromochloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
	EPA 624.1
Tetrachloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,4-Dichloro-2-butene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

Trichlorofluoromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Vinyl chloride	EPA 8260D
	EPA 8260C
	EPA 624.1

Volatiles Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
	EPA 8270D SIM
	EPA 8270E
	EPA 8270E SIM
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatiles Organics

Methyl cyclohexane	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

SM 4500-P B(5)-2011
EPA 5030C
SM 4500-CN B-2016 and C-2016
EPA 3015A
EPA 3010A
EPA 3005A
EPA 3510C
SM 4500-N Org B-2011 or C-2011

Serial No.: 68593

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Miscellaneous

non-Polar Extractable Material (TPH)	EPA 1664A
Organic Carbon, Total	SM 5310B-2014

Serial No.: 68594

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Acrylates

Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C

Amines

1,2-Diphenylhydrazine	EPA 8270D
	EPA 8270E
2-Nitroaniline	EPA 8270D
	EPA 8270E
3-Nitroaniline	EPA 8270D
	EPA 8270E
4-Chloroaniline	EPA 8270D
	EPA 8270E
4-Nitroaniline	EPA 8270D
	EPA 8270E
Aniline	EPA 8270D
	EPA 8270E
Carbazole	EPA 8270D
	EPA 8270E
Diphenylamine	EPA 8270D
	EPA 8270E

Benzidines

3,3'-Dichlorobenzidine	EPA 8270D
	EPA 8270E

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Benzidines

Benzidine	EPA 8270D
	EPA 8270E

Characteristic Testing

Corrosivity (pH)	EPA 9045D
Free Liquids	EPA 9095B
Ignitability	EPA 1010A
Synthetic Precipitation Leaching Proc.	EPA 1312
TCLP	EPA 1311

Chlorinated Hydrocarbon Pesticides

4,4'-DDD	EPA 8081B
4,4'-DDE	EPA 8081B
4,4'-DDT	EPA 8081B
Aldrin	EPA 8081B
alpha-BHC	EPA 8081B
alpha-Chlordane	EPA 8081B
Atrazine	EPA 8270D
	EPA 8270E
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B
delta-BHC	EPA 8081B
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B
Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B
Endrin	EPA 8081B
Endrin aldehyde	EPA 8081B

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Chlorinated Hydrocarbon Pesticides

Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
Heptachlor epoxide	EPA 8081B
Lindane	EPA 8081B
Mirex	EPA 8081B
Toxaphene	EPA 8081B

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
	EPA 8270E
1,2,4-Trichlorobenzene	EPA 8270D
	EPA 8270E
2-Chloronaphthalene	EPA 8270D
	EPA 8270E
Hexachlorobenzene	EPA 8270D
	EPA 8270E
Hexachlorobutadiene	EPA 8270D
	EPA 8270E
Hexachlorocyclopentadiene	EPA 8270D
	EPA 8270E
Hexachloroethane	EPA 8270D
	EPA 8270E

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Chlorophenoxy Acid Pesticides

2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
Dicamba	EPA 8151A

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 8270D
	EPA 8270E
4-Bromophenylphenyl ether	EPA 8270D
	EPA 8270E
4-Chlorophenylphenyl ether	EPA 8270D
	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 8270D
	EPA 8270E
Bis(2-chloroethyl)ether	EPA 8270D
	EPA 8270E

Metals I

Barium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Cadmium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Calcium, Total	EPA 6010C
	EPA 6010D
Chromium, Total	EPA 6010C

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Metals I

Chromium, Total	EPA 6010D
	EPA 6020A
	EPA 6020B
Copper, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Iron, Total	EPA 6010C
	EPA 6010D
Lead, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Magnesium, Total	EPA 6010C
	EPA 6010D
Manganese, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Nickel, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Potassium, Total	EPA 6010C
	EPA 6010D
Silver, Total	EPA 6010C
	EPA 6010D

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Metals I

Silver, Total	EPA 6020A
	EPA 6020B
Sodium, Total	EPA 6010C
	EPA 6010D

Metals II

Aluminum, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Antimony, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Arsenic, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Beryllium, Total	EPA 6010C
	EPA 6010D
Chromium VI	EPA 7196A
Mercury, Total	EPA 7471B
	EPA 7473
Selenium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Vanadium, Total	EPA 6010C

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Metals II

Vanadium, Total	EPA 6010D
	EPA 6020A
	EPA 6020B
Zinc, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B

Metals III

Cobalt, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Molybdenum, Total	EPA 6020A
Thallium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Tin, Total	EPA 6020A
	EPA 6020B
Titanium, Total	EPA 6020A

Miscellaneous

Boron, Total	EPA 6020A
	EPA 6020B
Cyanide, Total	EPA 9014
Extractable Organic Halides	EPA 9023

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	EPA 8270D
	EPA 8270E
2,6-Dinitrotoluene	EPA 8270D
	EPA 8270E
Isophorone	EPA 8270D
	EPA 8270E
Nitrobenzene	EPA 8270D
	EPA 8270E
Pyridine	EPA 8270D
	EPA 8270E

Nitrosoamines

N-Nitrosodimethylamine	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 8270D
	EPA 8270E
N-Nitrosodiphenylamine	EPA 8270D
	EPA 8270E

Organophosphate Pesticides

Parathion ethyl	EPA 8270D
	EPA 8270E

Petroleum Hydrocarbons

Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D

Phthalate Esters

Benzyl butyl phthalate	EPA 8270D
	EPA 8270E

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Phthalate Esters

Bis(2-ethylhexyl) phthalate	EPA 8270D
	EPA 8270E
Diethyl phthalate	EPA 8270D
	EPA 8270E
Dimethyl phthalate	EPA 8270D
	EPA 8270E
Di-n-butyl phthalate	EPA 8270D
	EPA 8270E
Di-n-octyl phthalate	EPA 8270D
	EPA 8270E

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A
Aroclor 1016 (PCB-1016) in Oil	EPA 8082A
Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1221 (PCB-1221) in Oil	EPA 8082A
Aroclor 1232 (PCB-1232)	EPA 8082A
Aroclor 1232 (PCB-1232) in Oil	EPA 8082A
Aroclor 1242 (PCB-1242)	EPA 8082A
Aroclor 1242 (PCB-1242) in Oil	EPA 8082A
Aroclor 1248 (PCB-1248)	EPA 8082A
Aroclor 1248 (PCB-1248) in Oil	EPA 8082A
Aroclor 1254 (PCB-1254)	EPA 8082A
Aroclor 1254 (PCB-1254) in Oil	EPA 8082A
Aroclor 1260 (PCB-1260)	EPA 8082A
Aroclor 1260 (PCB-1260) in Oil	EPA 8082A
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1262 (PCB-1262) in Oil	EPA 8082A

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Polychlorinated Biphenyls

Aroclor 1268 (PCB-1268)	EPA 8082A
Aroclor 1268 (PCB-1268) in Oil	EPA 8082A

Polynuclear Aromatic Hydrocarbons

Acenaphthene	EPA 8270D
	EPA 8270E
Acenaphthylene	EPA 8270D
	EPA 8270E
Anthracene	EPA 8270D
	EPA 8270E
Benzo(a)anthracene	EPA 8270D
	EPA 8270E
Benzo(a)pyrene	EPA 8270D
	EPA 8270E
Benzo(b)fluoranthene	EPA 8270D
	EPA 8270E
Benzo(g,h,i)perylene	EPA 8270D
	EPA 8270E
Benzo(k)fluoranthene	EPA 8270D
	EPA 8270E
Dibenzo(a,h)anthracene	EPA 8270D
	EPA 8270E
Fluoranthene	EPA 8270D
	EPA 8270E
Fluorene	EPA 8270D
	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 8270D
	EPA 8270E

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Polynuclear Aromatic Hydrocarbons

Naphthalene	EPA 8270D
	EPA 8270E
Phenanthrene	EPA 8270D
	EPA 8270E
Pyrene	EPA 8270D
	EPA 8270E

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270D
	EPA 8270E
2,4,5-Trichlorophenol	EPA 8270D
	EPA 8270E
2,4,6-Trichlorophenol	EPA 8270D
	EPA 8270E
2,4-Dichlorophenol	EPA 8270D
	EPA 8270E
2,4-Dimethylphenol	EPA 8270D
	EPA 8270E
2,4-Dinitrophenol	EPA 8270D
	EPA 8270E
2-Chlorophenol	EPA 8270D
	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 8270D
	EPA 8270E
2-Methylphenol	EPA 8270D
	EPA 8270E
2-Nitrophenol	EPA 8270D
	EPA 8270E

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Priority Pollutant Phenols

4-Chloro-3-methylphenol	EPA 8270D
	EPA 8270E
4-Methylphenol	EPA 8270D
	EPA 8270E
4-Nitrophenol	EPA 8270D
	EPA 8270E
Pentachlorophenol	EPA 8270D
	EPA 8270E
Phenol	EPA 8270D
	EPA 8270E

Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270D
	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
2-Methylnaphthalene	EPA 8270D
	EPA 8270E
Acetophenone	EPA 8270D
	EPA 8270E
Benzaldehyde	EPA 8270D
	EPA 8270E
Benzoic Acid	EPA 8270D
	EPA 8270E

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Semi-Volatile Organics

Benzyl alcohol	EPA 8270D
	EPA 8270E
Caprolactam	EPA 8270D
	EPA 8270E
Dibenzofuran	EPA 8270D
	EPA 8270E

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Aromatics

Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Aromatics

Total Xylenes	EPA 8260C

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Halocarbons

1,2-Dichloropropane	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D
	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Halocarbons

Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C

Volatile Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
	EPA 8270D SIM
	EPA 8270E

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Organics

1,4-Dioxane	EPA 8270E SIM
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

	EPA 5035A-L
	EPA 5035A-H
	EPA 3580A

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Sample Preparation Methods

EPA 3010A
EPA 3050B
EPA 3550C
EPA 3546
EPA 3545A
EPA 9010C

Serial No.: 68595

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Lead in Dust Wipes	EPA 6010C
Lead in Paint	EPA 6010C

Sample Preparation Methods

	EPA 3050B

Serial No.: 68596

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

11CL-PF3OUDS	EPA 533
	EPA 537.1
4:2FTS	EPA 533
6:2FTS	EPA 533
8:2FTS	EPA 533
9CL-PF3ONS	EPA 533
	EPA 537.1
ADONA	EPA 533
	EPA 537.1
Hexafluoropropylene Oxide Dimer Acic	EPA 533
	EPA 537.1
NETFOSAA	EPA 537.1
NMEFOSAA	EPA 537.1
Nonafluoro-3,6-Dioxaheptanoic Acid	EPA 533
Perflourotridecanoic Acid (PFTRDA)	EPA 537.1
Perfluordecanoic Acid (PFDA)	EPA 533
	EPA 537.1
Perfluoro-3-Methoxypropanoic Acid	EPA 533
Perfluoro-4-Methoxybutanoic Acid	EPA 533
Perfluorobutanesulfonic Acid (PFBS)	EPA 533
	EPA 537.1
Perfluorobutanoic Acid (PFBA)	EPA 533
Perfluorododecanoic Acid (PFDOA)	EPA 533
	EPA 537.1
Perfluoroheptanesulfonic Acid (PFHPS	EPA 533
Perfluoroheptanoic Acid (PFHPA)	EPA 533
	EPA 537.1

Serial No.: 69088

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

Perfluorohexanesulfonic Acid (PFHXS	EPA 533
	EPA 537.1
Perfluorohexanoic Acid (PFHXA)	EPA 533
	EPA 537.1
Perfluorononanoic Acid (PFNA)	EPA 533
	EPA 537.1
Perfluorooctanesulfonic Acid (PFOS)	EPA 533
	EPA 537
	EPA 537.1
Perfluorooctanoic Acid (PFOA)	EPA 533
	EPA 537
	EPA 537.1
Perfluoropentanesulfonic Acid (PFPES	EPA 533
Perfluoropentanoic Acid (PFPEA)	EPA 533
Perfluorotetradecanoic Acid (PFTA)	EPA 537.1
Perfluoroundecanoic Acid (PFUNA)	EPA 533
	EPA 537.1
PFEESA	EPA 533

Serial No.: 69088

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C
Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
Fuel Oxygenates	
Di-isopropyl ether	EPA 8260D
	EPA 8260C
Ethanol	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-amyl alcohol	EPA 8260D
	EPA 8260C
tert-amyl methyl ether (TAME)	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
tert-butyl ethyl ether (ETBE)	EPA 8260D
	EPA 8260C
Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D

Serial No.: 69089

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C

Serial No.: 69089

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Aromatics

Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D
	EPA 8260C

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C

Serial No.: 69089

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
Bromochloromethane	EPA 8260D

Serial No.: 69089

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

Bromochloromethane	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D
	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C

Serial No.: 69089

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatile Halocarbons

Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
trans-1,4-Dichloro-2-butene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C

Volatiles Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
Carbon Disulfide	EPA 8260D

Serial No.: 69089

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Volatiles Organics

Carbon Disulfide	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

	EPA 5030C

Serial No.: 69089

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

11CL-PF3OUDS	EPA 1633 (Draft)
4:2FTS	EPA 1633 (Draft)
6:2FTS	EPA 1633 (Draft)
8:2FTS	EPA 1633 (Draft)
9CL-PF3ONS	EPA 1633 (Draft)
ADONA	EPA 1633 (Draft)
Hexafluoropropylene Oxide Dimer Aci	EPA 1633 (Draft)
NETFOSAA	EPA 1633 (Draft)
NMEFOSAA	EPA 1633 (Draft)
Nonafluoro-3,6-Dioxaheptanoic Acid	EPA 1633 (Draft)
Perflourotridecanoic Acid (PFTRDA)	EPA 1633 (Draft)
Perfluordecanoic Acid (PFDA)	EPA 1633 (Draft)
Perfluoro-3-Methoxypropanoic Acid	EPA 1633 (Draft)
Perfluoro-4-Methoxybutanoic Acid	EPA 1633 (Draft)
Perfluorobutanesulfonic Acid (PFBS)	EPA 1633 (Draft)
Perfluorobutanoic Acid (PFBA)	EPA 1633 (Draft)
Perfluorododecanoic Acid (PFDOA)	EPA 1633 (Draft)
Perfluoroheptanesulfonic Acid (PFHPS	EPA 1633 (Draft)
Perfluoroheptanoic Acid (PFHPA)	EPA 1633 (Draft)
Perfluorohexanesulfonic Acid (PFHXS	EPA 1633 (Draft)
Perfluorohexanoic Acid (PFHXA)	EPA 1633 (Draft)
Perfluorononanoic Acid (PFNA)	EPA 1633 (Draft)
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633 (Draft)
Perfluorooctanoic Acid (PFOA)	EPA 1633 (Draft)
Perfluoropentanesulfonic Acid (PFPES	EPA 1633 (Draft)
Perfluoropentanoic Acid (PFPEA)	EPA 1633 (Draft)
Perfluoroundecanoic Acid (PFUNA)	EPA 1633 (Draft)

Serial No.: 69090

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

PFEESA	EPA 1633 (Draft)

Serial No.: 69090

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C
Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C

Serial No.: 69091

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Aromatics

Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
tert-Butylbenzene	EPA 8260D

Serial No.: 69091

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Aromatics

tert-Butylbenzene	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D
	EPA 8260C

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D

Serial No.: 69091

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Halocarbons

1,2-Dibromoethane	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D
	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C

Serial No.: 69091

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Halocarbons

cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C

Serial No.: 69091

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

	EPA 5035A-L
	EPA 5035A-H

Serial No.: 69091

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

8:2FTS	EPA 1633 (Draft)
NETFOSAA	EPA 1633 (Draft)
NMEFOSAA	EPA 1633 (Draft)
Perflourotridecanoic Acid (PFTRDA)	EPA 1633 (Draft)
Perfluordecanoic Acid (PFDA)	EPA 1633 (Draft)
Perfluorobutanoic Acid (PFBA)	EPA 1633 (Draft)
Perfluorododecanoic Acid (PFDOA)	EPA 1633 (Draft)
Perfluoroheptanoic Acid (PFHPA)	EPA 1633 (Draft)
Perfluorohexanoic Acid (PFHXA)	EPA 1633 (Draft)
Perfluorononanoic Acid (PFNA)	EPA 1633 (Draft)
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633 (Draft)
Perfluorooctanoic Acid (PFOA)	EPA 1633 (Draft)
Perfluoropentanoic Acid (PFPEA)	EPA 1633 (Draft)
Perfluorotetradecanoic Acid (PFTA)	EPA 1633 (Draft)
Perfluoroundecanoic Acid (PFUNA)	EPA 1633 (Draft)

Serial No.: 69092

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Acrylates

Acrylonitrile	EPA TO-15
Methyl methacrylate	EPA TO-15

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	EPA TO-15
Hexachlorobutadiene	EPA TO-15
Hexachloroethane	EPA TO-15

Purgeable Aromatics

1,2,4-Trimethylbenzene	EPA TO-15
1,2-Dichlorobenzene	EPA TO-15
1,3,5-Trimethylbenzene	EPA TO-15
1,3-Dichlorobenzene	EPA TO-15
1,4-Dichlorobenzene	EPA TO-15
Benzene	EPA TO-15
Chlorobenzene	EPA TO-15
Ethyl benzene	EPA TO-15
Isopropylbenzene	EPA TO-15
m/p-Xylenes	EPA TO-15
o-Xylene	EPA TO-15
Styrene	EPA TO-15
Toluene	EPA TO-15
Total Xylenes	EPA TO-15

Purgeable Halocarbons

1,1,1-Trichloroethane	EPA TO-15
1,1,2,2-Tetrachloroethane	EPA TO-15
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA TO-15
1,1,2-Trichloroethane	EPA TO-15

Serial No.: 69093

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Purgeable Halocarbons

1,1-Dichloroethane	EPA TO-15
1,1-Dichloroethene	EPA TO-15
1,2-Dibromoethane	EPA TO-15
1,2-Dichloroethane	EPA TO-15
1,2-Dichloropropane	EPA TO-15
3-Chloropropene (Allyl chloride)	EPA TO-15
Bromodichloromethane	EPA TO-15
Bromoform	EPA TO-15
Bromomethane	EPA TO-15
Carbon tetrachloride	EPA TO-15
Chloroethane	EPA TO-15
Chloroform	EPA TO-15
Chloromethane	EPA TO-15
cis-1,2-Dichloroethene	EPA TO-15
cis-1,3-Dichloropropene	EPA TO-15
Dibromochloromethane	EPA TO-15
Dichlorodifluoromethane	EPA TO-15
Methylene chloride	EPA TO-15
Tetrachloroethene	EPA TO-15
trans-1,2-Dichloroethene	EPA TO-15
trans-1,3-Dichloropropene	EPA TO-15
Trichloroethene	EPA TO-15
Trichlorofluoromethane	EPA TO-15
Vinyl bromide	EPA TO-15
Vinyl chloride	EPA TO-15

Volatile Chlorinated Organics

Benzyl chloride	EPA TO-15

Serial No.: 69093

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Volatile Organics

1,2-Dichlorotetrafluoroethane	EPA TO-15
1,3-Butadiene	EPA TO-15
1,4-Dioxane	EPA TO-15
2-Butanone (Methylethyl ketone)	EPA TO-15
4-Methyl-2-Pentanone	EPA TO-15
Acetone	EPA TO-15
Carbon Disulfide	EPA TO-15
Cyclohexane	EPA TO-15
Hexane	EPA TO-15
Isopropanol	EPA TO-15
Methyl tert-butyl ether	EPA TO-15
n-Heptane	EPA TO-15
Vinyl acetate	EPA TO-15

NEW YORK STATE | Department of Health

Serial No.: 69093

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

APPENDIX L

SITE MANAGEMENT FORMS

Site Inspection Checklist

Site Name: 28-90 Review Avenue Site **BCP Site No.:** C241236 **Project Number:** 100652601
Site Location: 28-90 Review Avenue, Queens, NY

Inspector Name: _____ **Weather Conditions:** _____

Inspection Date: _____ **Inspection Time:** _____

Reason for Inspection (i.e., routine, severe condition, etc.): _____

	Check one of the following: (Y: Yes N: No N/A: Not Applicable)	Y	N	N/A	Normal Situation	Remarks
General						
1	Are all applicable Site records (e.g., documentation of construction activity, most current easement, etc.) complete and up to date?				Y	
2	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the capping system, on-Site at the time of this inspection?				N	
3	If YES to number 3, is there documentation that the Soil Management Plan, HASP, and CAMP for the Site was/is being followed?				N/A if N to 3/ Y if Y to 3	
Environmental Easement						
4	Has Site use (Commercial) remained the same?				Y	
5	Does it appear that all environmental easement restrictions have been followed?				Y	
6	Are there any on-Site vegetable gardens?				N	
7	Is groundwater being withdrawn for potable or non-potable use?				N	
Composite Cover System						
8	Are there any indications of a breach in the composite cover system at the time of this inspection?				N	
9	Are there any signs of cracking or damage?				N	
10	Are there any areas of where greater than 25% of the surface is cracked or damaged?				N	
11	Is there adequate top soil cover present? (i.e. Is the underlying demarcation adequately covered?)				Y	
12	Are there any signs of erosion?				N	
Sub-Slab Depressurization System						
13	Do the alarm lights indicate that the system is operational?				Y	
14	Is the SSDS in-line fan operational at the time of the inspection and expelling air at the discharge point?				Y	
15	Have dust and debris been removed from the surface of the in-line fan?				Y	

**** If the answer to any of the above questions indicate non-compliance with any Institutional Controls/Engineering**
*** Controls (ICs/ECs) for the site, additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.**

Additional remarks: _____

Minimum Inspection Schedule:
- Site-wide inspections will be conducted annually, per certification year, at a minimum.
- Additional inspections will also be conducted at times of severe weather condition events.
- All inspection events will use this checklist.

Sub-Slab Depressurization System (SSDS)
Field Parameter Form

Site Name: 28-90 Review Avenue Site **BCP Site No.:** C241236 **Langan Project No.:** 100652601
Site Location: 28-90 Review Avenue, Queens, NY

Inspector Name: _____ **Insp. Date:** _____

Weather: _____ **Insp. Time:** _____

Reason for inspection (i.e., routine, maintenance, severe condition, etc.): _____

In-Line Fan Inlet				
Fan ID	**Pressure (IWC)**	**PID (ppb)**	**Flow (scfm)**	**Temperature (°F)**
In-Line Fan 1				

In-Line Fan Outlet					
Fan ID	**Pressure (IWC)**	**PID (ppb)**	**Flow (scfm)**	**Temperature (°F)**	**Speed Control Position**
In-Line Fan 1	-		-	-	

Vertical Vent Risers					
Riser ID	**Pressure (IWC)**	**PID (ppb)**	**Flow (scfm)**	**Temperature (°F)**	**Valve Position**
V1					
V2					
V3					

Vacuum Monitoring Points (VMPs)		
VMP ID	**Pressure (IWC)**	**PID (ppb)**
VMP1		
VMP2		
VMP3		
VMP4		
VMP5		
VMP6		

Notes:
1. Vacuum readings are reported as negative numbers.
2. No downtime was recorded during this monitoring period.

Minimum Inspection Schedule: SSDS inspections will be conducted quarterly for the first certification year and annually thereafter. Additional inspections will also be conducted at times of maintenance, repair, or severe condition events. All inspection events will utilize this checklist.

LOW FLOW SAMPLING FIELD PARAMETER MEASUREMENTS

Project:		**Site Location:**		**Well No:**	**Date:**
Job Number:		**Weather:**		**Sampler(s):**	
Initial DTW (ft):		**Well Depth (ft):**		**Pump Depth (ft):**	
Background PID (ppm):		**Well PID (ppm):**		**Screen Interval (ft):**	
Water Quality Meter:		**Water Quality Meter ID:**		**Well Diameter (in):**	

TIME	TEMP. °C	pH (std. Units)	ORP (mV)	COND. (mS/cm)	Turbidity (NTU)	DO (mg/L)	DTW (ft)	Q (mL/m)	COLOR?	ODOR?	NOTES
	—	—	—	—	—	—			—	—	Begin Purging
	+/- 3%	+/- 0.1 pH	+/- 10 mV	+/- 3%	+/- 10 NTU	+/- 10%	<0.3' drawdown				

Notes:

Sample Number:		Sample Time:	Sample Analyses:	
QA/QC Sample Number:		QA/QC Sample Time:	QA/QC Sample Analyses:	

LANGAN

SUMMA CANISTER SAMPLING FIELD DATA SHEET

Site:

Samplers:

Date:

Sample #					
Location					
Summa Canister ID					
Flow Controller ID					
Sample Depth (b.g.s.)					
Additional Tubing Added	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much	NO/ YES - How much
Purge Time (Start)					
Purge Time (Stop)					
Total Purge Time (min)					
Purge Volume (L)					
PID Test of Purge Air (ppb)					
Initial Tracer Gas Results in sampling line					
Initial Tracer Gas Results in shroud					
Pressure Gauge - before sampling (in Hg)					
Sample Time (Start)					
Sample Time (Stop)					
Total Sample Time (min)					
Pressure Gauge - after sampling (in Hg)					
Sample Volume (L)					
Canister Pressure Went to Ambient Pressure?	YES / NO	YES / NO	YES / NO	YES / NO	YES / NO
Final Tracer Gas Results in sampling line					
Final Tracer Gas Results in shroud					
Associated Ambient Air Sample Number					
Weather 24 hours before and during sampling					
General Comments					

LANGAN

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies and lab-supplied bottles, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service (bottle and sample delivery)		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site (not including treated water)		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Recommendations/Other:

CONTRACTOR CERTIFICATION
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of _____ (**Contractor Name**), which is responsible for the work documented on this form. According to my knowledge and belief, all of the information provided in this form is accurate and the site management program complies with the DER-10, DER-31, and CP-49 policies. _____ **Date** **Contractor**

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.

SECTION 1 – SITE BACKGROUND

Site Name:

Site Number:

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that passes a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Name and address of fill source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

APPENDIX M

GREEN AND SUSTAINABLE REMEDIATION FOOTPRINT ANALYSIS AND CLIMATE VULNERABILITY CHECKLIST

LANGAN

Climate Screening Checklist

Background Information

- Project Manager: Brittany Taranto, DEC Project Manager
- Site Name: 28-90 Review Avenue Development
- Site Number: NYSDEC BCP Site No. C241236
- Site Location: 28-90 Review Avenue, Queens, NY
- Site Elevation (average above sea level): +4 NAVD88
- ClimAID Region (Responding Climate Change in New York State (ClimAID) - NYSERDA): Region 4
- Remedial Stage/site classification:

  Site Classification: Active

- Contamination - Media Impacted/ Contaminants of Concern:

  Impacted media include soil, groundwater, and soil vapor. Analytical data indicates that fill material contains VOCs, SVOCs, pesticides, and metals at concentrations greater than the Unrestricted Use SCOs, Restricted-Residential RUSCOs, and/or the Protection of Groundwater SCOs and PFAS at concentrations greater than the Protection of Groundwater Guidance Values. Groundwater contains chlorinated VOCs, SVOCs, and metals above the SGVs and PFAS above the NYSDEC guidance thresholds. Soil vapor contains chlorinated VOCs at concentrations above the NYSDOH guidance levels that would require mitigation.

- Proposed/Current Remedy:
  The Track 4 Restricted-Commercial Remedy included excavation of metals hot spots, remediation of Spill No. 1809113, in-situ stabilization, SSDS installation, and construction of a composite Site cover, recording of an Environmental Easement, and establishment of a Site Management Plan.

- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?

  The predicted time frame is 50+ years. Components of the remedy will still be in place in 10+ years.

- Is the site in proximity to any sensitive receptors? (e.g. wetlands, waterbodies, residential properties, hospitals, schools, drinking water supplies, etc.)

  Surrounding properties include multi-story industrial/manufacturing buildings, parking lots, and the Metropolitan Transit Authority (MTA) Long Island Rail Road (LIRR). No sensitive receptors were identified within 500 feet of the Site.

Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))?

☐ **Yes** ■ **No**

If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

N/A ☐ **Yes** ☐ **No**

Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

N/A ☐ **Yes** ☐ **No**

Climate Screening Table*

Potential Climate Hazards	**Relevant to the Site Location** (Y/N/NA)[1]	**Projected Change** (Reference data source/Model)[3]	**Potential to Impact Remedy** (Y/N)	**Is remedy/site already resilient?** (Y/N)[4]
Precipitation	Y	N (https://climatetoolbox.org/tool/future-time-series)	N	Y
Temperature[2] (Extreme Heat or Cold Weather Impacts)	Y	Y - 5 degrees F over 50 years. (https://climatetoolbox.org/tool/future-time-series)	N	Y
Sea Level Rise	Y	Y - 6 ft (NOAA)	Y	Y
Flooding	Y	N/A	Y	Y
Storm Surge	Y	Risk is <3-9 feet above ground (NHC Storm Surge Map	Y	Y
Wildfire	N	N/A	N/A	N/A
Drought	Y	N (https://climatetoolbox.org/tool/future-time-series)	N	Y
Storm Severity	Y	Y (UCAR)	Y	Y
Landslides	N	N/A	N/A	N/A
Other Hazards:	N/A	N/A	N/A	N/A

* Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 0 degrees F (NYSERDA ClimAID report)

[3] List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

Required Next Steps (If no further action is required, provide justification):

A notable increase in precipitation is not projected over the next 50 years.

The composite cover system should not be impacted by the anticipated 5-degree (Fahrenheit) maximum temperature increase over the next 50 years.

Sea level rise of 6 ft will impact the Site. The Site is mostly resilient to sea level rise with the exception of the limited areas of impervious cover.

The Site is located within a 1% annual chance flood hazard zone. The Site is mostly resilient to flooding with the exception of the limited areas of impervious cover.

Storm surge hazards for the Site may occur. Based on the National Hurricane Center Storm Surge Risk Maps dated 2021, a storm surge is likely to impact the Site for a Category 1 or higher storm. The NYC Risk Landscape: Guide to Hazardous Mitigation cites the National Hurricane Center data point that Category 1 storms impact NYC every 19 years. The Site is mostly resilient to storm surges and increased storm severity with the exception of the limited areas of impervious cover.

An increase in drought severity is not projected over the next 50 years.

SITE INFORMATION	
User Name and Date	A. Sandve 2025-09-22
Site Name	28-90 Review Avenue
Remedial Alternative Name	SMP
Alternative File Name	SMP
Choose electricity profile	NY

Component	Component Alias
Component 1	MW Installation
Component 2	GW Sampling
Component 3	SV Intrusion Sampling
Component 4	Inspections

Do you want to reload a previously saved remedial alternative in the SiteWise input sheet?

Yes | Refresh List

Reset all input values on all worksheets to default

Reset All Values on All Sheets

-= Status =-

Reset complete.







SiteWiseTM Tool for Green and Sustainable Remediation has been developed jointly by United States (US) Navy, United States Army Corps of Engineers (USACE), and Battelle. This tool is made available on an as-is basis without guarantee or warranty of any kind, express or implied. The US Navy, USACE, Battelle, the authors, and the reviewers accept no liability resulting from the use of this tool or its documentation; nor does the above warrant or otherwise represent in any way the accuracy, adequacy, efficacy, or applicability of the contents hereof. Implementation of SiteWiseTM tool and interpretation or use of the results provided by the tool are the sole responsibility of the user. The tool is provided free of charge for everyone to use, but is not supported in any way by the US Navy, USACE, or Battelle.

Version 3.2

Instructions

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

BASELINE INFORMATION

COMPONENT 1 DURATION AND COST	Entire Site
Input duration of the component (unit time)	1
Input component cost per unit time ($)	

MATERIAL PRODUCTION

WELL MATERIALS	Well Type 1	Well Type 2	Well Type 3	Well Type 4	Well Type 5	Well Type 6
Input number of wells	5					
Input depth of wells (ft)	20					
Choose specific casing material schedule from drop down menu	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC
Choose well diameter (in) from drop down menu	2	1/8	1/8	1/8	1/8	1/8
Input total quantity of Sand (kg)	125					
Input total quantity of Gravel (kg)	0					
Input total quantity of Bentonite (kg)	19					
Input total quantity of Typical Cement (kg)	31					
Input total quantity of General Concrete (kg)	98					
Input total quantity of Steel (kg)	9					

TRANSPORTATION

PERSONNEL TRANSPORTATION - ROAD	Langan Personnel	Driller	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Cars	Heavy Duty	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Diesel	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	66	75				
Input number of trips taken	2	2				
Input number of travelers	1	2				
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

EQUIPMENT TRANSPORTATION - DEDICATED LOAD ROAD	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose fuel used from drop down menu	Diesel	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Account for an empty return trip?	No	No	No	No	No	No
Input one-way distance traveled (miles) with a given load. If applicable, impact for an empty return trip will be accounted for (no additional input is needed).	75					
Input weight of equipment transported per truck load (tons)	4.75					

EQUIPMENT USE

DRILLING	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Input number of drilling locations	5					
Choose drilling method from drop down menu	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push	Direct Push
Input time spent drilling at each location (hr)	3.00					
Choose fuel type from drop down menu	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

BASELINE INFORMATION

COMPONENT 2 DURATION AND COST	Entire Site
Input duration of the component (unit time)	1
Input component cost per unit time ($)	

TRANSPORTATION

PERSONNEL TRANSPORTATION - ROAD	Langan Personnel	Lab Courier	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Cars	Cars	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	66	20				
Input number of trips taken	40	40				
Input number of travelers	1	1				
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

EQUIPMENT USE

LABORATORY ANALYSIS	Analysis 1	Analysis 2	Analysis 3	Analysis 4	Analysis 5	Analysis 6
Input dollars spent on laboratory analysis ($)	70,000.00					

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

BASELINE INFORMATION

COMPONENT 3 DURATION AND COST	Entire Site
Input duration of the component (unit time)	1
Input component cost per unit time ($)	

TRANSPORTATION

PERSONNEL TRANSPORTATION - ROAD	Langan Personnel	Lab Courier	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Cars	Cars	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	66	20				
Input number of trips taken	1	2				
Input number of travelers	1	1				
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

EQUIPMENT USE

LABORATORY ANALYSIS	Analysis 1	Analysis 2	Analysis 3	Analysis 4	Analysis 5	Analysis 6
Input dollars spent on laboratory analysis ($)	5,250.00					

This worksheet allows the user to define material production, transportation, equipment use, and residual handling variables for the remedial alternative

Yellow cells	require the user to choose an input from a drop down menu
White cells	require the user to type in a value

BASELINE INFORMATION

COMPONENT 4 DURATION AND COST	Entire Site
Input duration of the component (unit time)	1
Input component cost per unit time ($)	

TRANSPORTATION

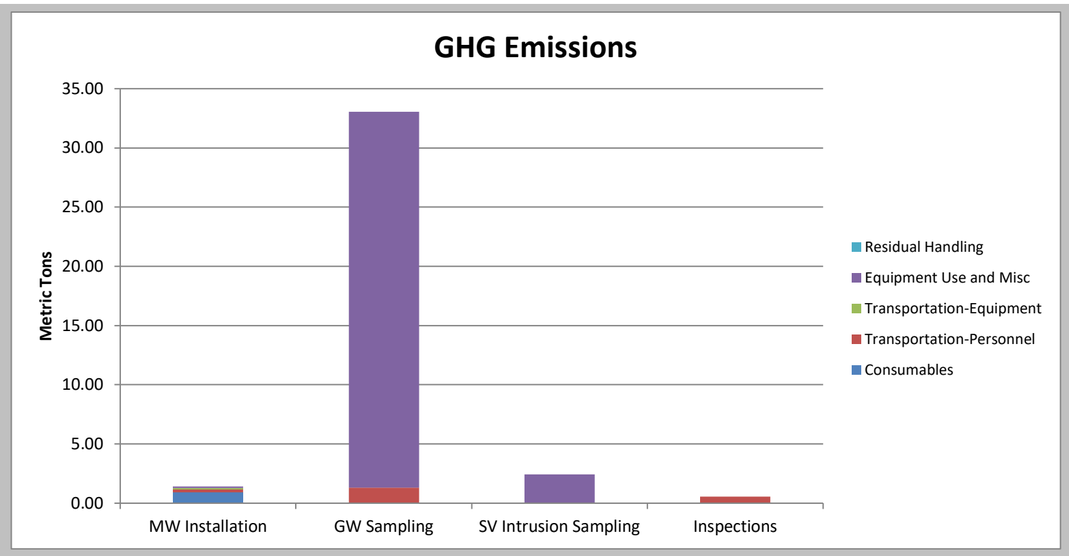
PERSONNEL TRANSPORTATION - ROAD	Langan Personnel	Trip 2	Trip 3	Trip 4	Trip 5	Trip 6
Will DIESEL-run vehicles be retrofitted with a particulate reduction technology?	No	No	No	No	No	No
Choose vehicle type from drop down menu*	Cars	Cars	Cars	Cars	Cars	Cars
Choose fuel used from drop down menu	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline
Input distance traveled per trip (miles)	66					
Input number of trips taken	22					
Input number of travelers	1					
Input estimated vehicular fuel economy (mi/gal) (Input only if known for the vehicle selected, otherwise a default will be used by the tool)						

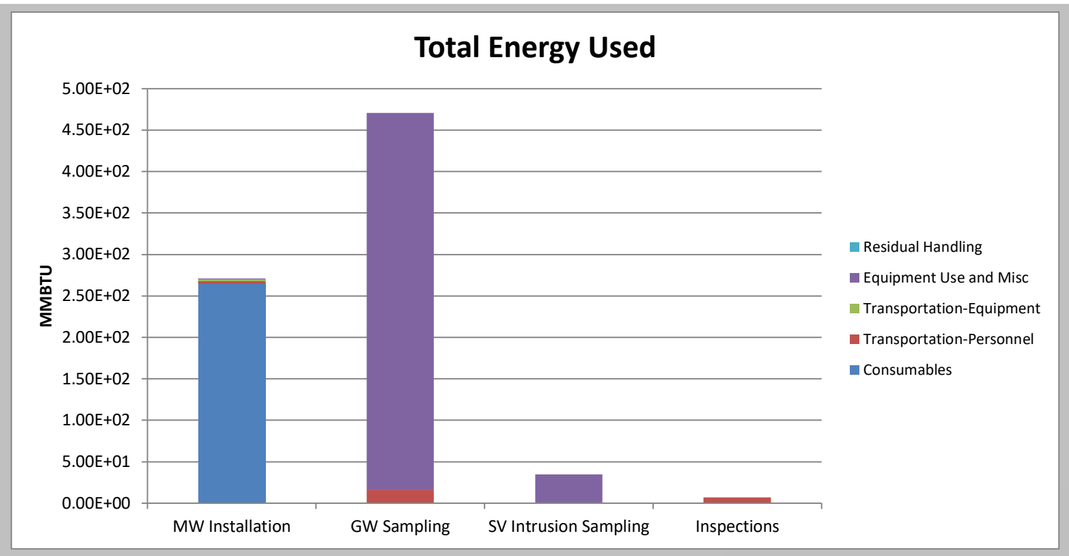
*For vehicle type 'Other' please enter values in Table 2b in the Look Up Table tab.

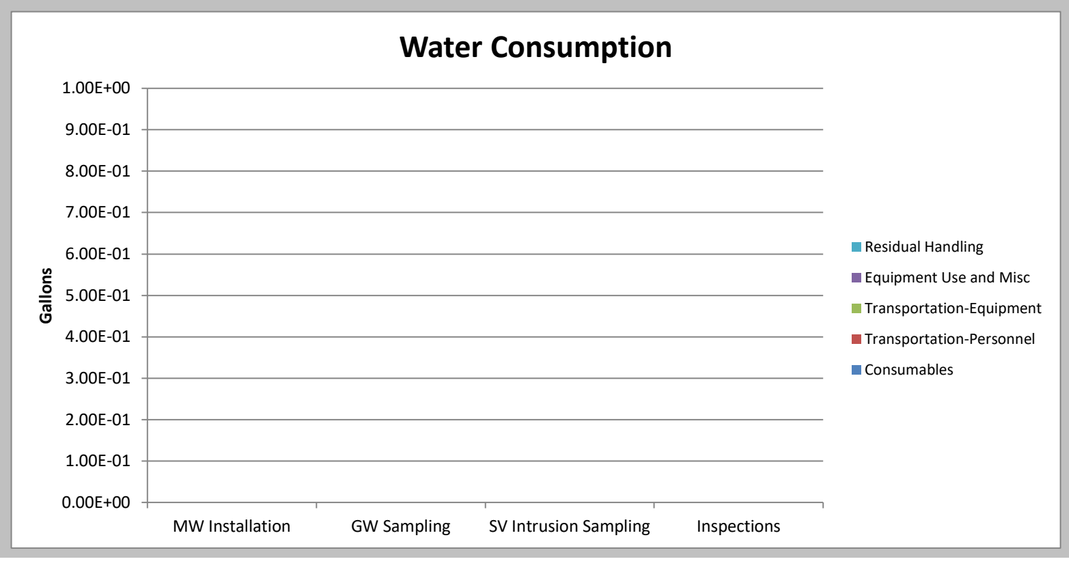
Sustainable Remediation - Environmental Footprint Summary
SMP

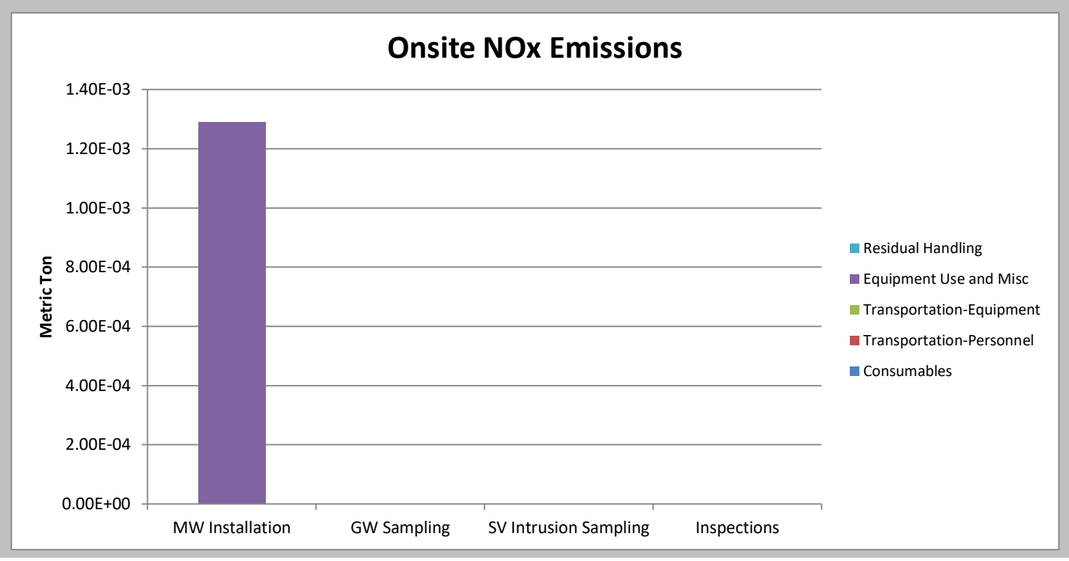
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
MW Installation	Consumables	0.91	2.6E+02	NA	NA	NA	NA	NA	9.4E-04	1.3E-03	1.7E-04	NA	NA
	Transportation-Personnel	0.26	3.4E+00	NA	NA	NA	NA	NA	8.5E-05	1.8E-06	9.7E-06	3.4E-06	2.7E-04
	Transportation-Equipment	0.11	1.5E+00	NA	NA	NA	NA	NA	3.5E-05	6.3E-07	3.2E-06	5.9E-07	4.7E-05
	Equipment Use and Misc	0.14	1.6E+00	0.0E+00	0.0E+00	1.3E-03	1.3E-04	1.2E-04	1.4E-03	1.7E-04	1.3E-04	1.4E-06	3.5E-04
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	1.42	2.71E+02	0.00E+00	0.00E+00	1.29E-03	1.32E-04	1.16E-04	2.42E-03	1.48E-03	3.11E-04	5.33E-06	6.63E-04
GW Sampling	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	1.31	1.6E+01	NA	NA	NA	NA	NA	4.9E-04	1.7E-05	9.8E-05	2.7E-05	2.2E-03
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	31.75	4.5E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-01	1.1E-01	1.3E-02	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	33.06	4.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	1.14E-01	1.28E-02	2.68E-05	2.16E-03
SV Intrusion Sampling	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.04	5.1E-01	NA	NA	NA	NA	NA	1.5E-05	5.3E-07	3.0E-06	8.3E-07	6.7E-05
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	2.38	3.4E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-02	8.6E-03	9.5E-04	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	2.42	3.46E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	8.57E-03	9.56E-04	8.27E-07	6.65E-05
Inspections	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.55	7.0E+00	NA	NA	NA	NA	NA	2.0E-04	7.2E-06	4.2E-05	1.1E-05	9.1E-04
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.55	6.96E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-04	7.21E-06	4.15E-05	1.13E-05	9.12E-04
Total		**37.46**	**783.54**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.167**	**0.124**	**0.014**	**0.00**	**0.00**

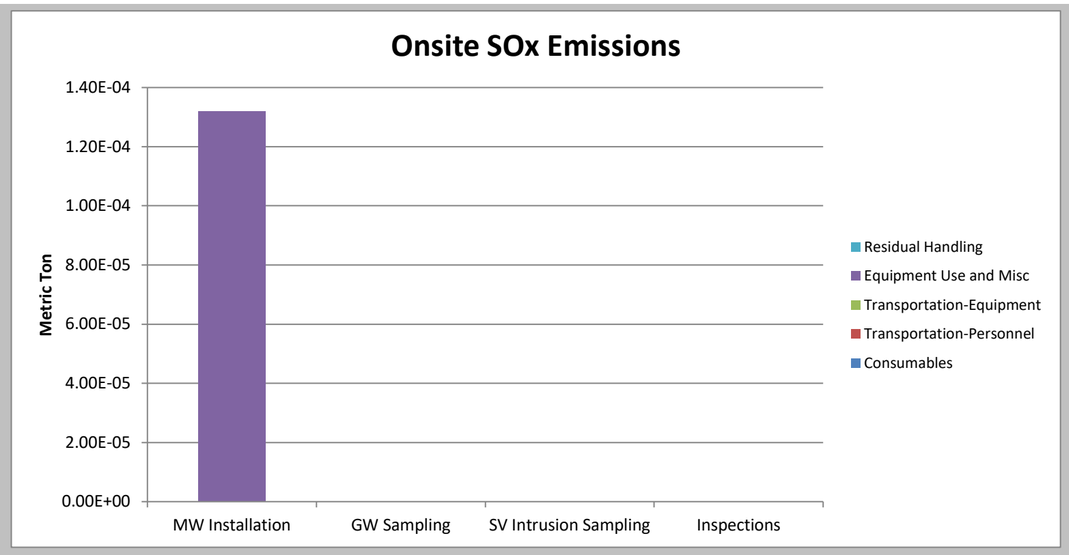
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
MW Installation	0.0E+00	0.0E+00	0.0E+00	0	5.3E-03	0.0%	
GW Sampling	0.0E+00	0.0E+00	0.0E+00	0	1.7E-02	0.0%	
SV Intrusion Sampling	0.0E+00	0.0E+00	0.0E+00	0	5.3E-04	0.0%	**$0**
Inspections	0.0E+00	0.0E+00	0.0E+00	0	7.3E-03	0.0%	
Total	**0.0E+00**	**0.0E+00**	**0.0E+00**	**$0**	**3.0E-02**	**0.0%**	

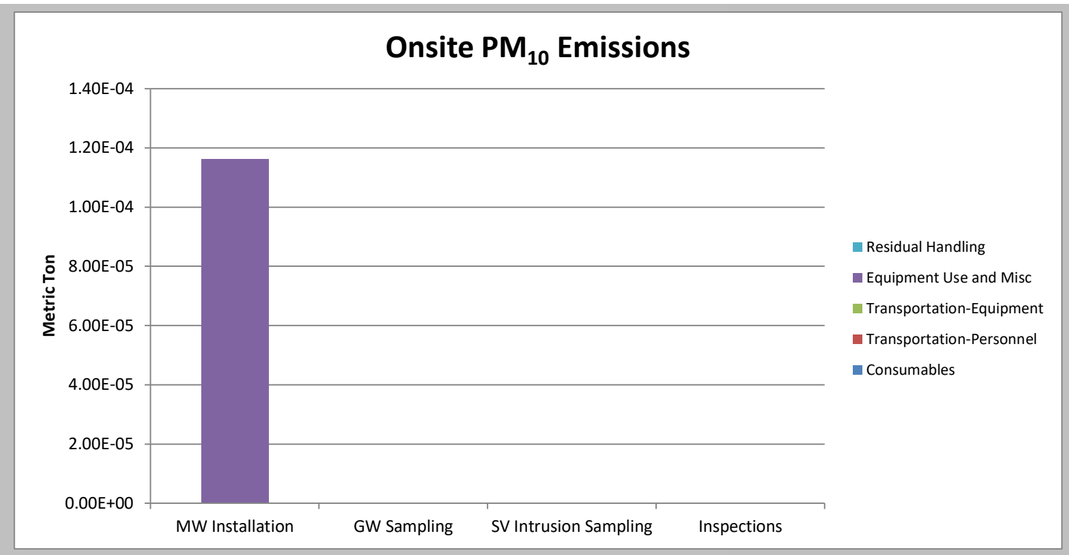

GHG Emissions
Metric Tons
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

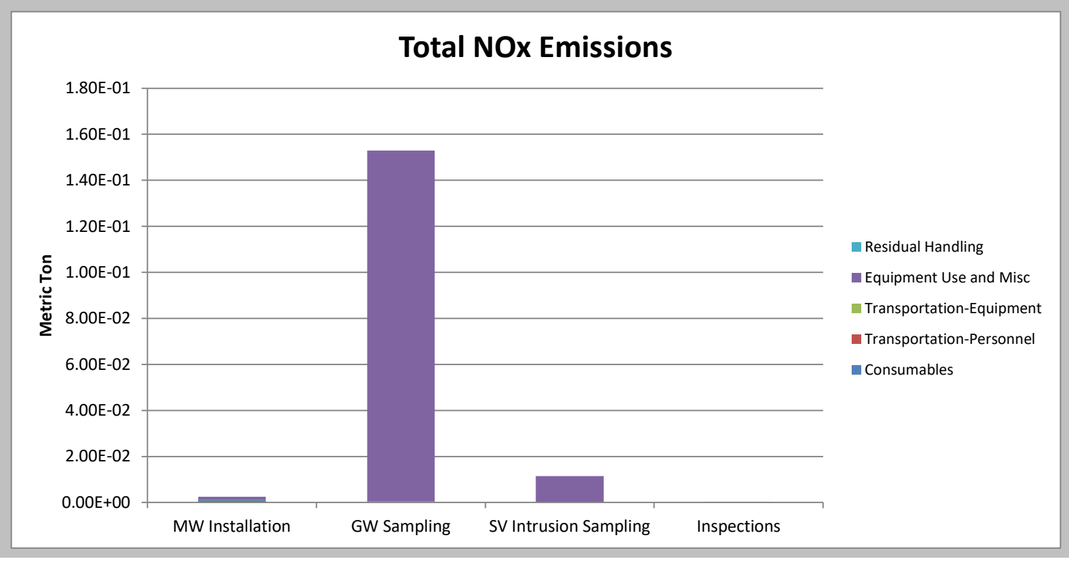

Total Energy Used
MMBTU
5.00E+02
4.50E+02
4.00E+02
3.50E+02
3.00E+02
2.50E+02
2.00E+02
1.50E+02
1.00E+02
5.00E+01
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

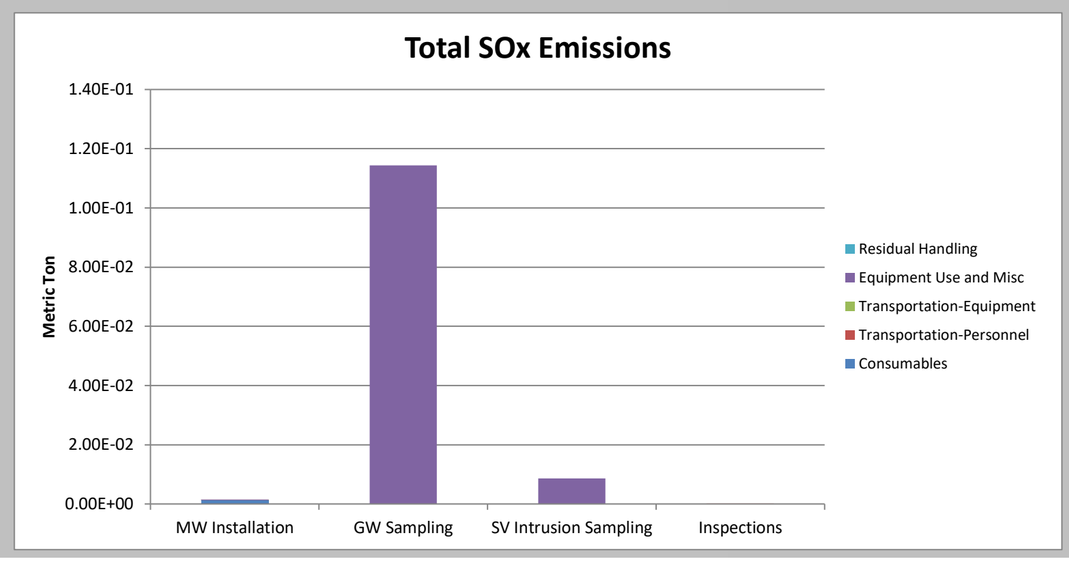

Water Consumption
Gallons
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

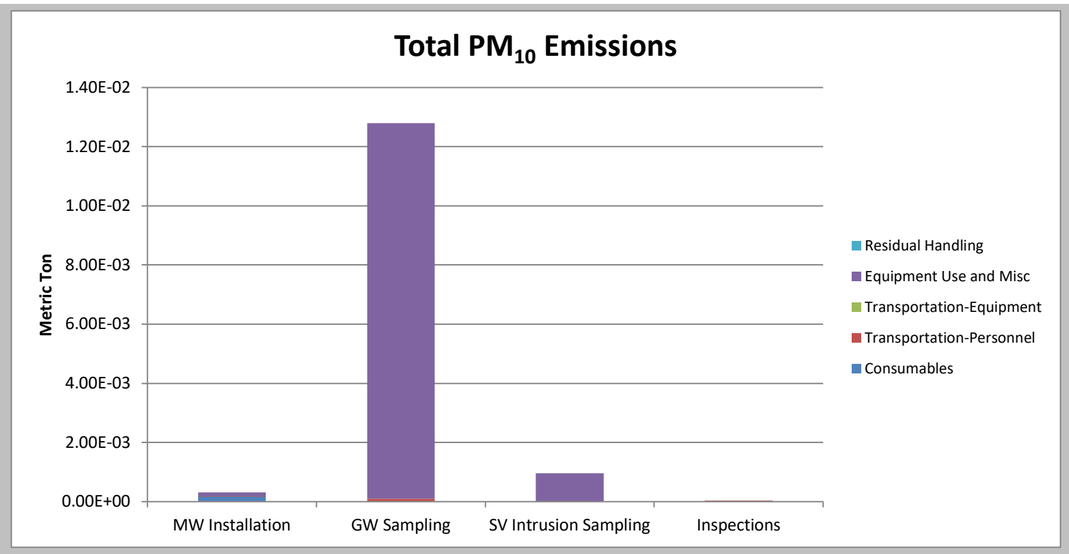

Onsite NOx Emissions
Metric Ton
1.40E-03
1.20E-03
1.00E-03
8.00E-04
6.00E-04
4.00E-04
2.00E-04
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

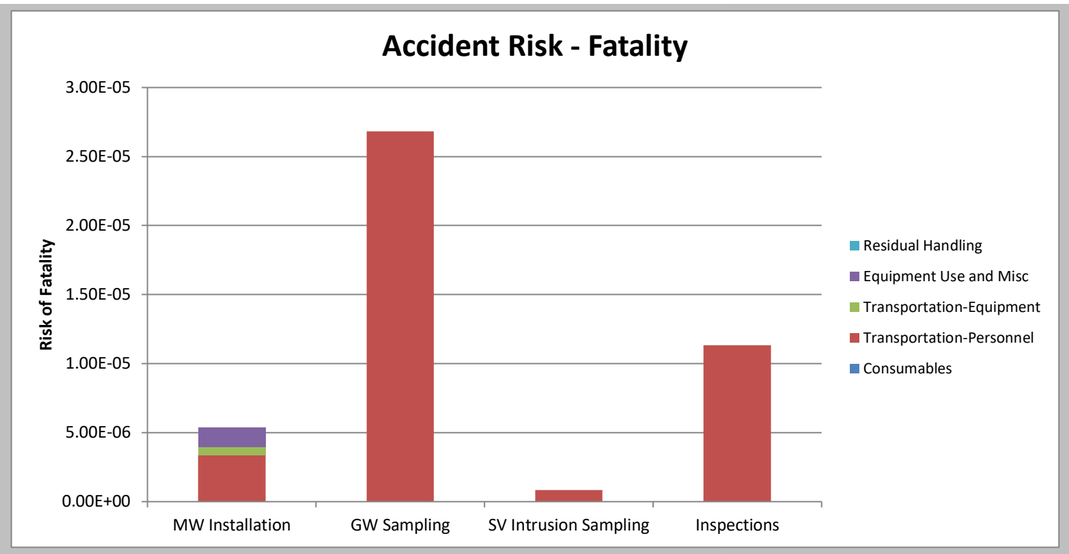

Onsite SOx Emissions
Metric Ton
1.40E-04
1.20E-04
1.00E-04
8.00E-05
6.00E-05
4.00E-05
2.00E-05
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

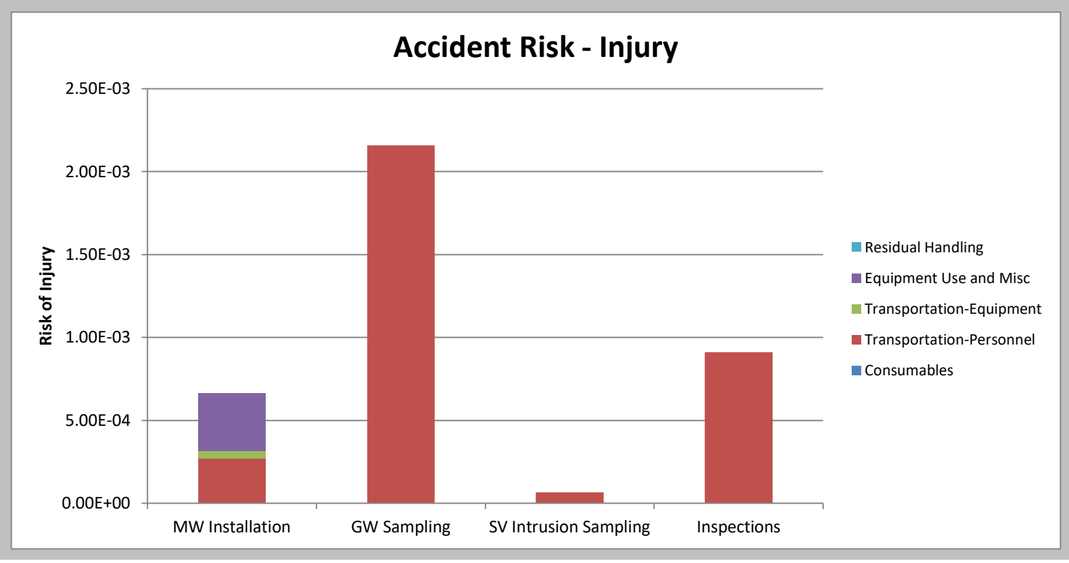

Onsite PM10 Emissions
Metric Ton
1.40E-04
1.20E-04
1.00E-04
8.00E-05
6.00E-05
4.00E-05
2.00E-05
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

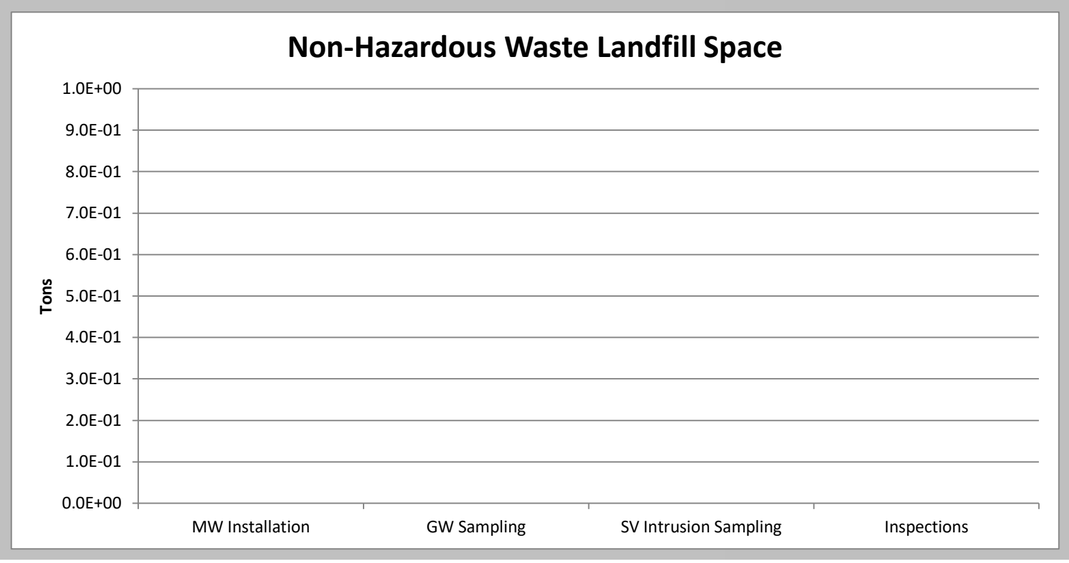

Total NOx Emissions
Metric Ton
1.80E-01
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

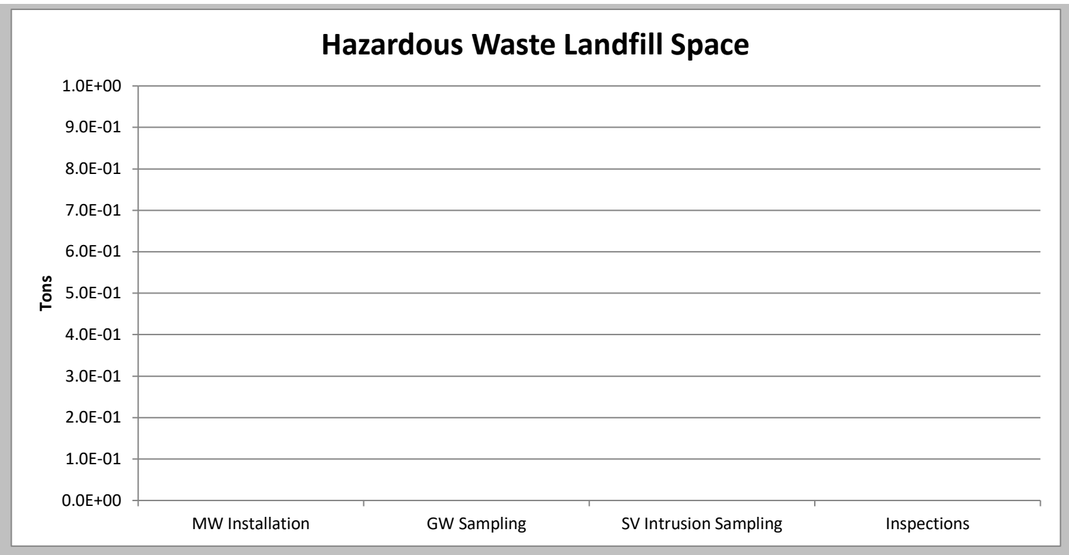

Total SOx Emissions
Metric Ton
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

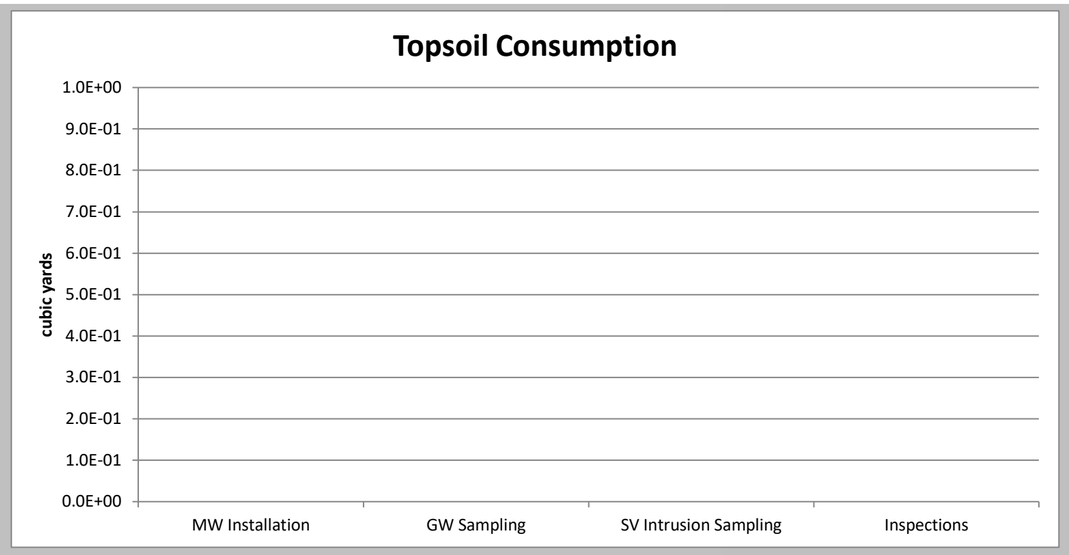

Total PM10 Emissions
Metric Ton
1.40E-02
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

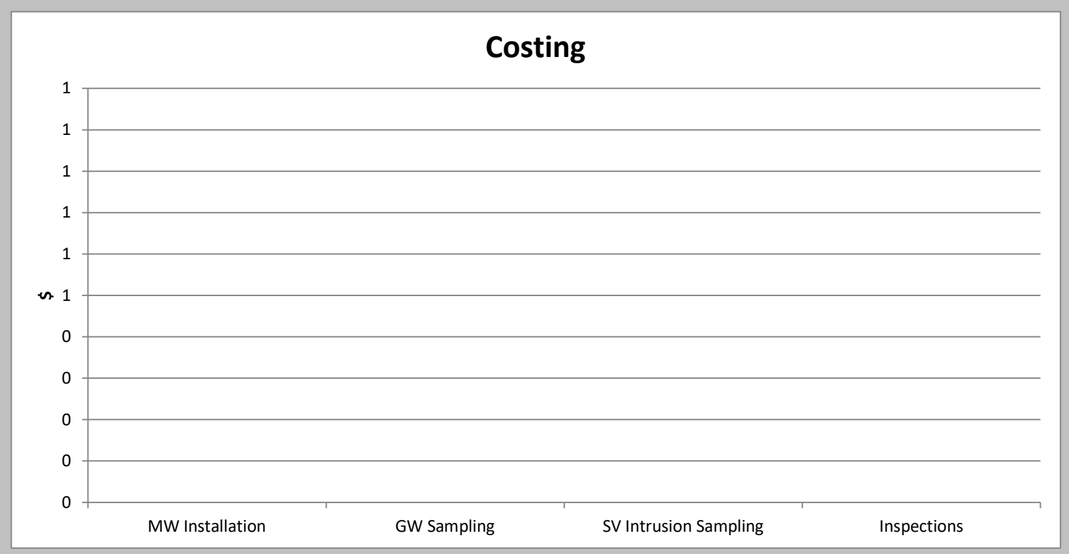

Accident Risk - Fatality
Risk of Fatality
3.00E-05
2.50E-05
2.00E-05
1.50E-05
1.00E-05
5.00E-06
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

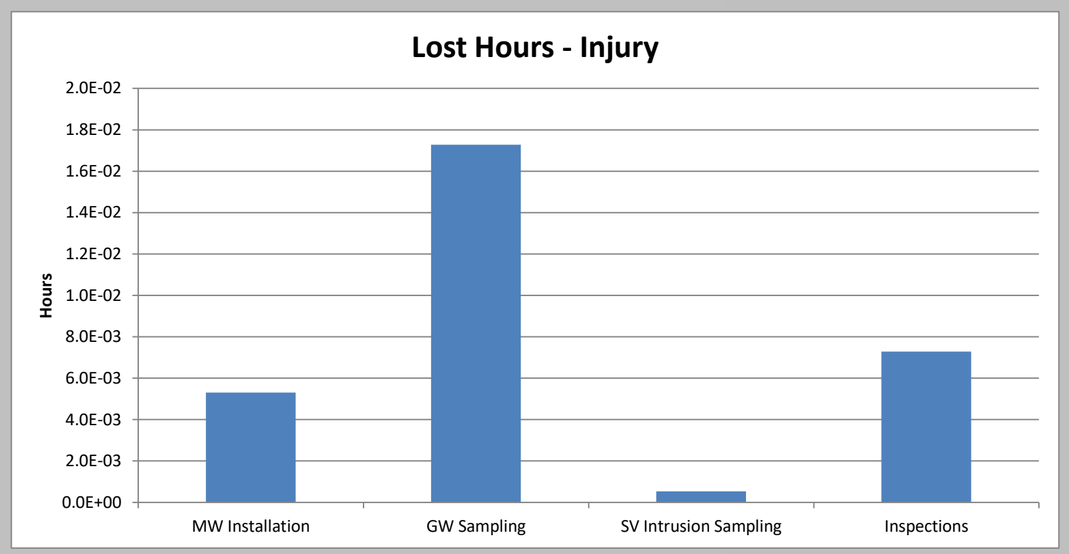

Accident Risk - Injury
Risk of Injury
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Non-Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections


Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections


Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections


Costing
$
1
1
1
1
1
1
0
0
0
0
0
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections


Lost Hours - Injury
Hours
2.0E-02
1.8E-02
1.6E-02
1.4E-02
1.2E-02
1.0E-02
8.0E-03
6.0E-03
4.0E-03
2.0E-03
0.0E+00
MW Installation
GW Sampling
SV Intrusion Sampling
Inspections

APPENDIX N

REMEDIAL SYSTEM OPTIMIZATION (RSO) REPORT OUTLINE

LANGAN

REMEDIAL SYSTEM OPTIMIZATION REPORT

TABLE OF CONTENTS

1.0 INTRODUCTION

- 1.1 Site Overview
- 1.2 Project Objectives and Scope of Work
- 1.3 Report Overview

2.0 REMEDIAL ACTION DESCRIPTION

- 2.1 Site Location and History
- 2.2 Regulatory History and Requirements
- 2.3 Clean-Up Goals and Site Closure Criteria
- 2.4 Previous Remedial Actions
- 2.5 Description of Existing Remedy
  - 2.5.1 System Goals and Objectives
  - 2.5.2 System Description
  - 2.5.3 Maintenance Program

3.0 FINDINGS AND OBSERVATIONS

- 3.1 System Performance
- 3.2 Regulatory Compliance
- 3.3 Major Cost Components or Processes
- 3.4 Safety Record

4.0 RECOMMENDATIONS

- 4.1 Recommendations to Achieve or Accelerate Site Closure
  - 4.1.1 Source Reduction/Treatment
  - 4.1.2 Sampling
  - 4.1.3 Conceptual Site Model (Risk Assessment)
- 4.2 Recommendations to Improve Performance
  - 4.2.1 Maintenance Improvements
  - 4.2.2 Monitoring Improvements
  - 4.2.3 Process Modifications
- 4.3 Recommendations to Reduce Costs
  - 4.3.1 Supply Management
  - 4.3.2 Process Improvements or Changes
  - 4.3.3 Optimize Monitoring Program
  - 4.3.4 Maintenance and Repairs
- 4.4 Recommendations for Implementation