Site Management Plan

2424 Hamburg Turnpike Site
BCP Site Number: C915296
Lackawanna, New York

December 2019 0345-015-001

Prepared By:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

2558 Hamburg Turnpike, Suite 300, Buffalo, New York 14218 | phone: (716) 856-0635 | fax: (716) 856-0583

2424 HAMBURG TURNPIKE SITE

ERIE COUNTY

BUFFALO, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C915296

Prepared for:

2424 Hamburg Turnpike, LLC
2558 Hamburg Turnpike, Suite 340, Buffalo, NY 14218

Prepared by:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300, Buffalo, NY 14218
(716) 856-0599

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

---

DECEMBER 2019

CERTIFICATION STATEMENT

I, Thomas H. Forbes, 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).

_____ P.E.

12-10-19 DATE

2424 HAMBURG TURNPIKE SITE

ERIE COUNTY

BUFFALO, NEW YORK

SITE MANAGEMENT PLAN

Table of Contents

Section	Description	Page
ES	**EXECUTIVE SUMMARY**	vii
1.0	INTRODUCTION	1
1.1	General	1
1.2	Revisions	2
1.3	Notifications	2
2.0	SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS	4
2.1	Site Location and Description	4
2.2	Physical Setting	4
2.2.1	*Land Use*	*4*
2.2.2	*Geology*	*5*
2.2.3	*Hydrogeology*	*5*
2.3	Investigation and Remedial History	6
2.3.1	*1994 "Inactive" NYSDEC Spill No. 9407600*	*6*
2.3.2	*2012 NYSDEC Spill No. 1204435*	*6*
2.3.3	*2013 Geophysical Survey Results*	*6*
2.3.4	*2014 Phase II Environmental Investigation*	*7*
2.3.5	*Remedial Investigation*	*8*
2.3.6	*Interim Remedial Measures*	*8*
2.3.7	*Remedial Action Activities*	*9*
2.3.8	*Emerging Contaminant Groundwater Sampling*	*10*
2.4	Remedial Action Objectives	10
2.4.1	*Groundwater*	*10*
2.4.2	*Soil*	*11*
2.4.3	*Soil Vapor*	*11*
2.5	Remaining Contamination	11
2.5.1	*Soil/Fill*	*12*
2.5.2	*Groundwater*	*12*
3.0	INSTITUTIONAL AND ENGINEERING CONTROL PLAN	13
3.1	General	13
3.2	Institutional Controls	13
3.3	Engineering Controls	14
3.3.1	*Cover System*	*14*
3.3.2	*In-Situ Dual Phase Soil Vapor and Groundwater Extraction System*	*15*

3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems *15*
4.0 MONITORING AND SAMPLING PLAN 17
4.1 General 17
4.2 Site-Wide Inspection 17
4.3 Treatment System Monitoring and Sampling 19
4.3.1 Remedial System Monitoring *19*
4.3.2 Remedial System Sampling *21*
4.3.3 Remedial System Discontinuation Sampling *21*
4.4 Post-Remediation Media Monitoring and Sampling 21
4.4.1 Groundwater Sampling *22*
4.4.2 Monitoring and Sampling Protocol *24*
5.0 OPERATION AND MAINTENANCE PLAN 25
5.1 General 25
5.2 Vapor and Groundwater Extraction and Monitoring Network 25
5.3 DPE System Process Equipment 26
5.4 Remedial System Performance Criteria 26
5.4.1 DPE System Emission Controls *26*
5.5 Operation and Maintenance of the DPE System 27
5.5.1 System Start-Up and Testing *27*
5.5.2 Routine System Operation and Maintenance *28*
5.5.3 System Monitoring Devices and Alarms *29*
6.0 PERIODIC ASSESSMENTS/EVALUATIONS 30
6.1 Climate Change Vulnerability Assessment 30
6.2 Green Remediation Evaluation 30
6.2.1 Timing of Green Remediation Evaluations *31*
6.2.2 Remedial Systems *31*
6.2.3 Building Operations *31*
6.2.4 Frequency of System Checks, Sampling and Other Periodic Activities *31*
6.2.5 Metrics and Reporting *31*
6.3 Remedial System Optimization 32
7.0. REPORTING REQUIREMENTS 33
7.1 Site Management Reports 33
7.2 Periodic Review Report 35
7.2.1 Certification of Institutional and Engineering Controls *36*
7.3 Corrective Measures Work Plan 38
7.4 Remedial Site Optimization Report 38
8.0 REFERENCES 39

TABLE OF CONTENTS (Continued)

List of Tables

Table 1 - Notifications (see Section 1.3)
Table 2 - Summary of IRM Post-Excavation Confirmatory Analytical Results
Table 3 - Summary of Emerging Contaminant Groundwater Analytical Results
Table 4 - Summary of Remaining On-Site Soil/Fill above USCOs
Table 5 - Summary of Pre-Remediation Groundwater Analytical Results
Table 6 - Remedial System Monitoring Requirements and Schedule (see Section 4.3.1)
Table 7 - DPE Well Construction Details (see Section 4.3.1)
Table 8 - Remedial System Sampling Requirements and Schedule (see Section 4.3.2)
Table 9 - Post-Remediation Sampling Requirements and Schedule (see Section 4.4)
Table 10 - On-site Monitoring Well Construction Details (see Section 4.4.1)
Table 11 - Schedule of Interim Monitoring/Inspection Reports (see Section 7.1)

List of Figures

Figure 1 - Site Location Map
Figure 2 - Site Plan (Aerial)
Figure 3 - Pre-Remediation Groundwater Isopotential Map
Figure 4 - IRM and Remedial Action Activities
Figure 5 - Remaining Soil/Fill Above USCOs
Figure 6 - Cover System Layout and Details
Figure 7 - DPE System Layout
Figure 8 - DPE System Details

List of Appendices

Appendix A - Environmental Easement
Appendix B - Monitoring Well Boring and Construction Logs
Appendix C - Excavation Work Plan
Appendix D - Health and Safety Plan and CAMP
Appendix E - DPE System O&M Manual
Appendix F - Quality Assurance Project Plan
Appendix G - Site Management Forms
Appendix H - Remedial System Optimization Table of Contents
Appendix I - Electronic Copy

List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
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
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Green House 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
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
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:

Site Identification:	C915296 - 2424 Hamburg Turnpike Site, 2424 Hamburg Turnpike, Buffalo, NY 14218
Institutional Controls:	1. The property may be used for commercial and industrial use as described in 6NYCRR Part 375-1.8(g), although land 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 the groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render if 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.
	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.
	9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.

Site Identification:	C915296 - 2424 Hamburg Turnpike Site, 2424 Hamburg Turnpike, Buffalo, NY 14218
	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. Compliance with the Department approved Site Management Plan and Periodic Review Reporting is required.
Engineering Controls:	1. A site cover has been placed over the site in all areas exceeding applicable SCOs. The cover is either a hardscape (asphalt and concrete, building) and/or a minimum of 12-inches of depth of material meeting the requirements as set forth in 6NYCRR Part 375-6.7(d) for commercial use.
	2. An in-situ dual phase extraction (DPE) system has been installed at the Site to mitigate remaining contamination within the subsurface soil vapor and groundwater. Discontinuation will be based primarily on the reduction of VOC concentrations or mass flow in the untreated soil gas and VOC concentrations in groundwater as observed in on-site groundwater monitoring wells.

Inspections:	Frequency
1. Cover inspection	Annually
Monitoring:	
1. DPE System	Monthly
2. Groundwater Monitoring	Annually
Maintenance:	
1. DPE System	As needed
Reporting:	
1. Groundwater and DPE System Data	Annually

Site Identification:	C915296 - 2424 Hamburg Turnpike Site, 2424 Hamburg Turnpike, Buffalo, NY 14218
2. Annual Site Inspection	Annually
3. Periodic Review Report	Annually

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 2424 Hamburg Turnpike Site located in City of Lackawanna, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP) Site No. C915296 which is administered by New York State Department of Environmental Conservation (NYSDEC).

2424 Hamburg Turnpike, LLC entered into a Brownfield Cleanup Agreement (BCA) on November 2, 2015 with the NYSDEC to remediate the site. Figures 1 and 2 show the site location and boundaries of this site. 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 A.

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 Erie 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 plan has been approved by the NYSDEC, and compliance with this plan 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);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA, (Index #C915296-10-15; Site #C915296) 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.

This SMP was prepared by Benchmark Environmental Engineering & Science, PLLC (Benchmark), on behalf of 2424 Hamburg Turnpike, LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010 (Ref. 1), 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

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC 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:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.
- 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.
- 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.

- 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:

- 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 Brownfield Cleanup Agreement (BCA) and all approved work plans and reports, including this SMP.

- 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.

Table 1 on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information.

Table 1: Notifications*

Name	**Contact Information**
NYSDEC Project Manager Mr. Anthony Lopes, P.E.	716-851-7220 anthony.lopes@dec.ny.gov
NYSDEC Regional HW Engineer Mr. Stan Radon, PG	716-851-7220 stanley.radon@dec.ny.gov
NYSDEC Site Control Ms. Kelly Lewandowski, P.E.	518-402-9543 kelly.lewandowski@dec.ny.gov

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

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in City of Lackawanna, Erie County, New York and is identified as Section 141.59 Block 5 and Lot 2 on the Erie County Tax Map (see Figure 2). The site is an approximately 1.04-acre area and is bounded by an active gasoline station to the north, a retail store to the south, vacant land to the east, and Hamburg Turnpike (aka Route 5) to the west (see Figure 2 – Site Plan). The boundaries of the site are more fully described in Appendix A – Environmental Easement. The owner(s) of the site parcel(s) at the time of issuance of this SMP is:

2424 Hamburg Turnpike, LLC
2558 Hamburg Turnpike, Suite 340
Buffalo, New York 14218

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a vacant commercial building consisting of a former automobile service building with four repair bays and seven (former) in-ground hydraulic lifts. The Site also includes green space and asphalt paved areas as well as concrete slabs suspected to have been associated with former on-site structures. The Site is zoned mixed commercial/industrial and is currently vacant and unoccupied. The area of the Site is predominantly zoned commercial and industrial along with the Bethlehem Redevelopment Area located west of the Site across Route 5. Residential properties are located north and east of the Site beyond vacant/commercial properties.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial, residential, and industrial properties. The properties immediately south of the Site include commercial properties (i.e., a retail store); the properties immediately north of the Site include commercial properties (i.e., an active gasoline station and convenience store); the properties immediately east of the Site include vacant commercial properties; and the properties to the west of the Site include vacant industrial properties.

Site redevelopment plans will be prepared as development opportunities arise and will be consistent with the local zoning plan. The Site is located within the City of Lackawanna First Ward Brownfield Opportunity Area (BOA).

2.2.2 Geology

The Site is located within the Lake Erie-Niagara River Major Drainage Basin which is typified by little topographic relief and gentle slope toward Lake Erie, except in the immediate vicinity of major drainage ways. Generally, the Site is topographically flat and almost entirely covered by the existing buildings, concrete slabs and asphalt paving.

Investigation activities characterized the overburden soil/fill as generally consisting of fill with sand, gravel, slag, black fines, and/or cinders ranging in thickness from grade to eight feet below ground surface (fbgs). The fill is underlain by silty clay and/or lean clay ranging in thickness between 2 to 11 feet overlaying an organic/peat layer that ranges at depths between 7 and 14 feet. Site specific boring logs are provided in Appendix B.

Based on the bedrock geologic map of Erie County, the Site is situated over the Skaneateles Formation of the Middle Devonian Series. The Skaneateles Formation consists mostly of dark- to medium-gray fossiliferous shale and mudrock, contains a black shale facies that resembles the Marcellus Shale, and includes the Stafford Limestone Member at its base. Approximate depth of bedrock at the Site is 60 feet. Bedrock was not encountered during the RI drilling activities.

2.2.3 *Hydrogeology*

During RI activities at the Site, the uppermost water bearing unit was generally observed between 10 and 14 fbgs, typically beneath the organic peat layer. A shallow apparent perched water table was generally noted beneath the fill and above the organic peat layer at depths ranging between 4 and 7 fbgs. Based on the findings of the RI, groundwater at the Site generally flows in a north-northwesterly direction toward Lake Erie and the Union Ship Canal.

A groundwater contour map is shown in Figure 3, using groundwater elevation data from the RI. Groundwater monitoring well construction logs are provided in Appendix B.

2.3 Investigation and Remedial History

Prior to being vacated, the Site was used as an automobile filling and service station (Stop-N-Gas) beginning in at least 1957 when three 10,000-gallon underground storage tanks (USTs) were installed on-site. Petroleum bulk storage (PBS) records indicate that the three USTs were closed/removed in 1994. Subsequent to the automobile filling and service station operations, the Site operated as a retail store. Historic Sanborn maps and aerial photographs indicate that prior to the current on-site development, the Site was vacant land from at least 1926 through at least 1951.

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

2.3.1 1994 "Inactive" NYSDEC Spill No. 9407600

NYSDEC Spill Record #9407600 indicates that three 10,000-gallon USTs (two gasoline and one diesel) were removed from the Site in 1994 by Nature's Way. According to the record, petroleum-impacted soil and groundwater were discovered during excavation activities. Approximately 500 cubic yards of contaminated soils were excavated and stockpiled on-site in areas north and south of the existing automotive service building. The stockpiled soil was bio-remediated on-site by the excavation contractor and returned to the excavation subsequent to treatment. Groundwater from the excavation was pumped into a temporary holding tank, treated through activated carbon and discharged to the ground on-site. The spill was reclassified as "inactive" on August 28, 1995.

2.3.2 2012 NYSDEC Spill No. 1204435

NYSDEC Spill Record #1204435 indicates that petroleum contamination was discovered during utility upgrades being completed along Hamburg Turnpike. Specifically, petroleum odors were apparent in the telecommunications manhole located along the western property boundary of the Site. The spill incident appears to have been administratively "closed" by NYSDEC when the Site was accepted into the BCP.

2.3.3 2013 Geophysical Survey Results

AMEC Environment and Infrastructure, Inc. (AMEC) completed a geophysical survey of the Site on July 23, 2013. In its August 10, 2013 letter report (Ref. 2), AMEC identified four

underground anomalies believed to be potential fueling operation equipment, including appurtenant piping to the dispenser islands and/or USTs.

2.3.4 2014 Phase II Environmental Investigation

TurnKey Environmental Restoration, LLC (TurnKey) completed a Phase II Environmental Investigation (Ref. 3) consisting of 10 soil borings (SB-1 through SB-10), three of which were converted into temporary one-inch diameter monitoring wells (SB-4/TMW-1, SB-5/TMW-2 and SB-7/TMW-3), to assess subsurface conditions on-site, including:

- The area of potential contamination discovered during utility upgrade activities along Hamburg Turnpike (SB-7/TMW-3; Spill No. 1204435).
- Areas proximate to the in-ground lifts within the service building.
- Four underground anomalies identified during the geophysical survey.

Elevated photoionization detector (PID) readings above background (0.0 ppm) and petroleum odors were identified in 7 of the 10 soil borings (SB-4 through SB-10) with the highest PID reading noted as 1,098 parts per million (ppm) at SB-6 (2-4'). In addition, approximately one inch of floating petroleum product was noted in temporary monitoring well TMW-1 completed north of the former UST excavation area.

Six soil samples were analyzed by the laboratory for Target Compound List (TCL) plus CP-51 (Ref. 4) volatile organic compounds (VOCs) and CP-51 semi-volatile organic compounds (SVOCs). Two groundwater samples were analyzed for TCL plus CP-51 VOCs. The laboratory analytical results indicate that:

- Petroleum VOCs were detected at concentrations above CP-51 and/or Part 375 Protection of Groundwater, Unrestricted and/or Restricted-Residential Use Soil Cleanup Objectives SCOs (USCOs and RSCOs) in all six soil samples.
- Three soil samples exhibited SVOC concentrations above CP-51 and/or Part 375 Protection of Groundwater, USCOs, RSCOs, Commercial and/or Industrial Use SCOs (CSCOs and ISCOs). Total PAH concentrations were reported at >500 ppm in SB-5.
- Both groundwater samples exhibited petroleum VOCs at concentrations above Class GA Groundwater Quality Standards (GWQS) with the more significant concentrations (16,333 micrograms per liter (ug/L) total VOCs) identified at TMW-2. Due to the presence of product at TMW-1, concentrations exceeding GWQS are assumed to be present.

2.3.5 Remedial Investigation

Benchmark completed a Remedial Investigation to further characterize the Site in accordance with the BCP requirements. The RI included soil boring advancement; test pit excavations; surface/subsurface soil/fill sampling; monitoring well installation; and groundwater quality sampling. The results of the RI are summarized below with details provided in the RI/IRM/AA Report (Ref. 5):

- Surface Soil/Fill: Minor SVOC and metal impacts; the only exceedance of CSCOs was benzo(a)pyrene at RI SS-1. Individual concentrations of SVOCs and metals were identified at concentrations slightly above USCOs. The SVOCs and metals identified are ubiquitous to industrial soil/fill and have been identified at numerous Sites nearby.
- Subsurface Soil/Fill: Grossly contaminated soil (GCS) was identified within the footprint of the historic automotive repair building, west of the repair building, and north of the former UST excavation area. GCS was noted to include strong petroleum-like odors and PID readings >100 ppm (up to 1,235 ppm). No VOCs, pesticides, herbicides, or PCBs were detected above Part 375 CSCOs. Only one metal (arsenic) was detected slightly above its respective Part 375 CSCO in subsurface soil/fill at two sample locations. Benzo(a)pyrene was detected above Part 375 CSCOs at four sample locations. Total PAH concentrations were reported at less than 500 ppm.
- Groundwater: Petroleum-related VOC concentrations exceeded GWQS/GVs at monitoring wells located northwest, west and southwest of the historic automotive repair building. SVOCs were predominantly reported as non-detect, trace (estimated), or detected at concentrations below GWQS/GVs. Only naphthalene at MW-3 and an estimated concentration of phenol at MW-4 exceeded GWQS/GVs. Total and dissolved metals detected at concentrations above GWQS/GVs included naturally occurring minerals such as iron, manganese, and sodium. Additionally, total arsenic was detected above its respective GWQS/GV at MW-2 and MW-5; however, dissolved arsenic was not detected. Herbicides and PCBs were reported as non-detect. Pesticides were non-detect except for an estimated concentration of 4’4’-DDD at MW-5 that was significantly below the GWQS/GV. The visual and olfactory evidence of impact observed in temporary well TMW-1 and well MW-3 are likely associated with the GCS present on-site.

2.3.6 Interim Remedial Measures

Based on the findings of the RI, remedial activities were completed in accordance with the Department-approved April 2016 Interim Remedial Measures (IRM) Work Plan (Ref. 6). Details of the completed IRM activities are presented below, and more fully documented in the Final Engineering Report (FER).

The following IRM activities were conducted between March 9 and May 1, 2017 (see Figure 4):

- Extraction of 270 gallons of hydraulic oil from within the in-ground lifts followed by off-site recycling by American Recyclers Company in Tonawanda, NY.
- Removal of seven in-ground lifts from the former automotive repair building followed by off-site recycling at Niagara Metals in Niagara Falls, NY.
- Excavation of GCS encountered during in-ground lift removal activities followed by off-site disposal of 885.9 tons of GCS at the Chaffee Landfill in Chaffee, NY.
- Discharge of 140,000 gallons of excavation water, which was pretreated with bag filters and activated carbon, to the sanitary sewer under a discharge permit from Erie County Sewer District No. 6. The solids and water generated from the final cleaning of the Frac tank were disposed off-site at American Recyclers Company in Tonawanda, NY.
- Collection of confirmatory samples from the sidewalls (8 samples) and bottom (3 samples) of the excavation for analysis of CP-51 VOCs and SVOCs. Five of the eight sidewall samples exceeded the CSCOs for one or more analytes.
- Backfilling of the excavation with the concrete from the floor and remediated soil from the Tonawanda Terminals Corp. Biotreatment Facility in Tonawanda, NY meeting unrestricted use SCOs.

Residual soil/fill impact remains on the north, west, and east sides of the excavation; however, additional soil/fill could not be removed without compromising the integrity of the existing building foundation. Table 2 summarizes the post-excavation confirmatory sample results. Documentation of the completed IRMs described above are provided in the FER.

2.3.7 Remedial Action Activities

Remedial actions have been completed to address known environmental impacts related to past use of the Site as identified in the RI, accordance with the Remedial Action Work Plan (RAWP) (Ref. 7). Specifically, remedial action activities included the following (see Figure 4):

- Demolition of the on-site shed located in the southeast corner of the site, and demolition of the elevated concrete floor slabs located north of the shed and at the northern portion of the site.
- Excavation and off-site disposal of petroleum piping and petroleum impacted subsurface soils between the former tank field and the fuel dispensing islands.
- Installation of a dual phase extraction (DPE) system to mitigate remaining contamination within the subsurface soil/fill and the groundwater.

- Replacement of existing exterior asphalt/concrete cover with a new primarily asphalt pavement cover over approximately 0.73 acres.
- Placement of a vegetated soil cover with a minimum of 12 inches of imported borrow soil meeting commercial SCOs over approximately 0.3 acres.
- Replacement of approximately 2,500 square feet of 6-inch thick reinforced concrete floor in the garage bay of the building

Documentation of the completed remedial action activities described above are provided in the FER.

2.3.8 Emerging Contaminant Groundwater Sampling

Benchmark completed emerging contaminant groundwater sampling on September 6, 2019 in accordance with the June 2019 NYSDEC approved Emerging Contaminants Groundwater Sampling Work Plan (Ref. 8). Emerging contaminant sampling was completed in three monitoring wells: MW-5 (upgradient), and MW-1 and MW-2 (downgradient) as shown on Figure 3. Sample analysis included 1,4-dioxine via EPA Method 8270 Selective Ion Monitoring (SIM) mode and polyfluoroalkyl substances (PFASs) via a modified EPA Method 537.

The results for 1,4-dioxane were all reported as non-detect. PFAS compounds were reported as either non-detect or low concentrations with PFOA+PFOS less than 70 ng/L in all wells and total PFAS less than 500 ng/L. It should be noted that low level concentration of PFAS compounds were detected in the field blank (provided by laboratory). Emerging contaminant groundwater sampling analytical results are summarized on Table 3.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated March 13, 2018 are as follows:

2.4.1 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 groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

2.4.2 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.

2.4.3 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

The 2424 Hamburg Turnpike Site was remediated to achieve a Track 4 Commercial Use cleanup, which is consistent with the current and intended future use of the Site.

Residual contamination remaining at the Site includes subsurface soil/fill located beneath the cover system, though potential exposure is mitigated due to the depth of the contamination, completion of the remedial activities, and placement of a Site cover system, including existing building, concrete, asphalt , and a minimum of 12 inches of vegetated soil cover systems.

2.5.1 Soil/Fill

Residual soil/fill contamination remaining on-site above Unrestricted Use SCOs (USCOs), includes VOCs, SVOCs (PAHs), and metals located beneath the cover system.

Table 4 summarizes the results of all soil samples collected that exceed the Unrestricted Use SCOs (USCOs) based on RI data and prior to installation and operation of the dual-phase extraction system.

Any remaining soil/fill constituents above regulatory guidelines remaining on-site are located beneath the cover system and VOCs in soil/fill are expected to be further reduced by operation of the DVE system. Potential exposure to the remaining contamination is mitigated due to the depth of the remaining contamination after the completion of remedial measures, depth to on-site groundwater, and placement of a cover system.

2.5.2 Groundwater

RI groundwater results identified certain VOCs, SVOCs, and metals above their respective GWQSs (see Tables 3 and Table 5).

Depth to water ranged from 6 to 8 fbgs during the RI. Due to the depth of contamination and the placement of a cover system, potential direct exposure to the remaining contamination is unlikely. The DPE system is expected to further reduce concentrations of VOCs in on-site groundwater.

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.

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 C) 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.

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. These ICs are:

- The property may be used for commercial as described in 6NYCRR Part 375-1.8(g)(2)(iii) and industrial as described in 6NYCRR Part 375-1.8(g)(2)(iv) uses;

- 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 Erie County Department of Health 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.

3.3 Engineering Controls

3.3.1 Cover System

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of a minimum of 12 inches of DER-10 compliant soil material over demarcation layer, and hardscape elements of the redevelopment, including asphalt pavement, concrete-covered sidewalks, and concrete building slabs. Figure 6 presents the location of the different cover system elements and details. The Excavation Work Plan (EWP) provided in Appendix C outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. 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 Appendix D.

3.3.2 In-Situ Dual Phase Soil Vapor and Groundwater Extraction System

Based on the presence of VOCs in soil vapor from the vadose zone and impacted perched groundwater, an in-situ dual phase soil vapor and groundwater extraction system was installed on-site. Dual phase extraction (DPE) is an in-situ remediation technology that uses a blower to remove both contaminated groundwater and hydrocarbon vapor (i.e., soil gas) from the subsurface. The groundwater extracted from the DPE wells will enter a knockout tank and further pretreatment (if required) by granular activated carbon filters before being discharged to the local publicly operated treatment works (POTW) in accordance with the sewer discharge permit.

Procedures for operating and maintaining the in-situ DPE system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). Shop drawings provided by DPE system manufacturer are included in Appendix E – Operations and Maintenance Manual. Figures 7 and 8 show the location of the DPE system components for the site and the system construction detail and process flow schematic.

3.3.3 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.

3.3.3.1 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.

3.3.3.2 In-Situ Dual Phase Soil Vapor and Groundwater Extraction System

The DPE system will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the DPE system may no longer be required, a proposal to discontinue the system will be submitted by the remedial party. The

proposal will include a specific soil/fill verification sampling plan, identifying the location, depth, and number of soil/fill samples to be collected. Discontinuation of the soil vapor control system will be based on achieving the goal of remediating petroleum impacted soil/fill and groundwater until gross petroleum contamination characteristics (i.e., presence of petroleum product, elevated groundwater concentrations, and elevated soil vapor concentrations) have been adequately addressed. Conditions that may warrant discontinuing the DPE system include contaminant concentrations in groundwater and/or soil vapor that: (1) reach levels that are consistently below ambient water quality standards or the site SCGs, as appropriate; (2) have become asymptotic to a low level over an extended period of time (e.g., reduction of VOC concentrations in the untreated soil gas and reduction in mass removal rate), as accepted by the NYSDEC; or (3) the NYSDEC has determined that the DPE system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC.

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. 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 F.

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

- Monitoring the performance and effectiveness of the site cover system;
- Scheduling monitoring and frequency of submittals to NYSDEC;
- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and soil vapor; 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 at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. 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 G – 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;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm 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.

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 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 determined by the NYSDEC. Written confirmation must be provided to the NYSDEC 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.

4.3 Treatment System Monitoring and Sampling

4.3.1 Remedial System Monitoring

Monitoring of the DPE system will be performed on a routine basis, as identified in Table 6 - Remedial System Monitoring Requirements and Schedule (see below). Modification to the frequency or sampling requirements will require approval from the NYSDEC. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the DPE system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. DPE system components to be monitored include, but are not limited to, the components included in Table 6 below.

Table 6 – Remedial System Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Monitoring Schedule
Blower (before knockout)	Vacuum	Monthly
Main Intake	Influent Air PID	Monthly
Condensate Holding Tank	Volume	Monthly
Blower	Discharge PID	Monthly
Extraction Wells	Vacuum and PID	Semi-annually

A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix G - 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; maintenance and repair, as per the Operation and Maintenance Plan, is required immediately.

Table 7 summarizes the DPE extraction well construction details.

Table 7 – DPE Well Construction Details

Monitoring Well ID	Coordinates (State Planar)	Well Diameter (inches)	Elevation			
			Casing	Surface	Screen Top	Screen Bottom
DPE-1	1077489.104E 1027143.164N	4	577.34	577.84	574.59	569.59
DPE-2	1077507.849E 1027096.169N	4	576.97	577.39	574.22	569.22
DPE-3	1077488.521E 1027114.541N	4	577.06	577.61	574.31	569.31
DPE-4	1077507.031E 1027060.976N	4	576.57	577.17	573.82	568.82
DPE-5	1077525.211E 1027013.232N	4	576.39	576.99	573.64	568.64
DPE-6	1077549.194E 1027036.309N	4	577.19	577.58	573.44	568.44
DPE-7	1077541.05E 1027076.574N	4	577.35	577.99	573.60	568.60
DPE-8	1077552.396E 1027119.783N	4	577.13	578.22	575.38	570.38
DPE-9	1077520.038E 1027148.418N	4	577.64	577.99	573.89	568.89
DPE-10	1077494.337E 1027180.638N	4	577.63	578.14	574.88	569.88
DPE-11	1077539.463E 1027174.836N	4	577.25	577.68	573.51	568.51
DPE-12	1077532.825E 1027207.777N	4	577.42	577.86	573.67	568.67
DPE-13	1077523.111E 1027244.681N	4	579.47	579.80	575.72	570.72
DPE-14	1077508.171E 1027278.726N	4	580.05	580.49	576.30	571.30

4.3.2 Remedial System Sampling

Samples shall be collected from the DPE system on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in Table 8 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 8 – Remedial System Sampling Requirements and Schedule

Sampling Location	Field Parameters	Analytical Parameter		Schedule
	VOCs (PID Readings)	VOCs+TICs (EPA Method TO-15)	MADEP Air Phase Hydrocarbons (APH)	
SVE Blower Intake	X			Monthly
SVE Blower Intake		X	X	Initially/annually

Detailed sample collection and analytical procedures and protocols are provided in Appendix F – Quality Assurance Project Plan.

4.3.3 Remedial System Discontinuation Sampling

Post DPE treatment sampling will be performed in accordance with the DPE discontinuation verification plan that will be prepared and submitted to the NYSDEC to assess completion of the remedial actions.

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater monitoring wells on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in Table 9 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 9 – Post-Remediation Sampling Requirements and Schedule

Sampling Location	Field Parameters	Analytical Parameters	Schedule
	Water Level, DO, ORP, Temp.	VOCs (EPA Method 624)	
Monitoring Well MW-2	X	X	Annually for min. 2 years
Monitoring Well MW-3	X	X	Annually for min. 2 years
Monitoring Wells MW-1 through MW-5	X		Annually for min. 2 years

Detailed sample collection and analytical procedures and protocols are provided in Appendix F – Quality Assurance Project Plan.

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed annually to assess the performance of the remedy. Specifically, wells MW-2 and MW-3 will be sampled and analyzed for VOCs, and groundwater level elevation data will be collected from all five monitoring wells (MW-1 through MW-5) and all 14 DPE wells (DPW-1 through DPE-14) annually for a minimum of 2 years after which time a request may be made to the Department to modify the sampling frequency by the Site owner. Modification to the frequency or sampling requirements will require approval from the NYSDEC. Samples will be collected and analyzed as described below. Figure 7 identifies the extraction well locations.

Table 10 summarizes the on-site well identification numbers, as well as the location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, one mid/upgradient well and one mid/downgradient well are sampled to evaluate the effectiveness of the remedial system. Monitoring well construction logs are included in Appendix B of this document.

Table 10 - On-Site Monitoring Well Construction Details

Well ID	Well Location	Coordinates (state planar)	Well Diameter (inches)	Elevation (above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
MW-1	Downgradient	1077459E 1027319N	2	578.75	579.03	571.25	561.25
MW-2	Mid/ Downgradient	1077479E 1027168N	2	577.96	578.21	570.96	560.96
MW-3	Mid/ Upgradient	1077533E 1027077N	2	577.58	577.78	571.58	561.58
MW-4	Mid/ Upgradient	1077589E 1027036N	2	577.18	577.51	571.18	561.18
MW-5	Upgradient	1077569E 1026932N	2	576.28	576.28	565.71	555.71

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 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. 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.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

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

4.4.2 Monitoring and Sampling Protocol

Field personnel will sample monitoring wells using a submersible pump with dedicated pump tubing following low-flow/minimal drawdown purge and sample collection procedures. In the event of pump failure or the saturated unit does not permit the proper implementation of low-flow sampling, a dedicated polyethylene bailer will be used to sample the well.

Sample collection methods that will be implemented include:

- **Submersible Pump with Dedicated Pump Tubing**
  All monitoring wells will be purged and sampled using a non-dedicated submersible pump and dedicated pump tubing following low-flow (minimal drawdown) purge and sample collection procedures, as described above. Non-dedicated pumps will require decontamination prior to use at each well location and the collection of an equipment blank.
- **Polyethylene Disposable Bailer**
  Wells of any depth (up to 100 fbgs) may be purged and sampled using a polyethylene disposable bailer via direct grab. In general, a bottom filling dedicated polyethylene bailer is attached to a length of dedicated hollow-braid polypropylene rope and lowered into the well smoothly and slowly as not to agitate the groundwater or damage the well. Purging continues until a predetermined volume of water has been removed (typically three well volumes.)

Groundwater samples will be collected from monitoring wells MW-2 and MW-3 and analyzed for TCL VOCs. All collected groundwater samples will be placed in pre-cleaned, pre-preserved laboratory provided sample bottles, cooled to 4°C in the field, and transported under chain-of-custody command to a NYSDOH-approved laboratory for analysis.

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix G - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity, etc.) 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 the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the DPE system;
- Will be updated periodically to reflect changes in site conditions or the manner in which the DPE system is operated and maintained.

Further detail regarding the Operation and Maintenance of the DPE system is provided in Appendix E - Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Vapor and Groundwater Extraction and Monitoring Network

The DPE system is comprised of 14 vertical extraction wells manifolded to trailer-mounted process unit. Figure 7 shows the individual 2-inch HDPE pipes originating from the DVE wells and bundled in common trenches leading to the north east corner of the building where they surface through the new concrete floor slab in the garage bay and are connected to the DVE trailer influent manifold. The vacuum in each pipe and well is controlled by individual valves at the DPE trailer. Groundwater extraction is controlled by using a drop tube set in each well to control the depth of the groundwater removal. The drop tube is set below the water table to a depth to be determined empirically.

Based on the DPE pilot study results and the permeable nature of the on-site soil/fill, a radius of influence of 25 feet per DPE well is expected; a greater radius of influence is probable once the Site surface has been paved and the cones-of-influence are fully developed during full-scale implementation.

The DPE wells were installed to a depth of approximately 8 to 9 fbgs and constructed of 4-inch Schedule 40 PVC with a 5-foot continuous slot well screen extending into the groundwater but no less than 2 fbgs. Well construction details are presented on Figure 8.

5.3 DPE System Process Equipment

Figure 8 presents a process flow schematic for the DPE equipment. The DPE equipment layout and process and instrumentation drawings are presented in the manufacturer's O&M manual for the DPE system (Appendix E).

Manifold piping from the DPE wells enter the DPE trailer and pass through a moisture separator to remove groundwater and water vapor. A fixed pitot tube on the intake line provides an air velocity measurement. A dilution valve on the DPE trailer intake line reduces vacuum, if required, by allowing for entrance of dilution air. A vacuum gauge, connected to the system control panel, measures inlet vacuum changes as the valve is adjusted to assure that the blower is operated within required minimum vacuum limits.

5.4 Remedial System Performance Criteria

DPE system monitoring will initially be conducted weekly during a one month "shake-down" period and thereafter, at a minimum, the performance of the DPE system will be monitored monthly. As summarized on Table 6, performance monitoring will include inspection of mechanical system components for proper operation; vacuum monitoring at each DPE well and at the main intake; and VOC vapor PID screening at the blower intake (influent) and the discharge (effluent) using a hand-held PID. Appendix E includes a DPE system performance log form to be completed and included in the annual PRR provided to the NYSDEC.

5.4.1 DPE System Emission Controls

NYSDEC's Program Policy DAR-1, Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212 (8/10/2016), requires the proper degree of control for applicable process emission sources. To determine if an air emission control or minimum stack height was required, the AERSCREEN modeling software was used to estimate downwind concentrations of

known contaminants. The control modeled was a stack height of 36 inches (minimum) above the building roof elevation.

The model indicated that the contaminant concentration at the downwind boundary of the property was below the allowable annual guideline concentration (AGC) for each contaminant and benzene's mass emission limit (MEL) of 100 pounds per year. Therefore, at this stack height, treatment of the DPE effluent air is not required.

5.5 Operation and Maintenance of the DPE System

The following sections provide a description of the operations and maintenance of the DPE system. Cut-sheets and record drawings for [specify EC] are provided in Appendix E - Operations and Maintenance Manual.

5.5.1 System Start-Up and Testing

The following procedure was followed for the start-up of the DPE system and will be followed in the event the system needs to be restarted after substantial downtime.

Prior to system start-up all the DPE well drop tubes will be set to the highest elevation. Upon initial startup of the system, all but one or two vacuum regulating ball valves for each of the extraction wells should be closed. The DPE dilution air valve should be opened 100%. The system blower and condensate pump should then be placed in automatic mode, and the inlet pressure should be monitored to assure it does not exceed 80 inches due to potential for upwelling of groundwater from the vacuum extraction wells. If inlet vacuum does not reach the minimum requirement, close the dilution air valve to 50% and restart the system. If minimum vacuum is still not achieved, the DPE well dilution valves should be further closed and the process repeated. The vacuum regulating ball valves for the remaining extraction wells will be sequentially opened one by one as the blower operation allows until all regulating valves are fully open. The dilution air valve will be adjusted last to maintain acceptable air and water flow rates.

Once the system is running, vacuum should be checked at each of the wellheads while a second individual monitors conditions in the trailer. To check vacuum at the wellheads, a liquid-filled, portable vacuum gage should be used. Tubing from the vacuum side of the portable gage should be attached to the brass ball valve located at the top of the wellheads, which will then be

opened to allow a vacuum reading. Otherwise, the vacuum regulating valve should be opened to decrease vacuum or closed to increase vacuum. This process should then be repeated for each of the remaining DPE wells. Vacuum adjustment at each of the wells and initial dynamic changes in well water elevations will affect overall system operation. Thus, the vacuum adjustment process is iterative and may require several sequences until the system is properly balanced and all wells are at or near the target vacuum.

During the vacuum adjustment period, the individual in the trailer should monitor conditions to assure that the pressure on the blower inlet line is maintained between 25 and 80 in. WC. Adjustment of the DPE blower inlet ball valve and/or the inlet dilution air valve may be necessary to assure adequate vacuum for safe blower operation. If either of these valves are adjusted, it will be necessary to recheck and possibly readjust the vacuum at each of the wellheads.

After DPE system has been adjusted, the system should be allowed to operate for a minimum period of 48 to 72 hours to reach steady-state conditions. Vacuum should then be checked at each DPE well and adjacent monitoring wells, after which the drop tubes will be lowered in one-foot increments in each of the DPE wells until target operating elevations are achieved.

Subsequent to start-up and during normal operation, the system will run continuously. If a process alarm condition occurs, it must be acknowledged after the problem is corrected in order for the system to restart. Alarm conditions are described above.

One air sample is to be collected from the DPE system exhaust immediately following the system startup period using a Tedlar bag or Summa canister and analyzed for TCL VOCs plus TICs per USEPA Method TO-15 and MADEP Air Phase Hydrocarbons (APH) for gasoline and diesel range organics (GRO and DRO). This DPE exhaust will also be field tested by PID at that time to establish a correlation between VOC concentrations and PID readings.

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

5.5.2 Routine System Operation and Maintenance

The DPE system is designed to require little maintenance over the expected duration of use at the Site. The blower bearing housing is oil-filled and will be checked once per month by

checking the side-mounted sight glass, which is located approximately 3 inches from the bottom of the housing. If the level is below the middle of the sight glass, oil should be added through the top fill port on the housing. Appendix E includes the DPE manufacturer's O&M Manual; maintenance is described on pages 8 and 9 of the Manual.

5.5.3 System Monitoring Devices and Alarms

The DPE system has warning devices to indicate that the system is not operating properly. A vacuum switch, wired to the system control panel, shuts down the system in the event the inlet vacuum is too high. A mechanical high-pressure relief valve and high-pressure switch are located on the discharge line to prevent excess backpressure from damaging the blower. DPE process conditions are controlled by an externally mounted system control panel. Monitored system operating conditions will include high air vacuum, high air pressure, and moisture separator tank high level. These alarm conditions will automatically shut down the DPE system.

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

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, 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.

The Site is considered to have low vulnerability related to climatic conditions. There are no State or Federal wetlands or floodplains located on the Site. The Site is serviced by municipal sewer system (combined storm and sanitary) and will not incorporate any petroleum or bulk storage in the redevelopment. The Site is improved with an existing building and new hardscape/ green space cover. As such, acute cover system erosion resultant in potential exposure to remaining contamination, a minimum of 12 inches below surface, is highly unlikely.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation (Ref. 9) 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 of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

Maintenance of the cover system is not anticipated to generate additional waste, use energy, produce emissions, and require substantial water to promote vegetative cover growth, and/or affect any ecosystem.

6.2.1 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 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. Reporting of these modifications will be presented in the PRR.

6.2.2 Remedial Systems

Remedial systems will be operated properly considering the current Site conditions 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. A DPE system will be operated at the Site and is included in this SMP.

6.2.3 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

6.2.4 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site and 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.

6.2.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix G – 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.

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC 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 focuses 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 G. These forms are subject to NYSDEC revision.

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 Table 11 and summarized in the Periodic Review Report.

Table 11: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Groundwater Monitoring	Annually
Site Inspection Report	Annually
Periodic Review Report	Annually, or as otherwise determined by the Department

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

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., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);

- 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 Department 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 or at another frequency as may be required by the Department. 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 A -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 and severe condition inspections, if applicable.
- 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.
- 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 will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheet, 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^{TM} 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 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; and
- Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.
- 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;
  - The average, high, and low flows per day;
  - The contaminant mass removed;
  - 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.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice 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;*
- *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;*
- *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; 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, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative] for the site."

Every five years the following certification will be added:

- *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 Central Office, NYSDEC Region 9 Office and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic

Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

7.3 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, a Corrective Measures Work Plan will be submitted to the NYSDEC 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.

7.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in Appendix H. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, 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 Central Office, NYSDEC Region 9 Office, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

1. New York State Department of Environmental Conservation. *DER-10/Technical Guidance for Site Investigation and Remediation.* May 2010.
2. AMEC. *Geophysical Survey Results, 2424 Hamburg Turnpike, Lackawanna, NY.* August 10, 2013.
3. Benchmark Environmental Engineering and Science, PLLC. *Phase II Environmental Investigation Report, 2424 Hamburg Turnpike Site, Lackawanna, New York.* January 2014.
4. New York State Department of Environmental Conservation. *Policy CP-51; Soil Cleanup Guidance.* October 21, 2010.
5. Benchmark Environmental Engineering and Science, PLLC. *Remedial Investigation/ Interim Remedial Measure/Alternatives Analysis (RI/IRM/AA) Report, 2424 Hamburg Turnpike, Lackawanna, New York.* August 2017.
6. Benchmark Environmental Engineering and Science, PLLC. *Work Plan for Interim Remedial Measures, 2424 Hamburg Turnpike Site, Lackawanna, New York, BCP Site No. C915296.* January 2017.
7. Benchmark Environmental Engineering and Science, PLLC. *Work Plan for Remedial Action Activities, 2424 Hamburg Turnpike Site, Lackawanna, New York, BCP Site No. C915296.* Revised May 2019.
8. Benchmark Environmental Engineering and Science, PLLC. *Emerging Contaminants Groundwater Sampling Work Plan, 2424 Hamburg Turnpike Site, Lackawanna, New York, BCP Site No. C915296.* June 2019.
9. New York State Department of Environmental Conservation. *DER-31/Green Remediation*. August 11, 2010.

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 2

SUMMARY OF IRM POST-EXCAVATION CONFIRMATORY ANALYTICAL RESULTS
SITE MANAGEMENT PLAN

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

PARAMETER [1]	Commercial Use SCOs [2]	REMEDIAL INVESTIGATION SAMPLE LOCATION (FEET BELOW GROUND SURFACE)										
		IRM NW-1 (4'-12')	IRM NW-2 (4'-12')	IRM SW-1 (4'-12')	IRM SW-2 (4'-12')	IRM EW-1 (4'-12')	IRM EW-2 (4'-12')	IRM WW-1 (4'-12')	IRM WW-2 (4'-12')	IRM BOTTOM 1 (12'-13')	IRM BOTTOM 2 (12'-13')	IRM BOTTOM 3 (12'-13')
		4/18/2017	4/18/2017	5/1/2017	5/1/2017	04/18/2017	04/18/2017	04/18/2017	5/1/2017	04/18/2017	04/18/2017	05/01/2017
Photoionization Detector (PID) - ppm												
Interval Maximum	--	1400.0	28.6	236.1	750.1	37.2	204.1	110.7	249.2	0.0	2.3	1.3
Volatile Organic Compounds (VOCs) - mg/kg [3]												
1,2,4-Trimethylbenzene	**190**	120 F2	16	110 D	130 F2	**450**	**420**	76	58	0.06 *	0.04	0.0064 J
1,3,5-Trimethylbenzene	**190**	50 F2	16	18 D	30 F2	160	140	25	11	0.015 *	0.013	0.0027 J
4-Isopropyltoluene	**--**	2.3 F2 F1	0.26	2.2 D	2 J F1	4 J	3.8 J	1.3	ND	ND	0.00076 J	ND
Benzene	**44**	ND	1.4	2.9 D	ND	16	20	0.56 J	0.72 J	0.0011 J	0.0017 J	ND
Ethylbenzene	**390**	4.9 F2 F1	2.9	18 D	5 J F1	140	130	6	6.9	0.0098 J	0.0084 J	0.001 J
Isopropylbenzene (Cumene)	**--**	2 F1	0.6	1.7 D	1.9 J	13	13	1.6	1.6	ND	0.018	0.0068 J
Methyl tert butyl ether (MTBE)	**500**	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0015 J	ND
n-Butylbenzene	**500**	21 F2	5.7	11 D	16 F2	43	38	9.2	6	ND	ND	ND
n-Propylbenzene	**500**	6.9 F2 F1	4.3	8.9 D	8.4 F2 F1	69	66	6.6	9.9	0.0071 J *	0.0054 J	0.011
sec-Butylbenzene	**500**	ND	0.51	2.6 D	2.4 J F1	7 J	6.1 J	1.3	0.94 J	ND	ND	ND
Toluene	**500**	0.96 J	0.54	8.8 D	ND	5.2 J	4.4 J	2.4	0.63 J	0.003 J	0.0076 J	0.0026 J
m&p-Xylene	**500**	21 F2	9.7	36 D	22	**620**	**570**	40	5.9	0.03	0.042	0.0096 J
o-Xylenes	**500**	1 J	0.34	2.5 D	1.2 J	9	7.3 J	8.9	0.37 J	0.0039 J	0.01	0.0042 J
Total Xylenes	**500**	22 F2 F1	10	39 D	23 F1	**630**	**580**	49	6.3	0.034	0.052	0.014
Semi-Volatile Organic Compounds (SVOCs) - mg/kg [3]												
Acenaphthene	**500**	1.3 J	0.2 J	0.21 J	ND	ND	ND	0.5 J	0.77 J	ND	ND	ND
Acenaphthylene	**500**	ND	ND	0.38 J	0.34 J	ND	ND	0.46 J	0.5 J	ND	ND	ND
Anthracene	**500**	2.2 J F1	ND	0.44 J	0.35 J	ND	ND	1.4 J	1.2 J	ND	ND	ND
Benzo(a)anthracene	**5.6**	2.8 J F1	0.23 J	0.86 J	0.62 J	0.42 J	0.42 J	2 J	1.4 J	ND	ND	ND
Benzo(a)pyrene	**1**	**2 J**	0.27 J	0.79 J	0.51 J	ND	ND	**1.4 J**	**1.1 J**	ND	ND	ND
Benzo(b)fluoranthene	**5.6**	2.3 J	0.47 J	1.2	0.77 J	0.5 J	0.52 J	2.1	1.6 J	ND	ND	ND
Benzo(ghi)perylene	**500**	1.3 J	0.27 J	0.73 J	0.48 J	ND	ND	0.93 J	0.88 J	ND	ND	ND
Benzo(k)fluoranthene	**56**	1.6 J	ND	0.39 J	0.28 J	ND	ND	0.78 J	0.74 J	ND	ND	ND
Chrysene	**56**	2.4 J	0.34 J	0.9 J	0.57 J	ND	ND	1.7 J	1.3 J	ND	ND	ND
Fluoranthene	**500**	8.1 F1	0.44 J	1.9	1.4	1 J	1.2 J	5.2	3.7	ND	ND	ND
Fluorene	**500**	3 J F1	0.18 J	0.5 J	0.35 J	0.4 J	0.4 J	2.8	2.4	ND	ND	ND
Indeno(1,2,3-cd)pyrene	**5.6**	1.3 J	0.25 J	0.62 J	0.42 J	ND	ND	0.92 J	0.82 J	ND	ND	ND
Naphthalene	**500**	11 F2	0.7 J	8	8	18	27	8.4	7	ND	ND	ND
Phenanthrene	**500**	11	0.33 J	1.6	1.2	1.3 J	1.4 J	7.2	5	ND	ND	ND
Pyrene	**500**	6 F1	0.34 J	1.5	1	0.89 J	0.93 J	3.8	2.7	ND	ND	ND

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per 6NYCRR Part 375 Soil Cleanup Objectives (SCOs).
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs

Definitions:

F1 = MS and/or MSD Recovery is outside acceptance limits.
F2 = MS/MSD RPD exceeds control limits.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
ND = Parameter not detected above laboratory detection limit.
ND = Based on results of DUSR
* = ISTD response or retention time outside acceptable limits.
D = Sample was diluted
Bold = Result exceeds Commercial Use SCO.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 3

SUMMARY OF EMERGING CONTAMINANT GROUNDWATER ANALYTICAL RESULTS
SITE MANAGEMENT PLAN

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

PARAMETERS [1]	NYSDEC Emergent Contaminant Threshold [2]	Sample Location and Date		
		MW-1	MW-2	MW-5
		9/6/2019	9/6/2019	9/6/2019
1,4 Dioxane - ng/L				
1,4 Dioxane	**350**	ND < 139	ND < 694	ND < 139
Perfluorinated Alkyl Acids - ng/L				
Perfluorobutanoic acid (PFBA)	**--**	10.6	31.8	1.62 J
Perfluoropentanoic acid (PFPeA)	**--**	4.7	ND < 1.92	ND < 1.70
Perfluorobutanesulfonic acid (PFBS)	**--**	0.867 J	1.05 J	ND < 1.70
Perflurorohexanoic acid (PFHxA)	**--**	2.79	2.82	0.527 J
Perfluoroheptanoic acid (PFHpA)	**--**	1.32 J	1.43 J	ND < 1.70
Perfluorohexanesulfonic acid (PFHxS)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluorooctanoic acid (PFOA)	**--**	2.56	4.11	ND < 1.70
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2FTS)	**--**	ND < 1.96	1.91 J	ND < 1.70
Perfluoroheptanesulfonic acid (PFHpS)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluorononanoic acid (PFNA)	**--**	ND < 1.96	0.605 J	ND < 1.70
Perfluorooctanesulfonic acid (PFOS)	**--**	ND < 1.96	4.61	0.592 J
Perfluorodecanoic acid (PFDA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2FTS)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
N-Methyl Perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluoroundecanoic Acid (PFUnA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluorodecanesulfonic acid (PFDS)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluorooctanesulfonamide (FOSA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluorododecanoic Acid (PFDoA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluorotridecanoic Acid (PFTriA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Perfluorotetradecanoic acid (PFTeA)	**--**	ND < 1.96	ND < 1.92	ND < 1.70
Total PFOA and PFOS	**70**	*2.56*	*8.72*	*0.59*
Total PFAS	**500**	*22.84*	*48.34*	*2.74*

Notes:

1. Only parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Contaminant threshold values per NYSDEC Emergent Contaminant Initial Site Sampling Results Checklist.

Definitions:

ng/L = nanograms per liter
"--" = No contaminant threshold value available for the parameter.
NA = Sample not analyzed for parameter.
ND < 1.96 = Parameter not detected above laboroatory reprorting limit.
J = Estimated Value - The target analyte concentration is below the Reporting Limit (RL) but above the the Method Detection Limit (MDL)

BOLD = Result exceeds NYSDEC Emergent Contaminant Threshold.

TABLE 4

SUMMARY OF REMAINING ON-SITE SOIL/FILL ABOVE USCOs
SITE MANAGEMENT PLAN

2424 HAMBURG TURNPIKE SITE
BUFFALO, NEW YORK

PARAMETER [1]	Unrestricted Use SCOs [2]	PHASE II SAMPLE LOCATION (DEPTH)				REMEDIAL INVESTIGATION SAMPLE LOCATION (DEPTH)																	
		SB-4 (6-8')	SB-5 (6-8')	SB-6 (2-4')	SB-7 (2-4')	RI SS-1 (0-2")	RI SS-2 (0-2")	RI MW-2 (2-4)	RI MW-3 (4-6)	RI MW-4 (10-12)	RI MW-5 (4-6)	RI TP-1 (4.5-7)	RI TP-1 (7-9)	RI TP-2 (4-6)	RI TP-2 (10-12)	RI TP-3 (4-10)	RI TP-3 (13-16)	RI TP-4 (1-3)	RI TP-4 (7-9)	RI TP-5 (1-3)	RI TP-6 (4-6)	RI SB-13 (7-9)	RI SB-14 (4-6)
		01/14/2014				06/06/2016		6/2/2016	06/01/2016							06/06/2016					06/06/2016	06/02/2016	
Photoionization Detector (PID) - ppm																							
Interval or Maximum	--	697 max	850 max	1098 max	67 max	--	--	84 max	712 max	0.0	0.0	0.0	0.0	--	--	--	--	0.0 to 21.5	141 max	1235 max	0.0	0.0	0.0
Volatile Organic Compounds (VOCs) - mg/Kg [3]																							
1,2,4-Trimethylbenzene	**3.6**	**180**	**74**	**14**	3.1	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	ND
1,3,5-Trimethylbenzene	**8.4**	**21**	**21**	3.3	0.96	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	ND
2-Butanone (MEK)	**0.12**	ND	ND	ND	ND	--	--	0.0099 J-	ND	0.052 J	ND	ND	0.1	ND	ND	ND	ND	ND	**0.23**	--	--	0.023 J	ND
Acetone	**0.05**	ND	ND	ND	ND	--	--	**0.077 UJ**	ND	**0.25 U**	0.02 U	0.0083 J	**0.47**	0.0096 J F1	**0.015 J**	ND	**0.056**	ND	**0.71 B**	--	--	**0.12**	0.021 J
Benzene	**0.06**	**1 J**	**0.8**	**1.5**	**0.083**	--	--	0.0026 J-	**0.23 J**	0.0018 J	0.0015	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	ND
Chloroform	**0.37**	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00047 J	ND	ND	--	--	ND	ND
Cyclohexane	**--**	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0022 J	ND	0.049	--	--	ND	ND
Ethylbenzene	**1**	**14**	**14**	**5.7**	0.25	--	--	0.0011 J-	**12**	ND	ND	ND	ND	ND	ND	0.0055 J	0.00055 J	0.057 J	0.0064 J*	--	--	ND	ND
Isopropylbenzene (Cumene)	**--**	**9.9**	2.1	0.46	0.046 J	--	--	0.0019 J-	1.8	ND	ND	ND	ND	ND	ND	0.016 J	ND	0.013	0.0065 J	--	--	ND	ND
Methyl tert butyl ether (MTBE)	**0.93**	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	0.0014 J	ND	ND	ND	0.0015 J	ND	0.0026 J	--	--	ND	ND
Methylcyclohexane	**--**	43	16	1.8	0.39	--	--	0.037 J-	7.9 *	ND	0.0036 J	ND	ND	ND	ND	0.027 J	0.00096 J	0.042 J	0.0058 J	--	--	ND	ND
Methylene chloride	**0.05**	ND	ND	ND	ND	--	--	0.033 UJ	ND	0.012 J	ND	ND	0.017 U	0.0039 U	0.0045 U	ND	0.0057 J	ND	0.0081 J	--	--	0.0087 U	0.0031 U
n-Butylbenzene	**12**	**26**	4.4	0.6	0.23	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	ND
n-Propylbenzene	**3.9**	**48**	**11**	2.5	0.23	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	ND
p-Cymene (p-isopropyltoluene)		4.6	0.9	0.14	0.056 J	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	ND
p-Isopropyltoluene	**--**	8.2	1.3	0.22	0.06	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	ND	ND
Toluene	**0.7**	**2.3 J**	**8.3**	**16**	0.26	--	--	0.00091 J-	**9.1**	ND	0.0014 J	ND	ND	ND	ND	ND	0.0008 J	ND	0.0038 J	--	--	ND	ND
Total Xylenes	**0.26**	**12.6 J**	**79**	**29.3**	**1.88**	--	--	0.0032 J-	**66**	ND	ND	ND	ND	ND	ND	ND	0.0011 J	0.061 J	0.029	--	--	ND	ND
Semi-Volatile Organic Compounds (SVOCs) - mg/Kg [3]																							
2-Methylnaphthalene	**--**	--	--	--	--	ND	ND	ND	8.9	0.067 J	2.9	ND	ND	ND	ND	0.79 J	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	**20**	0.49	3.3	ND	ND	ND	ND	ND	0.14 J	ND	0.51 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	**100**	0.34	21	ND	0.1 J	0.77 J	ND	0.77 J	0.16 J	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23 J	0.35 J
Anthracene	**100**	0.86	39	0.76 J	0.075 J	1.2 J	ND	ND	0.3 J	0.11 J	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.31 J
Benzo(a)anthracene	**1**	**1.1**	**71**	**1.6 J**	0.19	**3.9 J**	**1.1 J**	**1.7 J**	1	0.16 J	**3.8**	0.99 J	**1.3 J**	0.25 J	0.035 J	ND	ND	0.53 J	ND	ND	0.38 J	0.37 J	**1.5**
Benzo(a)pyrene	**1**	0.76	**63**	**1.6 J**	0.19	**3.2 J**	0.92 J	**1.9 J**	0.98	0.13 J	**3.4**	0.91 J	1 J	ND	0.03 J	ND	ND	0.67 J	ND	ND	0.41 J	0.26 J	**1.5**
Benzo(b)fluoranthene	**1**	**1.2**	**79**	**2.3 J**	0.26	**4.4**	**1.1 J**	**2.5 J**	**1.3**	0.12 J	**4.5**	**1.1 J**	1 J	0.28 J	0.055 J	ND	ND	0.82 J	ND	ND	0.54 J	0.37 J	**1.7**
Benzo(ghi)perylene	**100**	0.47	38	1.6 J	0.13 J	2.5 J	0.73 J	1.6 J	0.64 J	0.081 J	2.4	0.74 J	0.8 J	0.14 J	ND	ND	ND	0.76 J	ND	ND	0.39 J	0.18 J	1.2
Benzo(k)fluoranthene	**0.8**	0.38	**33**	**1 J**	0.096 J	**1.9 J**	0.65 J	**1.2 J**	0.5 J	0.12 J	**2.1**	0.76 J	**0.96 J**	ND	ND	ND	ND	0.52 J	ND	ND	0.27 J	ND	**1.2**
Biphenyl	**--**	--	--	--	--	ND	ND	ND	ND	ND	0.54 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	**--**	--	--	--	--	ND	ND	ND	0.18 J	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	**1**	**1.2**	**71**	**1.6 J**	0.18	**4.1**	**1.1 J**	**1.8 J**	1	0.14 J	**3.7**	1 J	**1.3 J**	0.26 J	ND	ND	ND	ND	ND	ND	0.44 J	ND	**1.5**
Dibenzo(a,h)anthracene	**0.33**	0.12 J	**10**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzofuran	**7**	--	--	--	--	ND	ND	ND	0.23 J	0.05 J	2.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-octyl phthalate	**--**	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	**100**	3.2	**140**	3.4	0.27	8.1	2.1	2.7 J	1.9	0.42	9.9	1.7 J	2.2 J	0.44 J F2	0.061 J	0.37 J	ND	0.63 J	ND	ND	0.55 J	0.81 J	2.5
Fluorene	**30**	1.3	24	1.4 J	0.056 J	ND	ND	ND	0.37 J	0.099 J	3.9	ND	ND	ND	ND	0.41 J	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	**0.5**	**0.54**	**41**	**1.8 J**	0.14 J	**2.4 J**	**0.63 J**	**1.4 J**	**0.61 J**	0.068 J	**2.1**	**0.65 J**	**0.67 J**	ND	ND	ND	ND	**0.53 J**	ND	ND	0.3 J	ND	**1.1**
Naphthalene	**12**	8	**50**	**48**	0.6	ND	ND	ND	6	0.088 J	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	**100**	3.8	**130**	3.2	0.18	3.9	0.99 J	1.1 J	1.4	0.45	12	0.81 J	2 J	0.24 J	0.038 J	1.2 J	ND	ND	ND	ND	ND	0.74 J	1.1
Pyrene	**100**	2.3	**110**	2.7	0.22	5.8	1.6 J	2.4 J	1.4	0.3 J	7.1	1.5 J	1.9 J	0.39 J	0.056 J	0.34 J	ND	0.58 J	ND	ND	0.54 J	0.58 J	2.2
Metals - mg/Kg																							
Aluminum	**--**	--	--	--	--	14400	8630 F1	--	--	--	--	--	--	12900 J-	--	5410	--	11300	--	25000	9660 B	--	--
Arsenic	**13**	--	--	--	--	9.8	5	--	--	--	--	--	--	5.3	--	2.8	--	11.3	--	5.1	**17.6**	--	--
Barium	**350**	--	--	--	--	121	61.8 F1	--	--	--	--	--	--	102 J	--	39.4	--	115	--	213	88.8	--	--
Beryllium	**7.2**	--	--	--	--	1.2	0.56	--	--	--	--	--	--	0.63	--	0.5	--	1.4	--	4.5	1.5	--	--
Cadmium	**2.5**	--	--	--	--	1.4	1	--	--	--	--	--	--	0.55	--	0.31	--	**3**	--	1.3	ND	--	--
Calcium	**--**	--	--	--	--	44800	69000	--	--	--	--	--	--	53800 J-	--	210000	--	58000	--	150000	60200 B	--	--
Chromium	**30**	--	--	--	--	**211**	26.4	--	--	--	--	--	--	23.6 J-	--	10.3	--	**65.1**	--	**49.1**	**184 B**	--	--
Cobalt	**--**	--	--	--	--	6.1	4.7	--	--	--	--	--	--	7.4	--	2.3	--	4	--	2.3	7.7	--	--
Copper	**50**	--	--	--	--	**53.1**	31.5	--	--	--	--	--	--	32.5	--	16.7	--	49.4	--	19.2	**170**	--	--
Iron	**--**	--	--	--	--	41700	17700	--	--	--	--	--	--	17400 J-	--	9730	--	47000	--	15200	185000 B^	--	--
Lead	**63**	--	--	--	--	**122**	**125 F2 F1**	--	--	--	--	--	--	**167 J**	--	45.8	--	**268**	--	**64.5**	**77.6**	--	--
Magnesium	**--**	--	--	--	--	10500	31700 F2	--	--	--	--	--	--	18400	--	11500	--	5240	--	20200	9860	--	--
Manganese	**1600**	--	--	--	--	**2920**	662 F2	--	--	--	--	--	--	407 J	--	569	--	**3230**	--	**3470**	**3760 B**	--	--
Mercury	**0.18**	--	--	--	--	0.12	0.11	--	--	--	--	--	--	0.16	--	**0.64**	--	0.15	--	0.053	0.15	--	--
Nickel	**30**	--	--	--	--	27.4	18	--	--	--	--	--	--	21.9	--	11.8	--	17.9	--	10	**63.6**	--	--
Potassium	**--**	--	--	--	--	2630	1910 F1	--	--	--	--	--	--	3440 J	--	1380	--	785	--	1390 B	767	--	--
Sodium	**--**	--	--	--	--	247	198	--	--	--	--	--	--	231	--	236	--	564	--	793	470	--	--
Vanadium	**--**	--	--	--	--	39.2	21.3 F1	--	--	--	--	--	--	28.7	--	14.5	--	30.6	--	20.6	38.7	--	--
Zinc	**109**	--	--	--	--	**297**	**243**	--	--	--	--	--	--	**194 J**	--	**231**	--	**578**	--	**141**	**165**	--	--
Cyanide - Total	**27**	--	--	--	--	ND	ND	--	--	--	--	--	--	ND	--	ND	--	ND	--	ND	ND	--	--
Polychlorinated biphenyls- mg/Kg [3]																							
Total PCBs	**0.1**	--	--	--	--	ND	ND	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--
Pesticides and Herbicides - mg/Kg [3]																							
4,4'-DDE	**0.0033**	--	--	--	--	ND	ND	--	--	--	--	--	--	**0.0084 J+**	--	ND	--	ND	--	--	--	--	--

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per 6NYCRR Part 375 Soil Cleanup Objectives (SCOs).
3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs

Definitions:
B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
F2 = MS/MSD RPD exceeds control limits.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
J- = The analyte was positively identified; the associated numerical value is an estimated quantity that may be biased low.
J+ = The analyte was positively identified; the associated numerical value is an estimated quantity that may be biased high.
ND = Parameter not detected above laboratory detection limit.
R = Rejected by third party data validator.
U = The analyte was analyzed for, but was not detected above the level of the associated reported quantitation limit.
UJ = The analyte was analyzed for, but was not detected. The associated reported quantitation limit is approximate amd may be inaccurate or imprecise.
"--" = No value available for the parameter. Or parameter not analysed for.
* = ISTD response or retention time outside acceptable limits.
^ = ICV, CCV, ICB, CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
Bold = Result exceeds Unrestricted Use SCOs.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 5

SUMMARY OF PRE-REMEDIATION GROUNDWATER ANALYTICAL RESULTS
SITE MANAGEMENT PLAN

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

Parameter [1]	NYSDEC Class GA GWQS[2]	Sample Location and Date				
		MW-1	MW-2	MW-3	MW-4	MW-5
		7/27/2016	7/27/2016	7/27/2016	7/27/2016	7/27/2016
Volatile Organic Compounds (VOCs) - ug/L						
Acetone	**50**	ND	12	4.4 J	9.1 J	5.4 J
Benzene	**1**	ND	**8.9**	**8.8**	0.77	ND
Carbon disulfide	**--**	ND	0.4 J	ND	ND	0.55 J
Ethylbenzene	**5**	ND	**6.3**	3.5	ND	ND
Methyl tert butyl ether (MTBE)	**10**	ND	5.1	0.5 J	0.49 J	ND
Methylcyclohexane	**--**	ND	ND	0.97 J	ND	ND
Toluene	**5**	ND	**8.6**	5	ND	ND
Total Xylenes	**5**	ND	**40**	**9.5**	ND	ND
Semi-Volatile Organic Compounds (SVOCs) - ug/L						
2,4-Dimethylphenol	**50**	1.7 J	1 J	0.97 J	ND	ND
2-Methylnaphthalene	**--**	ND	ND	9.4	5.4	ND
2-Methylphenol	**--**	1.6 J	ND	ND	ND	ND
3-Methylphenol/4-Methylphenol	**--**	1.7 J	ND	ND	ND	ND
Acenaphthene	**20**	ND	ND	0.78 J	1.9 J	ND
Acenaphthylene	**--**	ND	ND	0.45 J	1.9 J	ND
Acetophenone	**--**	ND	0.84 J	ND	ND	ND
Anthracene	**50**	ND	ND	ND	1.3 J	ND
Benzaldehyde	**--**	ND	ND	8.7 F1	ND	ND
Biphenyl	**5**	ND	ND	ND	0.81	ND
Carbazole	**--**	ND	ND	2.6 J	5.6	ND
Dibenzofuran	**--**	ND	ND	1.4 J	3.3 J	ND
Fluoranthene	**50**	ND	ND	ND	1.9 J	ND
Fluorene	**50**	ND	ND	2.4 J	7.7	ND
Naphthalene	**10**	ND	ND	**24**	9.1	ND
Phenanthrene	**50**	ND	ND	1.2 J	10	ND
Phenol	**1**	1 J	ND	ND	**2.1 J**	ND
Pyrene	**50**	ND	ND	ND	1.1 J	ND
Total Metals - ug/L [3]						
Aluminum	**--**	490	5000	280	ND	3100
Arsenic	**25**	ND	**63**	16	ND	**48**
Barium	**1,000**	220	660	270	65	350
Calcium	**--**	97500	138000	112000	74700	159000
Chromium	**50**	ND	7.6	ND	ND	5.5
Cobalt	**--**	ND	4.4	ND	ND	4.6
Copper	**200**	ND	16	ND	ND	ND
Iron	**300**	**15800**	**26500**	**16700**	**3900**	**19000**
Lead	**25**	ND	16	ND	ND	ND
Magnesium	**35,000**	28800	23100	23900	20400	31900
Manganese	**300**	ND	**870**	**2500**	**830**	**1100**
Nickel	**100**	ND	15	ND	ND	19
Potassium	**--**	33300	6900	7100	11300	4300
Sodium	**20,000**	**79800**	**90900**	**28100**	**31000**	**42800**
Vanadium	**--**	ND	10	ND	ND	6.9
Zinc	**2,000**	ND	28	ND	ND	26
Dissolved Metals - ug/L [3]						
Barium	**1,000**	--	530 J-	--	--	320 J-
Calcium	**--**	--	129000 J-	--	--	145000 J-
Iron	**300**	--	**840 J-**	--	--	**1700 J-**
Magnesium	**35,000**	--	17900 J-	--	--	29500 J-
Manganese	**300**	--	**790 J-**	--	--	**830 J-**
Nickel	**300**	--	ND	--	--	13 J-
Potassium	**--**	--	5500 J-	--	--	3100 J-
Sodium	**20,000**	--	**98300 J-**	--	--	**38200 J-**
Zinc	**2,000**	--	15 J-	--	--	15 J-
Polychlorinated biphenyls (PCBs) - ug/L						
Total PCBs	**0.09**	ND	ND	ND	ND	ND
Pesticides and Herbicides - ug/L						
4,4'-DDD	**0.3**	ND	ND	ND	ND	0.011 J
alpha-BHC	**--**	ND	ND	ND	ND	ND

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect.
2. Values per NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards (GWQS).
3. Sample results were reported by the laboratory in mg/L and converted to ug/L
4. All results are from sampling performed during the RI and do not reflect the impact of remediation.

Definitions:

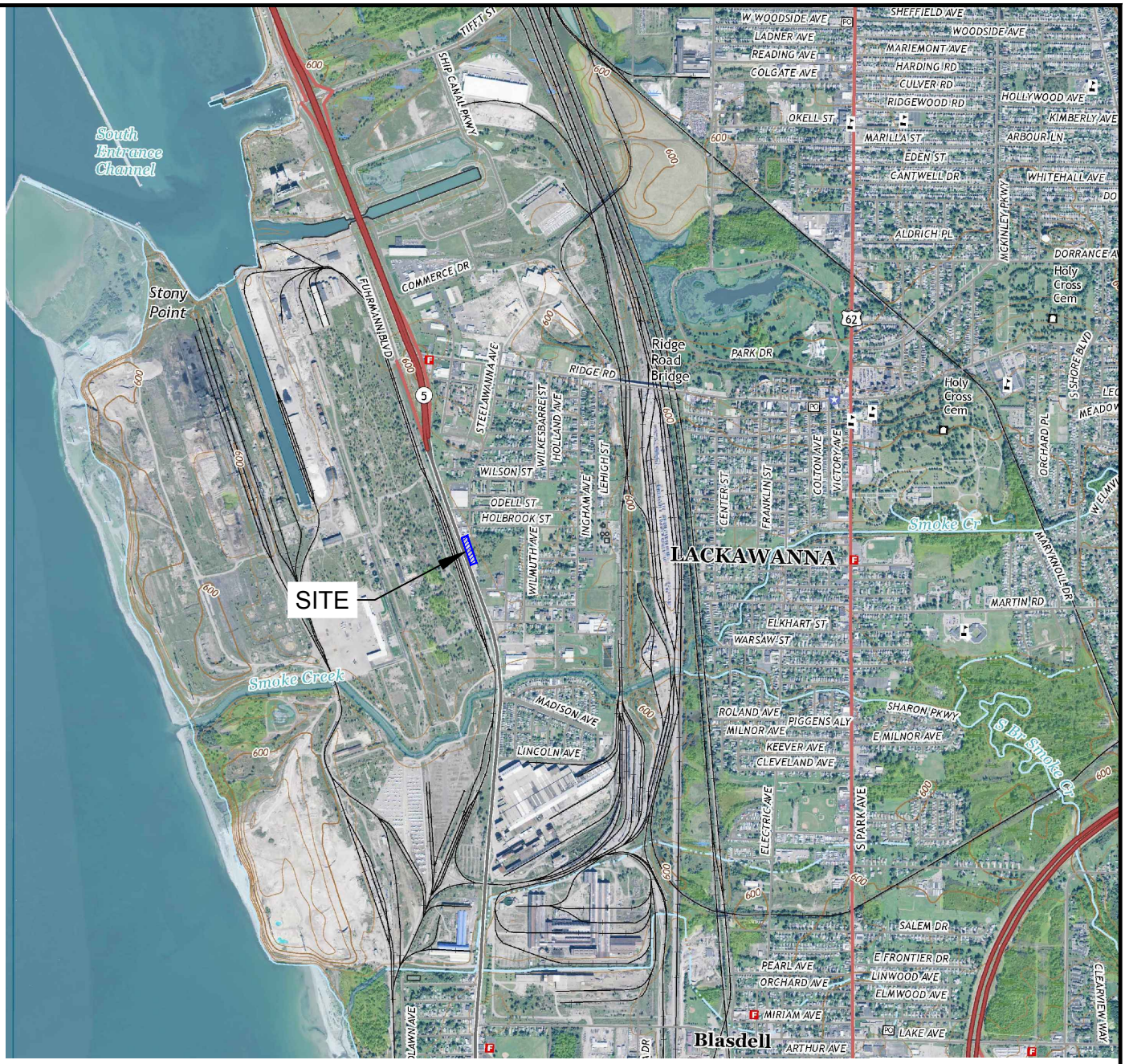
ND = Parameter not detected above laboratory detection limit.
"--" = No GWQS available or sample not anazlyzed for compound
F1 = MS and/or MSD Recovery is outside acceptance limits.
J- = The analyte was positvely identified, the associated numerical vale is an estimated quantity that may be biased low.
J = Estimated value - Below calibration range.

BOLD = Result exceeds GWQS.

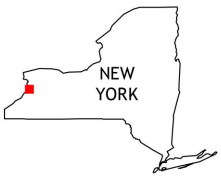
FIGURES

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 1; Site Location and Vicinity Map.dwg

FIGURE 1



APPROXIMATE SCALE 1" = 2,500'
BASE MAP IS USGS 2016 BUFFALO SE QUADRANGLE.



BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

PROJECT NO.: 0345-015-001

DATE: AUGUST 2019

DRAFTED BY: RFL/CCB

SITE LOCATION & VICINITY MAP

SITE MANAGEMENT PLAN

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PREPARED FOR

2424 HAMBURG TURNPIKE, LLC

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 2; Site Plan.dwg

LEGEND:

- BCP AND PROPERTY BOUNDARY
- EXISTING STRUCTURE / BUILDING
- FORMER ELEVATED CONCRETE PAD SUBSEQUENTLY REMOVED
- FORMER 1-STORY BUILDING SUBSEQUENTLY DEMOLISHED

GOOGLE EARTH AERIAL - DATED MAY 29, 2017

2424 HAMBURG TURNPIKE SITE
SBL No. 141.59-5-2
1.04 ACRES

HAMBURG TURNPIKE

N

40' 0' 40' 80'

SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

DATE: AUGUST 2019
DRAFTED BY: CCB

BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

SITE PLAN (AERIAL)

SITE MANAGEMENT PLAN
2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK
PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

FIGURE 2

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 3; Groundwater Isopotential Map.dwg

LEGEND:

- BCP AND PROPERTY BOUNDARY
- EXISTING STRUCTURE
- FORMER ELEVATED CONCRETE PAD SUBSEQUENTLY REMOVED
- FORMER 1-STORY BUILDING SUBSEQUENTLY DEMOLISHED
- MW-1 (573.1) — RI MONITORING WELL LOCATION (ELEVATION)
- 573.0 — GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTE: GROUNDWATER ELEVATION DATA PER REMEDIAL INVESTIGATION DATA JULY 2016

N

60' 0' 60' 120'

SCALE: 1 INCH = 60 FEET
SCALE IN FEET
(approximate)

DATE: AUGUST 2019
DRAFTED BY: RFL/CCB

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

PRE-REMEDIATION GROUNDWATER ISOPOTENTIAL MAP

SITE MANAGEMENT PLAN

2424 HAMBURG TURNPIKE SITE

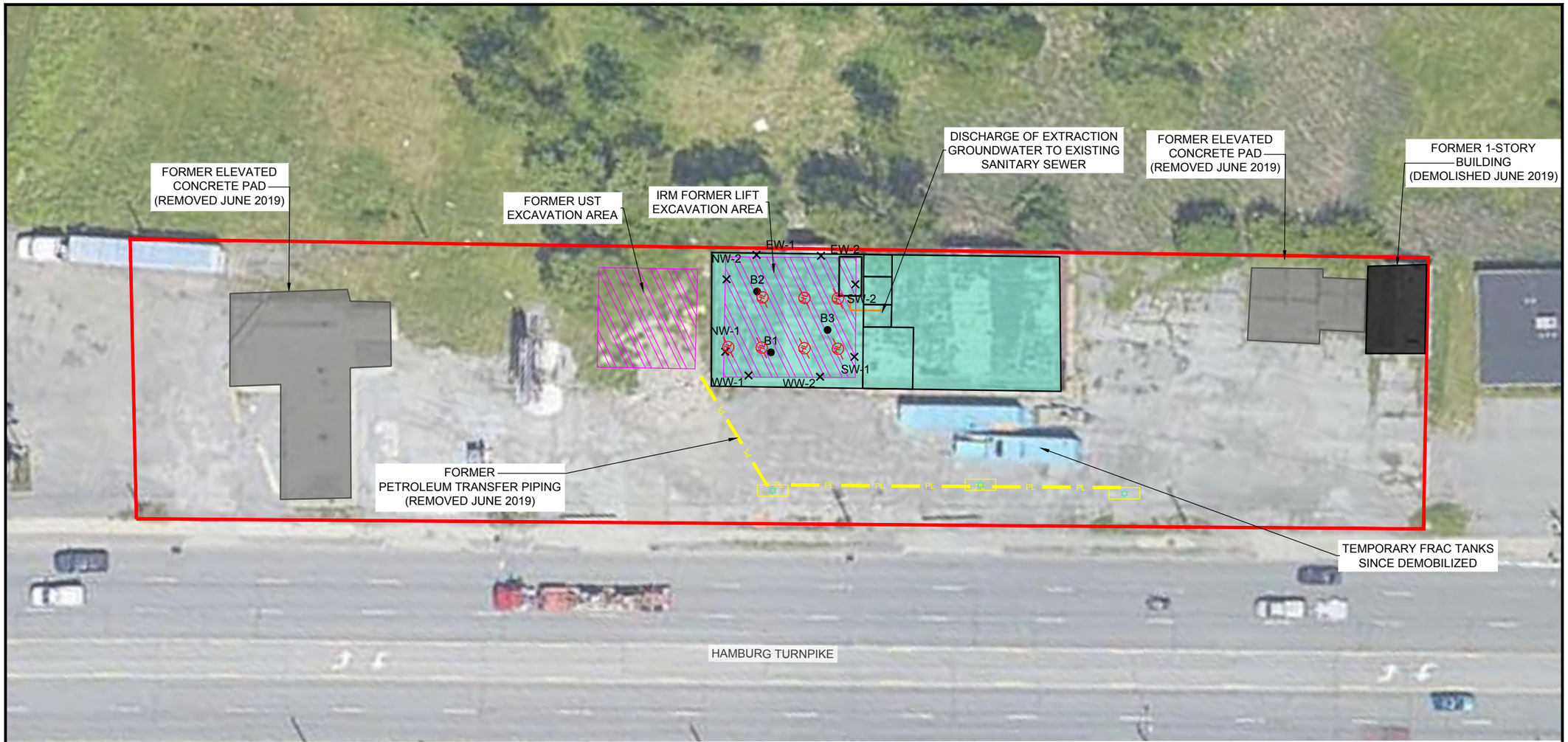
LACKAWANNA, NEW YORK

PREPARED FOR

2424 HAMBURG TURNPIKE, LLC

FIGURE 3

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.



LEGEND:

- BCP AND PROPERTY BOUNDARY
- EXISTING STRUCTURE
- FORMER ELEVATED CONCRETE PAD SUBSEQUENTLY REMOVED
- FORMER 1-STORY BUILDING SUBSEQUENTLY DEMOLISHED
- POTENTIAL FORMER PETROLEUM TRANSFER PIPING
- FORMER PUMP ISLAND LOCATION
- EW-1 ✕ CONFIRMATORY SAMPLE LOCATION
- FORMER HYDRAULIC LIFT

N

40' 0' 40' 80'

SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

DATE: AUGUST 2019
DRAFTED BY: CCB

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 4; IRM and Remedial Action Activities.dwg

IRM AND REMEDIAL ACTION ACTIVITIES

SITE MANAGEMENT PLAN
2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK
PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

FIGURE 4

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 5; Remaining Soil-Fill Above USCOs (12-11-19).dwg

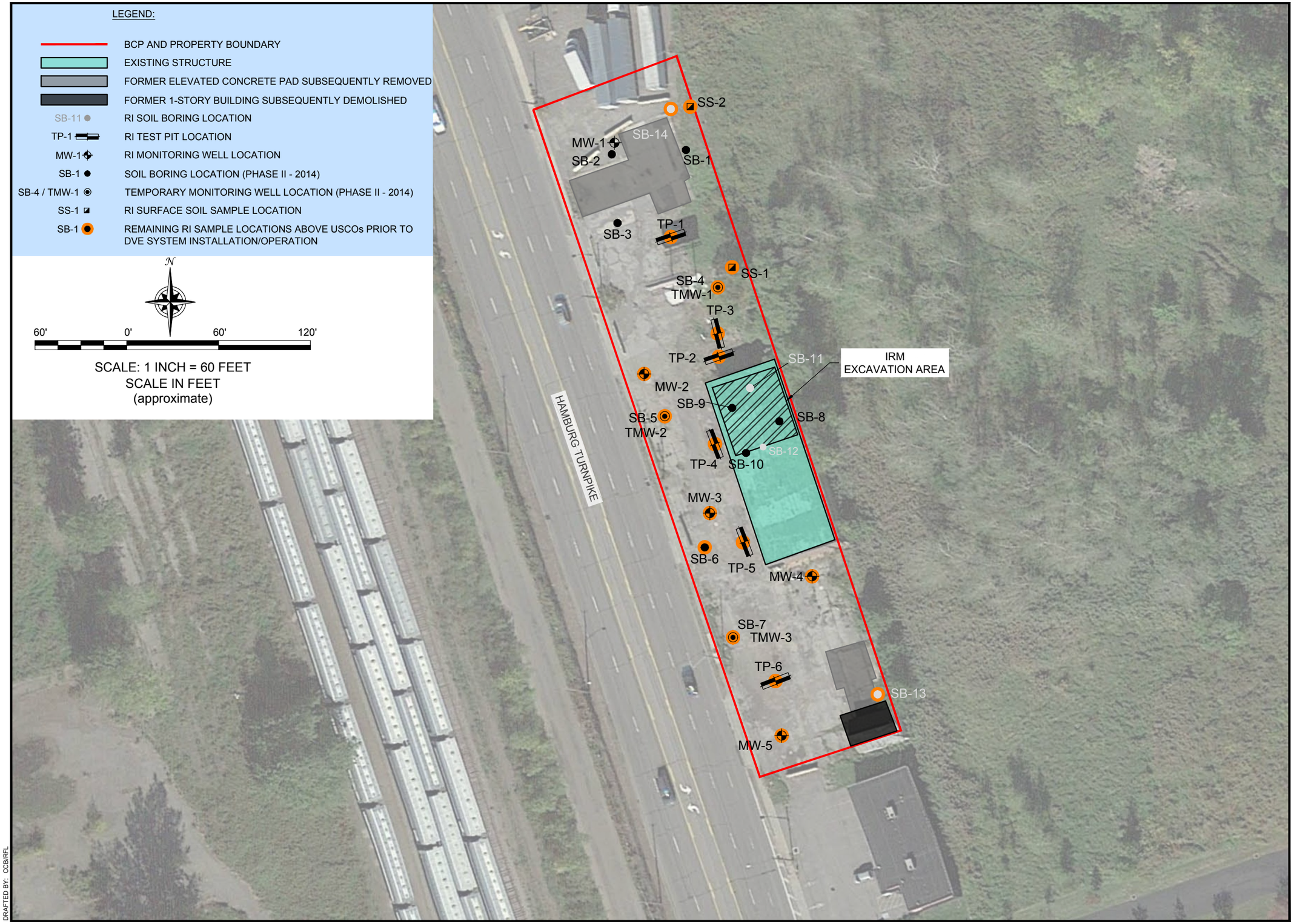
LEGEND:

- BCP AND PROPERTY BOUNDARY
- EXISTING STRUCTURE
- FORMER ELEVATED CONCRETE PAD SUBSEQUENTLY REMOVED
- FORMER 1-STORY BUILDING SUBSEQUENTLY DEMOLISHED
- SB-11 — RI SOIL BORING LOCATION
- TP-1 — RI TEST PIT LOCATION
- MW-1 — RI MONITORING WELL LOCATION
- SB-1 — SOIL BORING LOCATION (PHASE II - 2014)
- SB-4 / TMW-1 — TEMPORARY MONITORING WELL LOCATION (PHASE II - 2014)
- SS-1 — RI SURFACE SOIL SAMPLE LOCATION
- SB-1 — REMAINING RI SAMPLE LOCATIONS ABOVE USCOs PRIOR TO DVE SYSTEM INSTALLATION/OPERATION

N

60' 0' 60' 120'

SCALE: 1 INCH = 60 FEET
SCALE IN FEET
(approximate)



DATE: DECEMBER 2019
DRAFTED BY: CCB/RFL

BENCHMARK
ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

REMAINING SOIL/FILL ABOVE USCOs

SITE MANAGEMENT PLAN
2424 HAMBURG TURNPIKE SITE
BCP SITE NO. C915296
LACKAWANNA, NEW YORK
PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

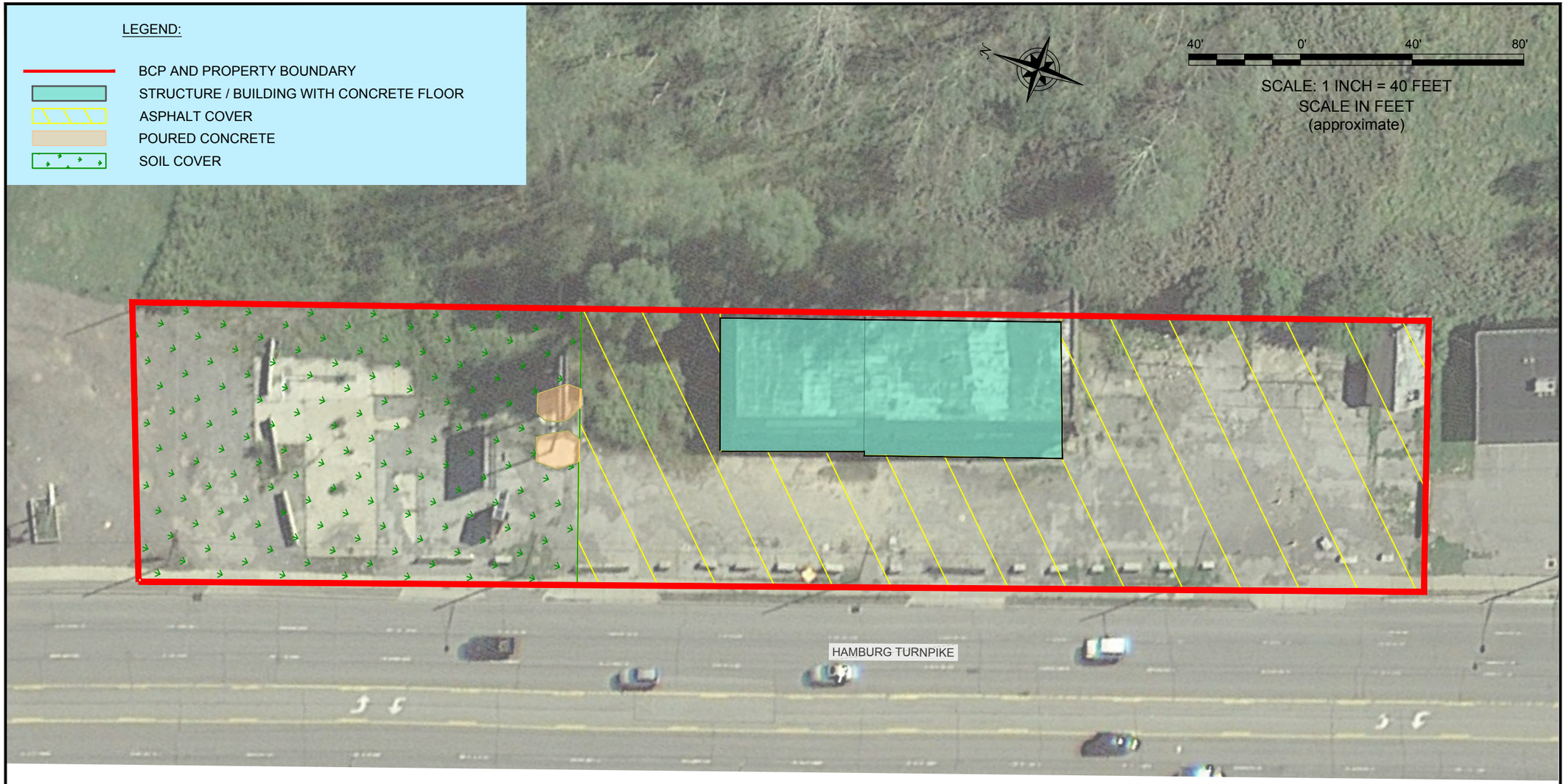
FIGURE 5

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 6; Cover System Layout & Detail rev.dwg

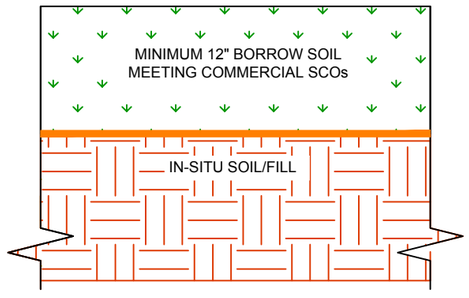
LEGEND:

- BCP AND PROPERTY BOUNDARY
- STRUCTURE / BUILDING WITH CONCRETE FLOOR
- ASPHALT COVER
- POURED CONCRETE
- SOIL COVER



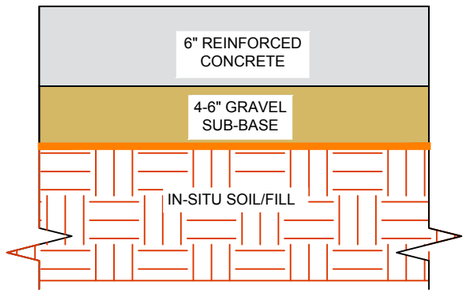
VEGETATIVE COVER SYSTEM DETAIL

NTS



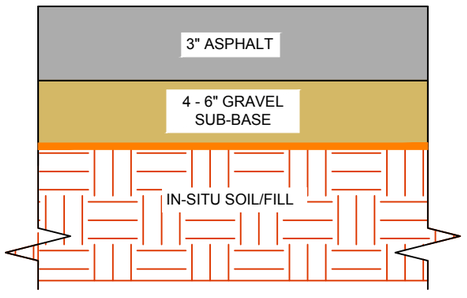
CONCRETE COVER SYSTEM DETAIL

NTS



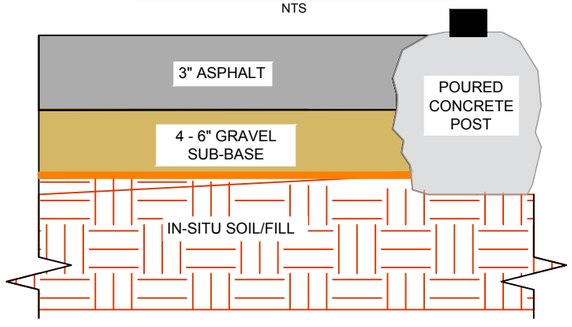
PAVEMENT COVER SYSTEM DETAIL

NTS



PAVEMENT / BILLBOARD POST TIE-IN COVER SYSTEM DETAIL

NTS



DEMARCATION LAYER

DATE: OCTOBER 2019
DRAFTED BY: CMC/CCB

COVER SYSTEM LAYOUT & DETAIL

SITE MANAGEMENT PLAN
2424 HAMBURG TURNPIKE SITE
BCP SITE NO. C915296
LACKAWANNA, NEW YORK
PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

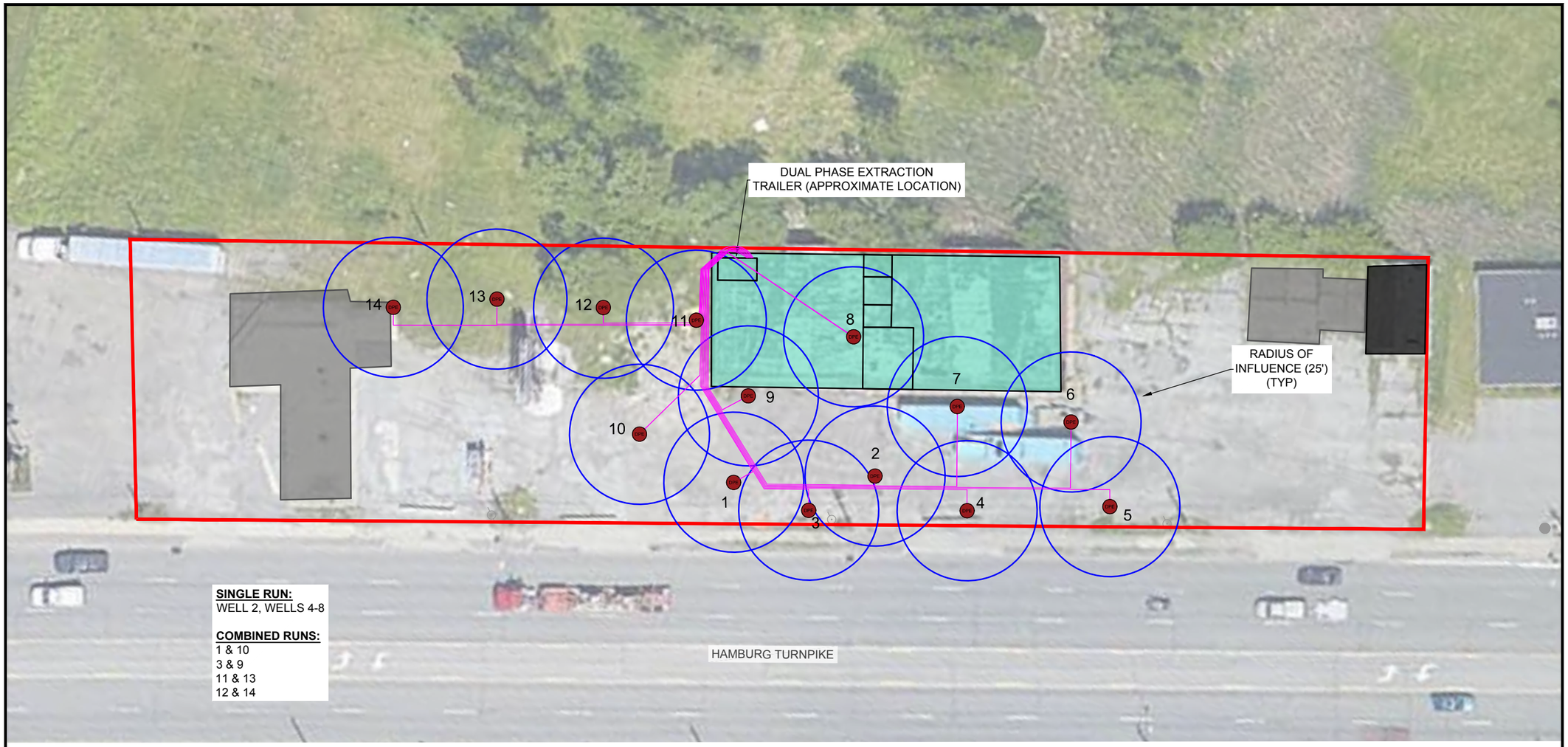
BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

FIGURE 6

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 7; DPE System Layout.dwg



SINGLE RUN:
WELL 2, WELLS 4-8

COMBINED RUNS:
1 & 10
3 & 9
11 & 13
12 & 14

LEGEND:

- BCP AND PROPERTY BOUNDARY
- EXISTING STRUCTURE
- FORMER ELEVATED CONCRETE PAD SUBSEQUENTLY REMOVED
- FORMER 1-STORY BUILDING SUBSEQUENTLY DEMOLISHED
- DPE SYSTEM PIPING
- DUAL PHASE (SOIL VAPOR AND GROUNDWATER) EXTRACTION WELL (14)

N

40' 0' 40' 80'

SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

DATE: AUGUST 2019
DRAFTED BY: CMC/CCB

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

DUAL PHASE EXTRACTION SYSTEM LAYOUT

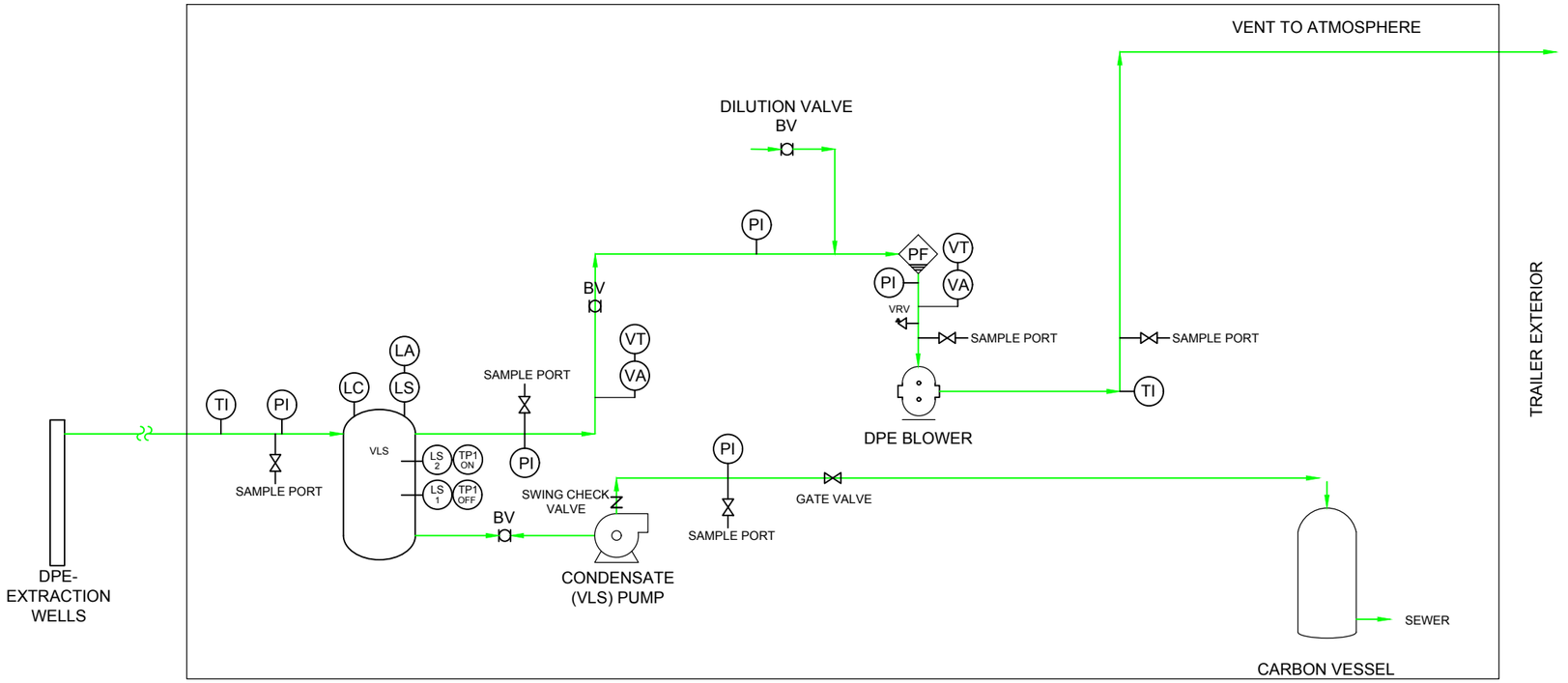
SITE MANAGEMENT PLAN
2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK
PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

FIGURE 7

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\Figure 8; DPE System Details.dwg

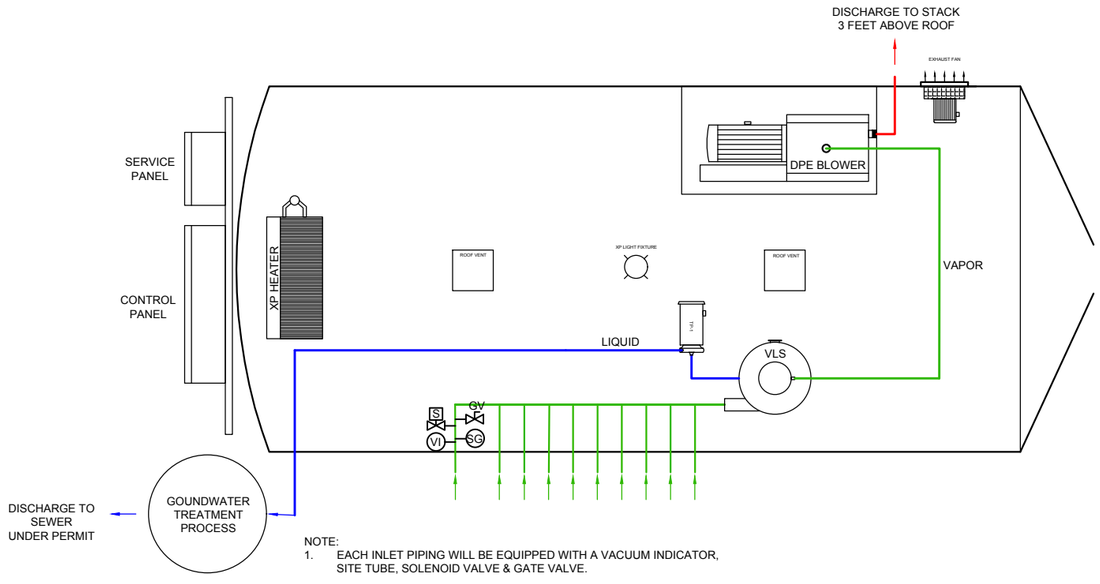
DUAL PHASE EXTRACTION TREATMENT SYSTEM SCHEMATIC



LEGEND:

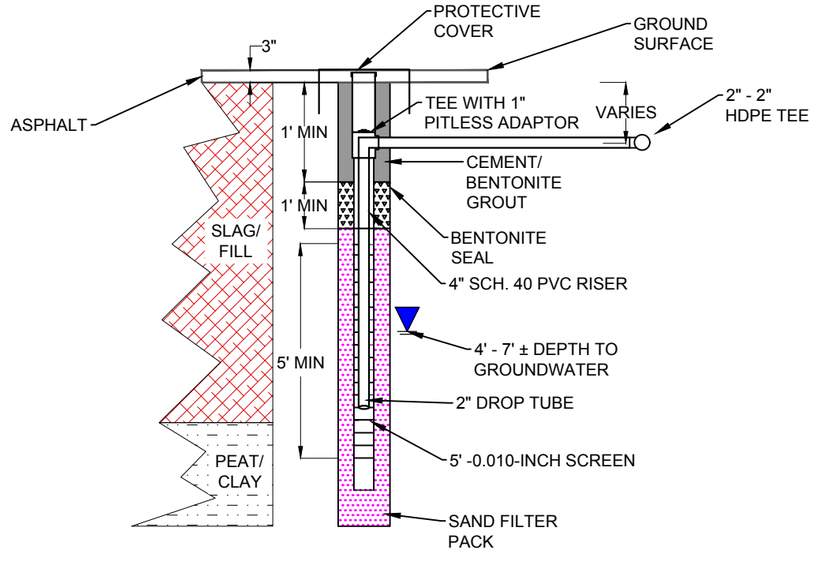
VRV	VACUUM RELIEF VALVE
PRV	PRESSURE RELIEF VALVE
LC	LEVEL CONTROL
LS	LEVEL SWITCH
LA	HIGH LEVEL ALARM
VA	LOW VACUUM ALARM
VT	ANALOG VACUUM TRANSMITTER
PI	PRESSURE (VACUUM) INDICATOR
FI	FLOW INDICATOR
TI	TEMPERATURE INDICATOR
BV	BALL VALVE
PF	PARTICULATE FILTER
TP	TRANSFER PUMP (ON/OFF FLOAT)
VLS	VAPOR LIQUID SEPARATOR
	VAPOR/CONDESATE WATER PIPING

DUAL PHASE EXTRACTION TRAILER PLAN VIEW



NOTE:
1. EACH INLET PIPING WILL BE EQUIPPED WITH A VACUUM INDICATOR, SITE TUBE, SOLENOID VALVE & GATE VALVE.

TYPICAL DPE WELL



DATE: AUGUST 2019
DRAFTED BY: RFL/CCB

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

DUAL PHASE EXTRACTION SYSTEM DETAILS

SITE MANAGEMENT PLAN
2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

FIGURE 8

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

APPENDIX A

ENVIRONMENTAL EASEMENT

ERIE COUNTY CLERK'S OFFICE

County Clerk's Recording Page

Return to:
BOX 140

Party 1:
2424 HAMBURG TURNPIKE LLC

Party 2:

Book Type: D Book: 11320 Page: 4161
Page Count: 10
Doc Type: EASEMENT/RTWY
Rec Date: 10/20/2017
Rec Time: 11:21:13 AM
Control #: 2017212831
UserID: Donna G
Trans #: 17184655
Document Sequence Number
TT2017006272

Recording Fees:

RECORDING	$70.00
COE CO $1 RET	$1.00
COE STATE $14.25 GEN	$14.25
COE STATE $4.75 RM	$4.75
TP584	$10.00

Consideration Amount: 0.00

BASIC MT	$0.00
SONYMA MT	$0.00
ADDL MT/NFTA	$0.00
SP MT/M-RAIL	$0.00
NY STATE TT	$0.00
ROAD FUND TT	$0.00

Total: $100.00

STATE OF NEW YORK
ERIE COUNTY CLERK'S OFFICE

WARNING – THIS SHEET CONSTITUTES THE CLERK'S ENDORSEMENT REQUIRED BY SECTION 319&316-a (5) OF THE REAL PROPERTY LAW OF THE STATE OF NEW YORK. DO NOT DETACH. THIS IS NOT A BILL.

Peggy A. Lagree
Acting County Clerk

Boy 140 SLATER

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

THIS INDENTURE made this 6th day of October, 2017 between Owner, 2424 Hamburg Turnpike, LLC, having an office at 2558 Hamburg Turnpike, Lackawanna, New York 14218, County of Erie, 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 2424 Hamburg Turnpike in the City of Lackawanna, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel numbers: Section 141.59 Block 5 Lot 2, being the same as that property conveyed to Grantor by deed dated October 26, 2015 and recorded in the Erie County Clerk's Office in Liber and Page 11288/4519. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.05 +/- acres, and is hereinafter more fully described in the Land Title Survey dated July 24, 2017 prepared by Michael Ennis, P.L.S. of Nussbaumer & Clarke, Inc., 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

21283(
785-9

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: C915296-10-15, 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 Erie County Department of Health 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: C915296
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.

Remainder of Page Intentionally Left Blank

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

2424 Hamburg Turnpike, LLC:

By: _____

Print Name: Paul H. Werthman

Title: Managing Member Date: Sept. 17, 2017

Grantor's Acknowledgment

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

On the 18th day of Sept, in the year 20 17, before me, the undersigned, personally appeared Paul H. Werthman, 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.

_____
Notary Public - State of New York

LOUISE M. SEYMOUR
Notary Public, State of New York
No. 01SE6228178
Qualified in Erie County
Commission Expires Sept. 13, 2018

9/13/18

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: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 6th day of October, in the year 2017 before me, the undersigned, personally appeared Robert W. Schick, 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

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

ALL THAT TRACT OR PARCEL OF LAND SITUATE IN THE CITY OF LACKAWANNA, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 26, TOWNSHIP 10, RANGE 8 OF THE BUFFALO CREEK RESERVATION, DESCRIBED AS FOLLOWS;

BEGINNING AT A POINT IN THE NORTHEASTERLY LINE OF THE HAMBURG TURNPIKE AS NOW MONUMENTED, 303.04 FEET SOUTHEAST OF THE POINT OF INTERSECTION OF SAID NORTHEASTERLY LINE OF HAMBURG TURNPIKE WITH THE SOUTHERLY LINE OF HOLBROOK STREET;

THENCE NORTHEASTERLY AT AN INTERIOR ANGLE 89°44'55", 100.02 FEET TO THE LANDS OF THE UNITED STATES GOVERNMENT AS SHOWN N ERIE COUNTY CLERK'S OFFICE IN LIBER 3113 OF DEEDS AT PAGE 101;

THENCE SOUTHEASTERLY AND AT RIGHT ANGLES AND ALONG THE LANDS OF THE UNITED STATES GOVERNMENT, 460.00 FEET TO A POINT IN THE NORTH LINE OF LAND OS ANTHONY PALUMBO, WHICH WERE CONVEYED BY DEED RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 4961 OF DEEDS AT PAGE 13;

THENCE SOUTHWESTERLY AT RIGHT ANGLES AND ALONG SAID PALUMBO'S LAND 98.00 FEET TO THE NORTHEASTERLY LINE OF HAMBURG TURNPIKE AS NOW MONUMNETED;

THENCE NORTHWESTERLY ALONG SAID NORTHEASTERLY LINE OF HAMBURG TURNPIKE, 460.00 FEET TO THE POINT OF BEGINNING CONTAINING 1.05 ACRES MORE OR LESS

APPENDIX B

MONITORING WELL BORING
&
CONSTRUCTION LOGS

Project No: 0345-015-001

Borehole Number: RI MW-1

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike LLC

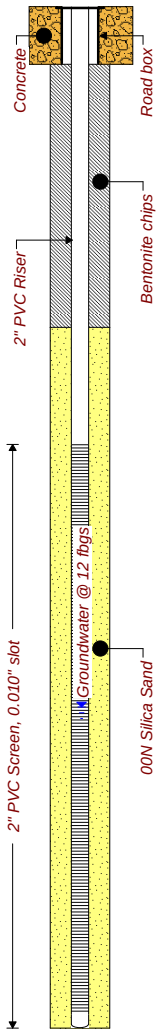
Logged By: PWW

Site Location: 2424 HamburgTurnpike

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 12.5 / 25)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Fill*** Dark brown to tan, moist, mostly gravel, massive, very dense, loose when disturbed trace slag, trace asphalt, trace cinders	S-1	115	1.3		0.0 / 0.0		
	-2.5 / 2.5	***Silty Sand*** Dark brown to black, moist, mostly medium sand, some non plastic fines, trace cinders	S-2	12	1.4		0.0		
	-4.5 / 4.5	***Lean Clay*** Dark brown to black, mostly medium plasticity fines,coal fines, little subrounded gravel, stiff	S-3	34	1.4		0.0	Sampled (4-6')	
5.0	-6.0 / 6.0	As above, no coal fines, moist to wet (7')	S-4	27	0		0.0		
	-8.0 / 8.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, few medium plasticity fines, firm, massive	S-5	8	1.8		0.0		
10.0	-10.0 / 10.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, little fine sand, trace organics, firm, massive, no odors	S-6	6	1.5		0.0		
	-12.0 / 12.0	***Sandy Lean Clay*** grey,wet, mostly medium plasticity fines, some fine sand grading to mostly fine sand, firm, massive, no odors	S-7	3	1.5		0.0		
15.0			S-8	15	1.2		0.0		
			S-9	16	1.5		0.0	Sampled (16-18')	
	-18.0 / 18.0	End of Borehole							
20.0									



Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Drill Rig
Drill Method: Standard Split Spoon
Comments:
Drill Date(s): 6/2/16

Hole Size: 8.25"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI MW-2

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike LLC

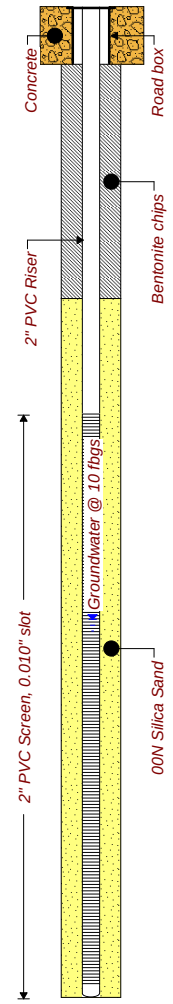
Logged By: PWW

Site Location: 2424 HamburgTurnpike

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 50 / 100)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Fill with Sand*** Dark brown, moist, mostly poorly graded fine to medium sand, trace fine gravel, very dense, massive, loose when disturbed	S-1	56	1.4		1.5, 0.0		
	-0.6								
	0.6								
	-2.0	***Fill with Silt*** Dark brown, moist, mostly low plasticity fines, little coarse sand, massive,hard, metal, trace coarse gravel	S-2	108	1.1		84.0	Sampled (2-4')	
	2.0	***Fill with Gravel*** Light grey, moist, poorly graded gravel, mostly coarse gravel, few fine to coarse sands, very dense							
	-4.2								
	4.2	***Silty Sand*** Dark Brown to Black mostly medium sand, some non plastic fines, little fine gravel, very dense, massive, slight petroleum-like odor	S-3	34	.2		3.8		
5.0		***Lean Clay*** Dark brown to grey moist to wet (7') mostly medium plasticity fines, little medium to coarse sand, trace subrounded coarse to fine gravel, hard, no odor	S-4	10	1		0.5		
	-8.0								
	8.0	***Organic Soil (peat)*** Brown, moist, mostly organic soil with wood debris, few medium plasticity fines, firm	S-5	14	1.3		0.0		
10.0		***Sandy Lean Clay*** Dark grey, wet, mostly medium plasticity fines with little fine sand	S-6	8	1.2		0.0		
			S-7	18	.11		0.0		
	-14.0								
	14.0	***Lean Clay With Sand*** Brown,grey, wet, mostly medium plasticity fines, little fine sand, very stiff, cohesive, laminated	S-8	18	.10		0.0		
15.0			S-9	9	1		0.0, 0.0	Sampled (16-18')	
	-18.0								
	18.0	End of Borehole							
20.0									



Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Drill Rig
Drill Method: Standard Split Spoon
Comments:
Drill Date(s): 6/2/16

Hole Size: 8.25"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI MW-3

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike, LLC

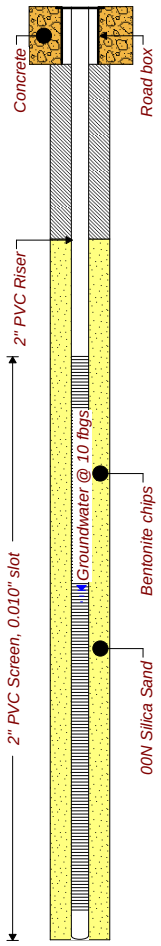
Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 500 / 1000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Asphalt***					0.0		
	-0.5						0.0		
	0.5	***Fill*** Brownish black, moist, asphalt pieces, few black fines, few semi angular gravel, slag	S-1	13	.5				
	-2.0								
	2.0	***Pea Gravel*** tan fine to medium gravel few slag, few black fines							
	-3.0		S-2	22	1.7		157.0		
	3.0	***Lean Clay*** Brownish black, moist, mostly medium plasticity fines, little fine sand, grey mottleing, very stiff							
	-4.0								
	4.0	***Lean Clay with Gravel*** Dark brownish black, moist to wet (8'), mostly medium plasticity fines, some well sorted gravel with trace fill material including brick, very stiff, petroleum-like odors	S-3	80	1.7		712.0	Sampled (4-6')	
5.0			S-4	20	1.5		3.0		
	-8.0								
	8.0	***Organic Soil (Peat) with Lean Clay*** Brown, moist, mostly organic soil with wood pieces, little medium plasticity fines, firm, massive	S-5	4	1		0.3		
	-10.0								
10.0	10.0	***Lean Clay*** Grey, wet, mostly medium plasticity fines, few fine sand, firm, massive	S-6	3	1.		0.3		
	-11.0								
	11.0	***Lean Clay with Peat*** Brown, moist, mostly medium plasticity fines with organic material, firm, massive	S-7	3	1.8		0.7		
	-14.0								
	14.0	***Sandy Lean Clay*** Grey, wet, mostly medium plasticity fines, some fine sand,firm, no odor	S-8	6	1.8		0.0		
15.0	-16.0						0.0		
	16.0	End of Borehole							
20.0									



Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Drill Rig
Drill Method: Standard Split Spoon
Comments:
Drill Date(s): 6/1/16

Hole Size: 8.25"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI MW-4

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike, LLC

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 12.5 / 25)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Asphalt***					0.0		
		Fill Brownish black, moist, asphalt pieces, black fines, semi angular gravel, slag	S-1	66	1.1		0.0		
			S-2	45	1.4		0.0		
	-4.0								
	4.0	***Lean Clay*** Greyish brown, moist, mostly medium plasticity fines, few fine sands, few gravel, firm, massive	S-3	36	1		0.0	Sampled (4-6')	
5.0			S-4	6	.9		0.0		
	-8.0								
	8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, few medium plasticity fines, firm, massive	S-5	5	1		0.0		
10.0			S-6	4	1.8		0.0	Sampled (10-12')	
	-12.0								
	12.0	***Lean Clay*** Grey, moist to wet (12') mostly medium plasticity fines, trace organic soils (peat), firm, massive	S-7	5	1.8		0.0		
	-13.0								
	13.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood pieces, little medium plasticity fines, firm, massive							
	-15.0								
15.0	15.0	***Lean Clay*** Grey,wet, mostly medium plasticity fines, few fine sand, firm, massive	S-8	7	2		0.0		
	-16.0						0.0		
	16.0	End of Borehole							
20.0									

Well Completion Details: Concrete; Road box; 2" PVC Riser; Bentonite chips; 2" PVC Screen, 0.010" slot; Groundwater @ 12 fbgs; 00N Silica Sand

Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Drill Rig
Drill Method: Standard Split Spoon
Comments:
Drill Date(s): 6/1/16

Hole Size: 8.25"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI MW-5

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike, LLC

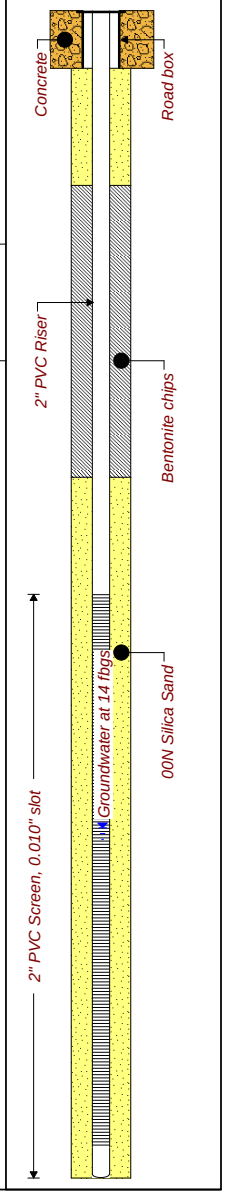
Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 – 12.5 – 25)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Asphalt***					0.0		
		Fill Brownish black, moist, asphalt pieces, black fines, semi angular gravel, slag	S-1	19	1.1		0.0		
			S-2	45	.9		0.0		
	-4.0								
	4.0	***Lean Clay*** Brown, moist to wet (4'), mostly medium plasticity fines, few fine sands, few gravel, massive, very stiff	S-3	20	22		0.4	Sampled (4-6')	
5.0	-7.0								
	7.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm	S-4	16	1.1		0.0		
			S-5	6	1		0.2		
10.0			S-6	6	2		0.0		
			S-7	3	2		0.0		
	-14.0								
	14.0	***Poorly Graded Sand*** Yellowish brown, moist to wet (14') mostly poorly graded fine sand, trace gravel	S-8	11	1.6		0.0		
15.0	-16.0								
	16.0	As above, grey, wet							
	-17.0								
	17.0	***Lean Clay*** Grey,wet, mostly medium plasticity fines, few fine sand, firm, massive	S-9	6	1.5		0.0		
			S-10	8	1.5		0.0		
20.0	-20.0						0.0		
	20.0								



Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Drill Rig
Drill Method: Standard Split Spoon
Comments:
Drill Date(s): 6/1/16

Hole Size: 8.25"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-01

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 12.5 / 25)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Gravel Road Base***					0.0		
							0.0		
	-2.0								
	2.0	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive	S-1	NA	1.3		0.0		
	-4.0								
	4.0	As above, moist to wet (6')							
5.0			S-2	NA	1.2		0.0		
							0.0		
	-8.0								
	8.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm					0.0		
	-9.0								
	9.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm							
10.0	-10.0		S-3	NA	3.1				
	10.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense					0.0		
	-12.0								
	12.0	***Organic Soil (Peat)*** Same as (9-10') interval					0.0		
			S-4	NA	1.1				
15.0							0.0		
	-16.0								
	16.0	End of Borehole							

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-02

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs (ppm, 0 / 12.5 / 25)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive	S-1	NA	1.6		0.0, 0.0, 0.0		
	-4.0								
	4.0	As above, moist to wet (7')	S-2	NA	2.9		0.0, 0.0		
5.0	-8.0								
	8.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm	S-3	NA	2.2		0.0, 0.0		
	-10.0								
10.0	10.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm							
	-12.0								
	12.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense	S-4	NA	3.0		0.0, 0.0		
15.0	-16.0								
	16.0	End of Borehole							

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-03

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs (ppm, 0 / 12.5 / 25)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive	S-1	NA	2.4		0.0, 0.0, 0.0		
	-4.0 / 4.0	As above, moist to wet (6')	S-2	NA	2.1		0.0, 0.0		
5.0	-8.0 / 8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm	S-3	NA	4.0		0.0, 0.0		
	-9.0 / 9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm							
10.0	-11.0 / 11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense	S-4	NA	4.0		0.0, 0.0		
15.0	-16.0 / 16.0	End of Borehole							

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-04/TMW-01

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

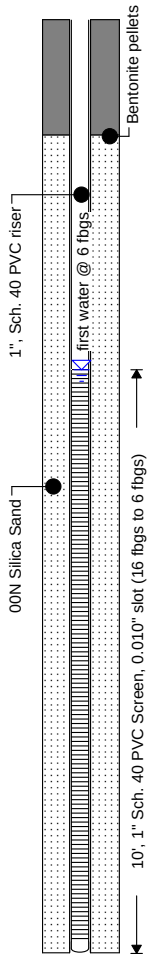
Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs (ppm)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive, slight petro odor @ 1 fbgs	S-1	NA	2.6		0.0, 14.7, 22.0		
	-4.0 / 4.0	As above, moist to wet (6'), strong petroleum-like odor	S-2	NA	2.5		262.0, 697.0	Sampled (6-8')	
	-8.0 / 8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm, slight petroleum-like odor					44.0		
	-9.0 / 9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm	S-3	NA	3.2		3.0		
	-11.0 / 11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense	S-4	NA	3.1		0.0, 0.0, 0.0		
	-16.0 / 16.0	End of Borehole							
20.0									



Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-05/TMW-02

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

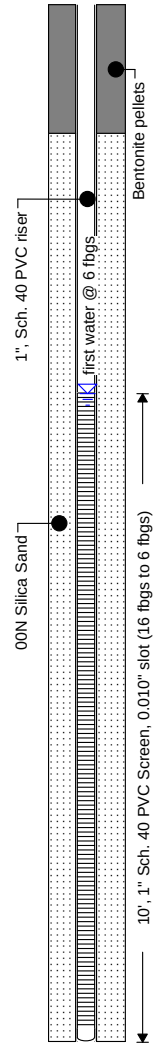
Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface					0 500 1000		
	0.0	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive, petroleum-like odor @ 1 fbgs	S-1	NA	2.7		0.0, 147.0, 349.0		
	-4.0 4.0	As above, moist to wet (6'), strong petroleum-like odor	S-2	NA	3.0		693.0, 850.0	Sampled (6-8')	
	-8.0 8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm, slight petroleum-like odor							
	-9.0 9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm, slight petroleum-like odor	S-3	NA	4.0		354.0, 46.0		
	-11.0 11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense	S-4	NA	4.0		0.0, 0.0, 0.0		
	-16.0 16.0	End of Borehole							



Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-06

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 1000 / 2000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Gravel Road-Base***					0.0		
	-1.0						212.0		
	1.0	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive, petroleum-like odors starting @ 2 fbgs	S-1	NA	2.1		1098.0	Sampled (2-4')	
	-4.0								
	4.0	As above, moist to wet (6')					348.0		
5.0			S-2	NA	2.4		369.0		
	-8.0								
	8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm					5.3		
	-9.0								
	9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm	S-3	NA	4.0		0.0		
10.0									
	-11.0								
	11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense					0.0		
			S-4	NA	3.6				
15.0							0.0		
	-16.0								
	16.0	End of Borehole							

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-07/TMW-03

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

Depth (ftbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 50 / 100)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Gravel Road-Base***					0.0		
	-1.0						14.0		
	1.0	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive, slight petroleum-like odors starting @ 2 fbgs	S-1	NA	2.1		67.0	Sampled (2-4')	
	-4.0								
	4.0	As above, moist to wet (6')					12.0		
5.0			S-2	NA	2.4		4.0		
	-8.0								
	8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm					0.0		
	-9.0								
	9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm	S-3	NA	4.0		0.0		
10.0									
	-11.0								
	11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense					0.0		
			S-4	NA	3.6				
15.0							0.0		
	-16.0								
	16.0	End of Borehole							

Well Completion Details: *Bentonite pellets*; *1", Sch. 40 PVC riser*; *first water @ 6 fbgs*; *00N Silica Sand*; *10', 1" Sch. 40 PVC Screen, 0.010" slot (16fbgs to 6 fbgs)*

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-08

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 250 / 500)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Concrete***					0.0		
	-0.8								
	0.8	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive, slight petroleum-like odors starting @ 2 fbgs	S-1	NA	1.7		10.9		
							4.2		
	-4.0								
	4.0	As above, moist to wet (6'), petroleum-like odors							
5.0			S-2	NA	2.4		21.0		
							362.0	Sampled (6-8')	
	-8.0								
	8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm, petroleum-like odors							
	-9.0						14.0		
	9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm	S-3	NA	3.4				
10.0									
	-11.0						4.1		
	11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense							
			S-4	NA	3.0		0.0		
15.0							0.0		
	-16.0								
	16.0	End of Borehole							

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-09

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 500 / 1000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Concrete***					0.0		
	-0.8						246.0		
	0.8	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive, slight petroleum-like odors starting @ 2 fbgs	S-1	NA	2.0		149.0		
	-4.0								
	4.0	As above, moist to wet (6'), petroleum-like odors					461.0		
5.0			S-2	NA	2.6			Sampled (6-8')	
							900.0		
	-8.0								
	8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm, petroleum-like odors							
	-9.0						239.0		
	9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm, petroleum-like odors	S-3	NA	3.0				
10.0									
	-11.0						211.0		
	11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense, slight petroleum-like odors							
							14.9		
			S-4	NA	3.6				
15.0							4.3		
	-16.0								
	16.0	End of Borehole							

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0298-014-001

Borehole Number: SB-10

Project: Phase II Environmental Investigation

A.K.A.:

Client: Franklin Asset Management

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BCH

TurnKey Environmental Restoration, LLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0635

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 250 / 500)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Concrete***					0.0		
	-0.8								
	0.8	***Slag*** Brown, moist, mostly fine to coarse slag, brick pieces, trace fine sand, loose when disturbed, massive, slight petroleum-like odors starting @ 2 fbgs	S-1	NA	1.2		9.3		
							21.2		
	-4.0								
	4.0	As above, moist to wet (6'), petroleum-like odors							
5.0			S-2	NA	2.6		106.0		
							299.0		
	-8.0								
	8.0	***Organic Soil (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm, petroleum-like odors							
	-9.0						96.0		
	9.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, few fine sand, firm	S-3	NA	3.1				
10.0									
	-11.0						1.3		
	11.0	***Poorly Graded Sand*** Grey, wet, mostly fine sand, medium dense							
			S-4	NA	4.0		0.0		
15.0									
							0.0		
	-16.0								
	16.0	End of Borehole							

Drilled By: DDS Companies
Drill Rig Type: Geoprobe 66DT Track Mounted Rig
Drill Method: Direct Push w/ 4' macro-core
Comments:
Drill Date(s): 1-14-14

Hole Size: 2"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI SB-11

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike, LLC

Logged By: PWW

Site Location: 2424 HamburgTurnpike

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 1000 / 2000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Concrete***					0.0		
		Fill Brown, moist, mostly slag ,brick , some fine to coarse gravel, medium dense, massive	S-1	NA	2.1		0.0		
	-4.0						0.0		
	4.0	As above					0.0		
5.0							787.0		
	-6.0		S-2	NA	2.8				
	6.0	***Lean Clay With Gravel*** Dark brown to black, moist to wet (7'), mostly medium plasticity fines, some fine to coarse gravel, firm, massive, strong petroleum-like odors					864.0		
	-8.0						989.0		
	8.0	***Lean Clay*** Brown, moist, mostly medium plasticity fines, little fine sand, stiff, massive, petroleum-like odors					1116.0		
	-10.0								
10.0	10.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, few medium plasticity fines, firm, no odors	S-3	NA	3.5		847.0	Sampled (9-11')	
	-12.0						60.2		
	12.0	As above					260.0		
	-14.0						127.0		
	14.0	***Poorly Graded Sand*** Grey, wet, mostly fine grade sand, trace non-plastic fines, medium dense, massive	S-4	NA	4				
15.0								Sampled (14-16')	
	-16.0						2.6		
	16.0	End of Borehole							
20.0									

Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Geoprobe
Drill Method: Direct Push with 4' Macro-core
Comments:
Drill Date(s): 6/2/16

Hole Size: 3"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI SB-12

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike, LLC

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 – 1000 – 2000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Concrete***					0.0		
		Fill Brown, moist, mostly slag ,brick , some fine to coarse gravel, medium dense, massive	S-1	NA	2.9		0.0		
	-3.5 3.5						0.0		
	-4.0 4.0	***Lean Clay With Gravel*** Dark brown to black, moist, mostly medium plasticity fines, some fine to coarse gravel, firm, massive, strong petroleum like odors					676.0		
5.0		As above, moist to wet (6.5')	S-2	NA	3.0		887.0		
	-7.0 7.0	***Sand With Gravel*** Black, wet , mostly well sorted fine to coarse sand with some fine angular gravel, strong petroleum like odors					1000.0		
	-8.0 8.0	As above					1085.0		
	-9.0 9.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, few medium plasticity fines, firm	S-3	NA	2.4		783.0	Sampled (9-11')	
10.0							545.0		
	-12.0 12.0	As above					347.0		
			S-4	NA	2.5		461.0		
							147.0		
15.0	-15.0 15.0						121.0		
	-16.0 16.0	***Silty Sand*** Grey, wet, mostly poorly graded fine sand, little to some non-plastic fines, medium dense, massive, petroleum like odors (8'-16')					80.7		
		Sandy Lean Clay Grey, wet, mostly medium plasticity fines, some fine sand, firm, massive	S-5	NA	2.6		341.0		
							321.0		
							1.7		
20.0	-20.0 20.0	End of Borehole					1.2		

Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Geoprobe
Drill Method: Direct Push with 4' Macro-core
Comments:
Drill Date(s): 6/2/16

Hole Size: 3"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI SB-13

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike, LLC

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 1000 / 2000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Concrete***					0.0		
	-0.5						0.0		
	0.5	***Fill*** Brown, moist, mostly slag ,brick , some fine to coarse gravel, medium dense, massive	S-1	NA	2.6		0.0	Sampled (2-4')	
	-4.0								
	4.0	As above					0.0		
5.0	-5.0								
	5.0	***Lean Clay*** Dark brown to black, moist, mostly medium plasticity fines, few fine to coarse gravel, firm, massive, no odors	S-2	NA	2.8		0.0		
	-8.0								
	8.0	As above, moist to wet (9')					0.0	Sampled (7-9')	
10.0			S-3	NA	3.4		0.0		
	-11.0						0.0		
	11.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, few medium plasticity fines, firm					0.0		
	-12.0								
	12.0	As above					0.0		
	-14.0								
	14.0	***Lean Clay*** Grey, wet, mostly medium plasticity fines, few fine sand, firm, massive	S-4	NA	4		0.0		
15.0	-16.0								
	16.0	End of Borehole							
20.0									

Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Geoprobe
Drill Method: Direct Push with 4' Macro-core
Comments:
Drill Date(s): 6/2/16

Hole Size: 3"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

Project No: 0345-015-001

Borehole Number: RI SB-14

Project: Remedial Investigation

A.K.A.:

Client: 2424 Hamburg Turnpike, LLC

Logged By: PWW

Site Location: 2424 Hamburg Turnpike

Checked By: BWM

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE			SAMPLE						
Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Sample No.	SPT N-Value	Recovery (ft)	Symbol	PID VOCs ppm (0 / 1000 / 2000)	Lab Sample	Well Completion Details or Remarks
0.0	0.0	Ground Surface							
	0.0	***Concrete***					0.0		
	-0.5						0.0		
	0.5	***Fill*** Brown, moist, mostly slag ,brick , some fine to coarse gravel, medium dense, massive	S-1	NA	2.6		0.0		
	-4.0								
	4.0	As above					0.0		
	-5.0								
5.0	5.0	***Lean Clay*** Dark brown to black, moist, mostly medium plasticity fines, few fine to coarse gravel, firm, massive, no odors	S-2	NA	2.8		0.0	Sampled (4-6')	
	-8.0						0.0		
	8.0	As above, moist					0.0		
10.0			S-3	NA	3.4		0.0		
	-11.0						0.0		
	11.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, few medium plasticity fines, firm					0.0		
	-12.0						0.0		
	12.0	As above					0.0		
	-14.0								
	14.0	***Poorly Graded Fine Sand*** Grey, moist to wet (15'), mostly fine sand, few non-plastic fines, medium dense, massive	S-4	NA	4		0.0	Sampled (14-16')	
15.0	-16.0								
	16.0	End of Borehole							
20.0									

Drilled By: Nature's Way Environmental
Drill Rig Type: Truck Mounted Geoprobe
Drill Method: Direct Push with 4' Macro-core
Comments:
Drill Date(s): 6/2/16

Hole Size: 3"
Stick-up: NA
Datum: Mean Sea Level

Sheet: 1 of 1

TEST PIT EXCAVATION LOG

Project No: 0345-015-001

Project: 2424 Hamburg Turnpike

Client: 2424 Hamburg Turnpike, LLC

Site Location: 2424 Hamburg Turnpike

Test Pit I.D.: RI TP-1

Logged By: PWW

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Lithologic Symbol	PID VOCs (ppm)	Lab Sample	Remarks
0.0	0.0	Ground Surface				
	0.0	***Fill*** Brown, moist, mostly slag, some brick,little coarse sand, loose when disturbed		0.0 0.0 0.0		
	-4.5					
5.0	4.5	***Lean Clay*** Dark brown to black, mostly medium plasticity fines, few coarse sand, few gravel, trace brick , slight petroleum odors		0.0	Sampled (4.5-7')	
	-7.0					
	7.0	As above black, moist to wet (9), some coal fines, no odor		0.0	Sampled (7-9')	
	-9.0					
10.0	9.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm		0.0		
	-12.0					
	12.0	***Sandy lean clay*** Grey, wet, mostly fine sand, some lean clay, poorly graded, trace fine gravel		0.0		
15.0				0.0		
	-17.0					
	17.0	End of Test Pit				
20.0						

Excavated By: TurnKey Environmental Restoration ***Length: 13'*** ***Depth to Water: 9'***
Excavator Type: Komatsu PC 170 ***Width: 3'*** ***Visual Impacts: None***
Excavation Date(s): 06/3/16 ***Depth: 17'*** ***Olfactory Observations: Slight petroleum-like odor***
Comments:

Sheet: 1 of 1

TEST PIT EXCAVATION LOG

Project No: 0345-015-001

Project: 2424 Hamburg Turnpike

Client: 2424 Hamburg Turnpike, LLC

Site Location: 2424 Hamburg Turnpike

Test Pit I.D.: RI TP-2

Logged By: PWW

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Lithologic Symbol	PID VOCs (ppm)	Lab Sample	Remarks
0.0	0.0	Ground Surface				
	0.0	***Topsoil***		0.0		
	-1.0 / 1.0	***Reworked Lean Clay with Fill*** Mostly medium plasticity fines, some well graded sands, trace subrounded reworked gravel trace brick, layers of plastic throughout		0.0		
5.0				0.0	Sampled (4-6')	
				0.0		
	-8.0 / 8.0	***Lean Clay*** Dark brown, moist to wet (10'), mostly medium plasticity fines, few coarse sand, few gravel, trace brick		0.0		
10.0				0.0	Sampled (10-12')	
				0.0		
15.0				0.0		
	-17.0 / 17.0	End of Test Pit		0.0		
20.0						

PID VOCs: 0 25 50 75 100 ppm

Excavated By: TurnKey Environmental Restoration
Excavator Type: Komatsu PC 170
Excavation Date(s): 06/3/16
Comments:

Length: 28'
Width: 3'
Depth: 17'

Depth to Water: 10'
Visual Impacts: None
Olfactory Observations: None

TEST PIT EXCAVATION LOG

Project No: 0345-015-001

Project: 2424 Hamburg Turnpike

Client: 2424 Hamburg Turnpike, LLC

Site Location: 2424 Hamburg Turnpike

Test Pit I.D.: RI TP-3

Logged By: PWW

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Lithologic Symbol	PID VOCs (ppm)	Lab Sample	Remarks
0.0	0.0	Ground Surface				
	0.0	***Topsoil***		0.0		
	-1.0					
	1.0	***Reworked Lean Clay with Fill*** Mostly medium plasticity fines, some well graded sands, trace subrounded reworked gravel trace brick, layers of plastic throughout		0.0		
5.0				0.0		
				0.0	Sampled (4-10')	
	-8.0					
	8.0	***Lean Clay*** Dark brown, moist to wet (10'), mostly medium plasticity fines, few coarse sand, few gravel, trace brick		0.0		
10.0				0.0		
				0.0		
15.0				0.0	Sampled (13-16')	
	-17.0					
	17.0	End of Test Pit				
20.0						

Excavated By: TurnKey Environmental Restoration
Excavator Type: Komatsu PC 170
Excavation Date(s): 06/3/16
Comments:

Length: 28'
Width: 3'
Depth: 17'

Depth to Water: 10'
Visual Impacts: None
Olfactory Observations: None

TEST PIT EXCAVATION LOG

Project No: 0345-015-001

Project: 2424 Hamburg Turnpike

Client: 2424 Hamburg Turnpike, LLC

Site Location: 2424 Hamburg Turnpike

Test Pit I.D.: RI TP-4

Logged By: PWW

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Lithologic Symbol	PID VOCs (ppm)	Lab Sample	Remarks
0.0	0.0	Ground Surface				
	0.0	***Asphault***		0.0		
		Fill Brown, moist, mostly slag, some brick,little coarse sand, loose when disturbed		0.0	Sampled (1-3')	
	-3.0 3.0	***Sand*** Black, moist, mostly well sorted sand, some slag, petroleum-like odors		21.5		
5.0				141.0	Sampled (3-7')	
	-7.0 7.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm, no odors		0.0	Sampled (7-9')	
10.0	-11.0 11.0	***Lean Clay*** Grey, wet, mostly medium plasticity fines,few fine sand, trace fine gravel, massive,very stiff, no odors		0.0		
				0.0		
				0.0		
15.0	-15.0 15.0	End of Test Pit		0.0		
20.0						

Excavated By: TurnKey Environmental Restoration
Excavator Type: Komatsu PC 170
Excavation Date(s): 06/3/16
Comments:

Length: 15'
Width: 3'
Depth: 15'

Depth to Water: 9'
Visual Impacts: None
Olfactory Observations: Petroleum-like odor

TEST PIT EXCAVATION LOG

Project No: 0345-015-001

Project: 2424 Hamburg Turnpike

Client: 2424 Hamburg Turnpike, LLC

Site Location: 2424 Hamburg Turnpike

Test Pit I.D.: RI TP-5

Logged By: PWW

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Lithologic Symbol	PID VOCs (ppm)	Lab Sample	Remarks
0.0	0.0	Ground Surface				
	0.0	***Fill*** Brown, moist, mostly slag, some brick,little coarse sand, loose when disturbed		0.0, 0.0	Sampled (1-3')	
	-3.5					
	3.5	***Sand*** Black, moist, mostly well sorted sand, some slag, petroleum-like odors		1235.0, 0.0		
5.0						
	-7.0					
	7.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm, no odors		0.0, 0.0	Sampled (7-9')	
10.0	-10.0					
	10.0	***Lean Clay*** Grey, wet, mostly medium plasticity fines,few fine sand, trace fine gravel, massive,very stiff, no odors		0.0		
	-12.0					
	12.0	End of Test Pit				
15.0						
20.0						

Excavated By: TurnKey Environmental Restoration
Excavator Type: Komatsu PC 170
Excavation Date(s): 06/6/16
Comments:

Length: 15'
Width: 3'
Depth: 12'

Depth to Water: 9'
Visual Impacts: None
Olfactory Observations: Petroleum-like odor

TEST PIT EXCAVATION LOG

Project No: 0345-015-001

Project: 2424 Hamburg Turnpike

Client: 2424 Hamburg Turnpike, LLC

Site Location: 2424 Hamburg Turnpike

Test Pit I.D.: RI TP-6

Logged By: PWW

Checked By: BWM

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

SUBSURFACE PROFILE

Depth (fbgs)	Elev. /Depth	Description (ASTM D2488: Visual-Manual Procedure)	Lithologic Symbol	PID VOCs (ppm)	Lab Sample	Remarks
0.0	0.0	Ground Surface				
	0.0	***Fill*** Brown, moist, mostly slag, some brick, little coarse sand, loose when disturbed		0.0, 0.0, 0.0, 0.0		
5.0	-6.0				Sampled (4-6')	
	6.0	***Lean Clay*** Dark brown to black, mostly medium plasticity fines, few coarse sand, few gravel, very stiff, massive		0.0		
	-8.0					
	8.0	***Organic Soils (Peat)*** Brown, moist, mostly organic soil with wood debris, little medium plasticity fines, firm		0.0, 0.0, 0.0		
10.0	-14.0					
	14.0	***Sandy lean clay*** Grey, wet, mostly fine sand, some lean clay, poorly graded, trace fine gravel, very stiff, massive		0.0	Sampled (14-16')	
15.0	-17.0					
	17.0	End of Test Pit				
20.0						

PID VOCs: ppm — 0, 25, 50, 75, 100

Excavated By: TurnKey Environmental Restoration ***Length: 17'*** ***Depth to Water: 12'***

Excavator Type: Komatsu PC 170 ***Width: 3'*** ***Visual Impacts: None***

Excavation Date(s): 06/3/16 ***Depth: 17'*** ***Olfactory Observations:***

Comments:

Sheet: 1 of 1

CONTENTS

PAGE	REFERENCE	DATE

Location 2424 H.T. Date 8/20/19

Project / Client

phil + Kyle

- Earth Dimensions on site @ 8:00a

- I set CAMP #1 up @ 8:30a.m north of billboard.

~~Started on~~ BH2

Split spoon 4'-6' wet Black, granular, fill (bricks, sand) no PID

★ (picture)

Split spoon @ 6-8' wet Black, peat wood, silt, wood chips
- 2.5ppm on PID
- has odors

- 4" well set @ 7.5' deep
  - ~~3~~ 5' screen then riser
  - sand through screen up to 2' below grade
  - Bentonite from 1' below grade

★ TOOK PICTURE OF LAST AUGER OUT OF HOLE

Check CAMP @ 10:00am -

Rite in the Rain

Location 2424 H.T Date 8/20/19

Project / Client pg. 2

B#4 started @ 10:20 am Blow counts:

Sample 4'-6' 14/14/40/40/5

Black silty gravel, slag, wet new 6', some woodchips
NO PID
PICTURE
No odor

Sample 6'-8' 20/3/5/9

Black, silty mulch, soft, wet
some gravel from fall in
NO PID
NO ODOR
PICTURE

Set well @ same depth as B#2

Check CAMP @ 11:15am

Location 2424 H.T. Date 8/20/19

Project / Client pg 3

B#5 started @ 12:15 p.m Blow counts

Sample 4'-6' 9/10/12/21

Black, gravelly fill, wet, slight odor
NO PID
PICTURE
SLIGHT ODOR
@ 6.0' NO sign of wood debris

Sample 6'-8' 47/8/6/7

Black, gravelly fill w/ brick, wet
7.5'
7.5'-8' Black silty clay native w/ peat

Set well @ same depth as B#2
- NO PID
- PICTURE
- SLIGHT ODOR

Check CAMP @ 12:45pm

Rite in the Rain

6

Location 2424 H.T. Date 8/20/19

Project / Client pg. 4

BH6 started @ 1:15 pm

4'-6' sample

Blow Counts
6/12/13/18

Black silty gravel wet near 6'
NO ODOR
NO PID
A Picture

6'-8' Sample
Black gravel, wet, clay near bottom 8'
NO ODOR
NO PID
A PICTURE

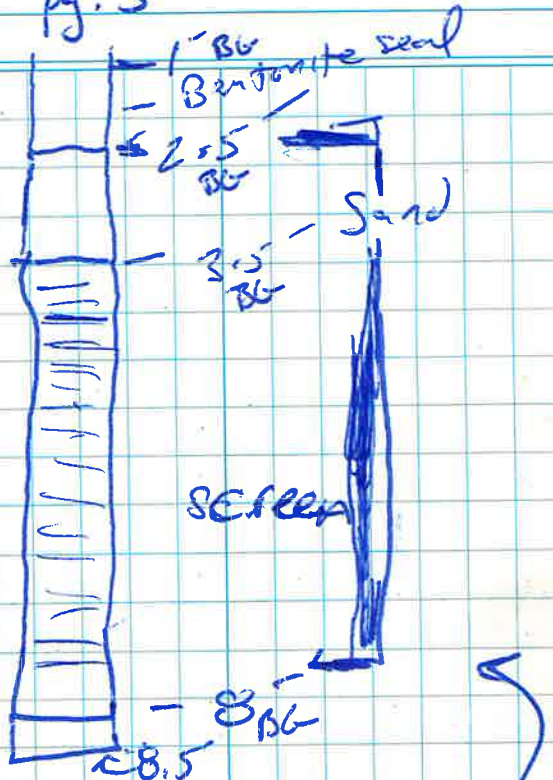
17/14/11/10
~~4/3/5/6~~

8'-10' Sample
Brown silty clay w/ mulch
NO ODOR
NO PID
A PICTURE

4/3/5/6

Location 2424 H.T Date 8/20/19

Project / Client pg. 5



Set BH6 @ 8.5' depth

See above

Check CAMP @ 2:00 pm

OFFSITE @ 2:45 pm

Rite in the Rain

Location 2424 H.T Date 8/21/19

Project / Client pg. 1

Heavy RAIN

B#7 started @ 8:00 -- NO camp

Sample 4-6 4/7/8/49

Grey clay w/ gravel wet @ 6'
no odor
NO PID

Sample 6-8' 11/7/5/7

Black wet gravel w/ some wood chips @ mucks @ 8'
Some petro odor
NO PID

☆ Picture of Both samples

Well set @ 8.0' Deep
SAME AS B#6

Location 2424 H.T Date 8/21/19

Project / Client pg. 2

- 9:00am CAMP setup Downwind
--STOPPED RAINING

#3 started @ 9:30am

Sample 4-6' 7/22/12/3

Grey slag / gravel @ 4-5'
Brown clay + wood chips @ 6'
NO ODOR → Dry
NO PID

☆ Picture

Sample 6-8' 11/7/9/4

Brown wet peat
- No odor
- NO PID
☆ - PICTURE

Well set same as B#4

Rite in the Rain

Location 2424 H.T Date 8/21/19

Project / Client PJ 3

B#1 started @ 10:30am

Sample 4-6'

Location _____ Date _____

Project / Client _____

SVG-1 1035

S1 6, 15, 13, 20

4-6

1.5 / 2.0 Brown, wet, moist, F6, some FS, Brick at Clinker stony petro 1485 ppm

S2 6-8

3, 5, 6, 6

1.2 / 2.0 Mostly Organic Fines w/ clay SL petro (65) 23.4 ppm → 4.8 ppm (7.5)

Rite in the Rain

Location _____ Date _____

Project / Client _____

Location _____ Date _____

Project / Client _____

SVE-9

S1 12, 24, 52, 15
4-6

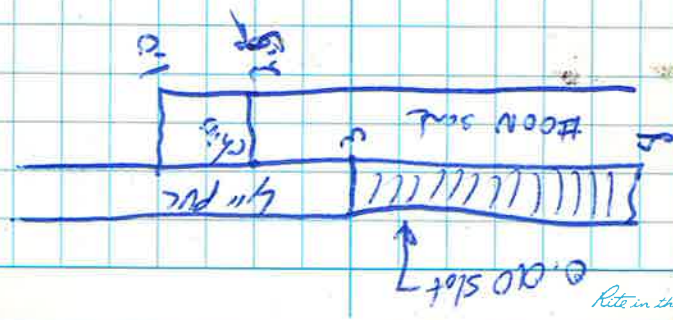
0.8/2.0 Fill yellow Brick, wet
100 ppm Some FS, little FG,
Blacks sl petro

S2 7, 15, 13, 6
6-8

1.3/2.0 As Above
1243 ppm petro

S3 5, 3, 3, 5
8-10

1.5/2.0 Brown, moist, mostly
MgF w/ some FS & Organic
Fines. 24.2 ppm
SL petro



Rite in the Rain

Location _____ Date _____

Project / Client _____

Location 2424 Hamburg Turnpike Date 8/2/19

Project / Client Lackawanna NY

SVE-10 1324

S1 4, 10, 35, 32

4-6

0.9/2.0 Fill wet, Black gravel, petro

1584 ppm

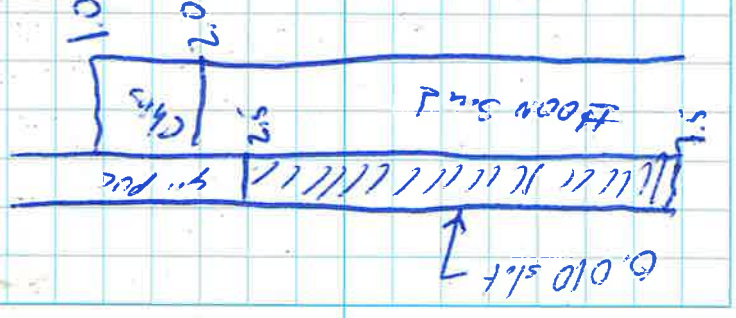
S2 2, 3, 7, 6

6-8

1.0/2.0 0-0.8 grey, moist mostly Sandy Lean clay, Some FS 24.2 ppm

0.8-1.0 Brown, moist, mostly Organic Fines, w/ Few FS

51.2 ppm



Rite in the Rain

16

Location _____ Date _____

Project / Client _____

Location 2424 Hamburg Turnpike Date 8/22/19 17

Project / Client SVE Install

SVE-11

S1 4, 3, 4, 4

1.0/2.0 Remarks SLC 4-6

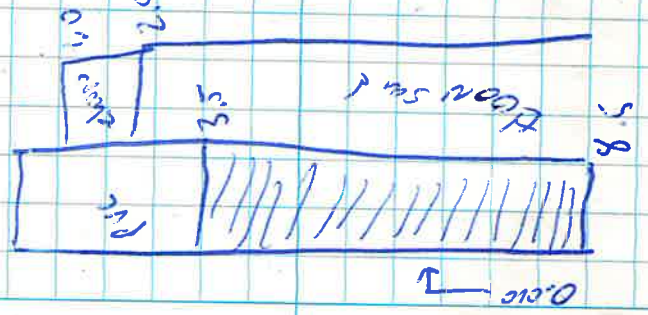
Reddish Brown, moist mostly MFF, some FS 0.1 ppm

S2 6-8

0.6/2.0 As Above concrete in shoe 0.0 ppm

S3 8-10

0.7/2.0 clayey Organic layer 12, 8, 9, 6 mostly LC w/ Organic Fines SI Petro 3.2 ppm



Rite in the Rain

Location _____ Date _____

Project / Client _____

Re-Spoons

Location _____ Date _____

Project / Client _____

SVE-12

S1 1,2,2,3

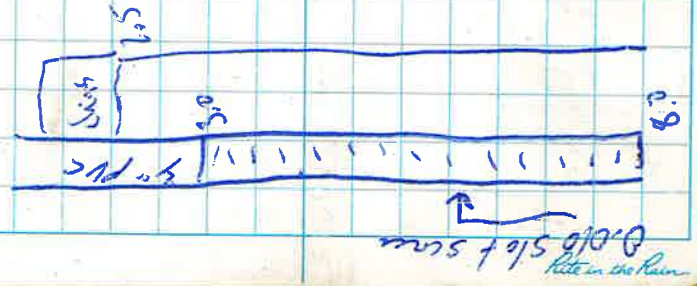
1d/20 Reworked clay 4-6
wl wet Black lens w/ gravel
at 5.0' sl petro 2.8 ppm

S2 2,3,4,4

0.9/2.0 6-8
As Above, sl petro
No wet lens 4.2 ppm
Plastic In shoe

S3 2,2,2,2

0.6/2.0 8-10
As above mixed w/ organics
Fines, Fine sand, Subrounded
Fine gravels. 0.2 ppm No odor



20

Location _____ Date _____

Project / Client _____

Location _____ Date 8/22/19 21

Project / Client _____

SVE-13 4-6

S1 5, 3, 5, 7

1.0/2.0 Wet, Brown, mostly FS, Few NPF Orange Brick, Angular FG Roots, 0.0 ppm No odor

S2 6-8

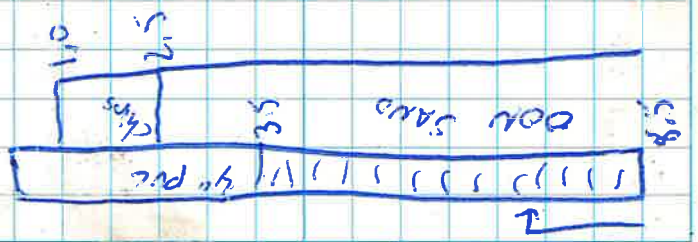
3, 7, 24, 8

0.8/2.0 Wet, Brown mostly, Rework sand + clay, w/ Poly sheeting, slag SI petro 6.3 ppm

S3 8-16

3, 4, 6, 6

1.2/2.0 Organic Fines w/ SLG 0.5 ppm No odor



Location _____ Date _____

Project / Client _____

concrete in sleeve taken second spoon

Location _____ Date 8/22/18

Project / Client _____

SVE-14

S1 4-6

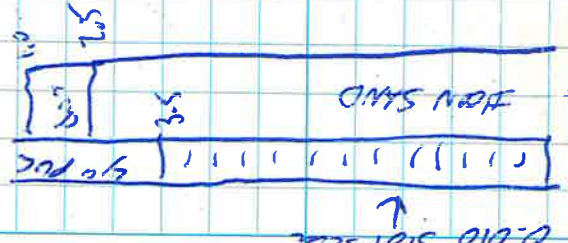
1.0/2.0 Clay Fill 4/9, 8, 9, 7
w/ concrete Brown, Black
0.0 ppm No odor

S2 6-8

1.0/2.0 0-0.5 gravel mat 15, 7, 4.5
Fill 1.0 ppm SL petro
0.5-1.0 gray, moist, SLC.
slight petro 1.2 ppm

S3 8-10

0.6/2.0 wet Organic Fines 4, 5, 7, 8
0.2 ppm No odor



Rite in the Rain

Location _____ Date _____

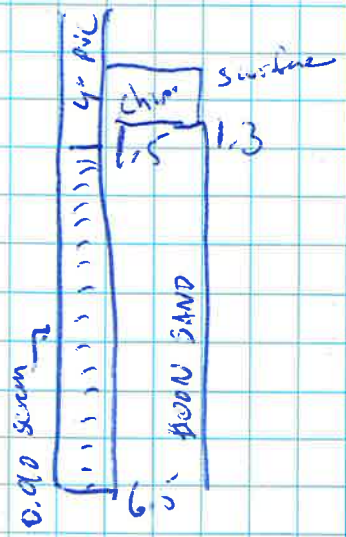
Project / Client _____

Location 2424 Hudson Turnpike Date 8/23/19

Project / Client _____

SVE-8

SVE is ~1.0 Due to no Finished Floor.
Auger to 6.5' Impact Sand



Rite in the Rain

APPENDIX C

EXCAVATION WORK PLAN

BROWNFIELD CLEANUP PROGRAM
SITE MANAGEMENT PLAN

APPENDIX C
EXCAVATION WORK PLAN

2424 HAMBURG TURNPIKE SITE
NYSDEC SITE NUMBER: C915296
LACKAWANNA, NEW YORK

October 2019 0345-015-001

Prepared for:

2424 Hamburg Turnpike, LLC

2558 Hamburg Turnpike, Suite 340

Buffalo, New York

Prepared By:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

2558 Hamburg Turnpike, Suite 300

Buffalo, NY 14218

SITE MANAGEMENT PLAN
APPENDIX C: EXCAVATION PLAN
2424 HAMBURG TURNPIKE SITE

Table of Contents

C-1: NOTIFICATION 1
C-2: SOIL SCREENING METHODS 2
C-3: SOIL STAGING METHODS 2
C-4: MATERIALS EXCAVATION AND LOAD-OUT 2
C-5: MATERIALS TRANSPORT OFF-SITE 3
C-6: MATERIALS DISPOSAL OFF-SITE 4
C-7: MATERIALS REUSE ON-SITE 4
C-8: FLUIDS MANAGEMENT 6
C-9: COVER SYSTEM RESTORATION 6
C-10: BACKFILL FROM OFF-SITE SOURCES 6
C-11: STORMWATER POLLUTION PREVENTION 8
C-12: EXCAVATION CONTINGENCY PLAN 8
C-13: COMMUNITY AIR MONITORING PLAN 9
C-14: ODOR CONTROL PLAN 9
C-15: DUST CONTROL PLAN 10
C-16: OTHER NUISANCES 10

APPENDIX C – EXCAVATION WORK PLAN (EWP)

C-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information.

Table 1: Notifications*

Mr. Anthony Lopes, P.E. (NYSDEC Region 9 Project Manager)	716-851-7220 anthony.lopes@dec.ny.gov
Mr. Stanley Radon, PG (NYSDEC Region 9 HW Engineer)	716-851-7220 stanley.radon@dec.ny.gov
Ms. Kelly Lewandowski (NYSDEC Site Control)	518-402-9543 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 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;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix E of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

C-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). 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 C-6 and C-7 of this Appendix.

C-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.

C-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision 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.

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).

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.

C-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 6NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. 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 transport routes shall be selected to involve the shortest commute through residential neighborhoods as feasible. 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.

C-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 in accordance with all local, State (including 6NYCRR Part 360) 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. Unregulated off-site management of materials from this site will not occur without formal NYSDEC 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, i.e., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: 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, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

C-7 MATERIALS REUSE ON-SITE

'Reuse on-site' means reuse on-site of material that originates at the site and does not leave the Site during the excavation. The criteria under which soil/fill originating on-site may be used on-site are presented below.

- **Excavated, Non-Impacted On-Site Soil/Fill:** Non-impacted soil/fill (i.e., soil/fill that does not exhibit visible or olfactory evidence of contamination, and is not grossly contaminated (as described in Part 375), and does not exhibit PID readings that exceed 10 parts per million (ppm) that is excavated from the Site may be used on-site as backfill

beneath the cover system without special handling. The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site.

- **Excavated, Potentially Impacted On-Site Soil/Fill:** Potentially impacted soil/fill (i.e., soils that exhibit field visual and/or olfactory indications of contamination), or with elevated PID readings (above 10 ppm) may not be used on-site unless tested and determined to meet the chemical criteria for Restricted Residential Use SCOs per 6NYCRR Part 375. Potentially impacted material will be segregated, as described above, and sampled to determine acceptance for reuse. The material reuse analysis will be discussed with the Department and may include those constituents identified in 6NYCRR Part 375 for VOCs, SVOCs, metals, PCBs, pesticides and herbicides, in accordance with applicable USEPA SW846 analytical methodology.

The analytical results will be compared to NYSDEC's current Restricted Residential Use SCOs (RRSCOs). If concentrations are below RRSCOs, the soil/fill can be reused on-site. If the concentrations are elevated above RRSCOs, the results shall be shared with the NYSDEC and approval obtained prior to their specified reuse on-site. It should be noted the NYSDEC may require highly impacted materials to be transported off-site and disposed of at a permitted landfill facility in accordance with all applicable local, state, and federal regulations. Staging and stockpiling management of materials should be conducted as described in the sections above.

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material 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 a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. No grossly-impacted materials shall be reused on-site; such materials must be disposed of offsite in accordance with applicable local, state, and federal regulations.

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 will not be reused on-site.

C-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 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.

C-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 a minimum of 12 inches of clean soil or 4-6" stone sub-base over demarcation layer, asphalt pavement, concrete covered sidewalks and curbs, and concrete building slab. The demarcation layer, consisting of orange snow fencing material, 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. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

C-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional 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.

Material from industrial sites, spill sites, or 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 6NYCRR 375-6.7(d). The criteria under which off-site material may be used as backfill are presented below.

- **Off-Site Soil/Fill:** Off-Site soil/fill may be used as backfill provided that it originates from known sources having no evidence of disposal or releases of hazardous substances; hazardous, toxic or radioactive wastes; or petroleum, and is tested and meet all of the criteria in accordance with Appendix 5 of DER-10. In addition, no off-site materials meeting the definition of a solid waste as defined in 6 NYCRR, Part 360-1.2(a) shall be used as backfill.
- **Other Off-Site Material:** Material other than soil may be imported as backfill, without chemical testing, provided it contains less than 10% (by weight) material that would pass through a size 80 sieve: 1) Rock or stone, consisting of virgin material from a permitted mine or quarry; 2) Recycled concrete, brick, or asphalt from a NYSDEC-registered or permitted C&D debris processing facility (as specified in Section 360-16.1 of 6 NYCRR Part 360) that conforms to Section 304 of the New York State Department of Transportation Standard Specifications Construction and Materials Volume 1 (2002). As stated in Section 360-16.4(b)(2), the facility may only accept recognizable, uncontaminated, non-pulverized C&D debris or C&D debris from other authorized C&D processing facilities. According to Section 360-16.2(c), "uncontaminated" means C&D debris that is not mixed or commingled with other solid waste at the point of generation, processing, or disposal, and that is not contaminated with spills of a petroleum product, hazardous waste, or industrial waste.

Off-site borrow soils shall be tested to assure conformance with the criteria identified above. If an off-site soil/fill borrow source is of unknown origin or originates from a commercial or urban site, then a tiered approach based on the volume of impacted soil/fill being excavated will be used to determine the frequency of characterization sampling in accordance with DER-10, Section 5.4 and Table 5.4(3)10.

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. 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.

C-11 STORMWATER POLLUTION PREVENTION

If future site activities include large excavation, details of storm water pollution prevention will be included in the applicable notification provided to the Department. If required by the Department as part of the planned future excavation activities, 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.

C-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.

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, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone 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.

C-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) will follow the guidance provided in the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan found in Appendix 1A of NYSDEC's DER-10 *Technical Guidance for Site Investigation and Remediation*. The CAMP for this Site is included as Appendix D of this SMP. The CAMP will be implemented for all intrusive activities performed at the Site. A figure showing the location of air sampling stations based on generally prevailing wind conditions will be prepared at the start of work. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations. VOC monitoring will be performed using a PID or other equipment capable of calculating 15-minute running average concentrations. All air monitoring equipment will be calibrated at least daily. The 15-minute average concentration will be compared to the levels specified below. Alternatively, the upwind monitoring location may be removed if the background contribution is 0.0 ppm.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

C-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 may include limiting exposed face of the excavation area, reduction in work hours and/or specific work activities (e.g. load out of material), proof rolling excavation, and application of odor control agents (e.g. spray-foam). 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.

C-15 DUST CONTROL PLAN

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 through the use of 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.
- Covering or proof-rolling excavated area and materials after excavation activities ceases.
- Reducing the excavation size and/or number of excavations.

C-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 D

HEALTH & SAFETY PLAN (HASP) AND CAMP

SITE HEALTH AND SAFETY PLAN
for
OPERATION, MAINTENANCE & MONITORING

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

SITE NO. C915296

October 2019 0345-015-001

Prepared for:

2424 Hamburg Turnpike, LLC

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

2424 HAMBURG TURNPIKE SITE
HEALTH AND SAFETY PLAN FOR OM&M

ACKNOWLEDGEMENT

Plan Reviewed by (initial):

Corporate Health and Safety Director: Thomas H. Forbes, P.E.

Project Manager: Mike Lesakowski

Designated Site Safety and Health Officer: Lori Riker, P.E.

Acknowledgement:
I acknowledge that I have reviewed the information contained in this site-specific Health and Safety Plan, and understand the hazards associated with performance of the field activities described herein. I agree to comply with the requirements of this plan.

NAME (PRINT)	SIGNATURE	DATE

BENCHMARK TURNKEY

2424 HAMBURG TURNPIKE SITE
HEALTH AND SAFETY PLAN FOR OM&M

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 General 1
1.2 Background 1
1.3 Known and Suspected Environmental Conditions 2
1.4 Parameters of Interest 4
1.5 Overview of Operation, Maintenance, and Monitoring Activities 4

2.0 ORGANIZATIONAL STRUCTURE 5
2.1 Roles and Responsibilities 5
2.1.1 Corporate Health and Safety Director 5
2.1.2 Project Manager 5
2.1.3 Site Safety and Health Officer 6
2.1.4 Site Workers 7
2.1.5 Other Site Personnel 7

3.0 HAZARD EVALUATION 8
3.1 Chemical Hazards 8
3.2 Physical Hazards 10

4.0 TRAINING 11
4.1 Site Workers 11
4.1.1 Initial and Refresher Training 11
4.1.2 Site Training 12
4.2 Supervisor Training 13
4.3 Emergency Response Training 14
4.4 Site Visitors 14

5.0 MEDICAL MONITORING 15

6.0 SAFE WORK PRACTICES 17

7.0 PERSONAL PROTECTIVE EQUIPMENT 19
7.1 Equipment Selection 19
7.2 Protection Ensembles 20
7.2.1 Level A/B Protection Ensemble 20
7.2.2 Level C Protection Ensemble 21
7.2.3 Level D Protection Ensemble 21
7.2.4 Recommended Level of Protection for Site Tasks 22

2424 HAMBURG TURNPIKE SITE
HEALTH AND SAFETY PLAN FOR OM&M

TABLE OF CONTENTS

8.0 EXPOSURE MONITORING 23
8.1 General 23
8.1.1 On-Site Work Zone Monitoring 23
8.1.2 Off-Site Community Air Monitoring 23
8.2 Monitoring Action Levels 24
8.2.1 On-Site Work Zone Action Levels 24
8.2.2 Community Air Monitoring Action Levels 25

9.0 SPILL RELEASE/RESPONSE 29
9.1 Potential Spills and Available Controls 29
9.2 Initial Spill Notification and Evaluation 30
9.3 Spill Response 31
9.4 Post-Spill Evaluation 32

10.0 HEAT/COLD STRESS MONITORING 33
10.1 Heat Stress Monitoring 33
10.2 Cold Stress Monitoring 35

11.0 WORK ZONES AND SITE CONTROL 38

12.0 DECONTAMINATION 40
12.1 Decontamination for Benchmark-TurnKey Employees 40
12.2 Decontamination for Medical Emergencies 41
12.3 Decontamination of Field Equipment 41

13.0 CONFINED SPACE ENTRY 42

14.0 FIRE PREVENTION AND PROTECTION 43
14.1 General Approach 43
14.2 Equipment and Requirements 43
14.3 Flammable and Combustible Substances 43
14.4 Hot Work 43

15.0 EMERGENCY INFORMATION 44

16.0 REFERENCES 45

2424 HAMBURG TURNPIKE SITE
HEALTH AND SAFETY PLAN FOR OM&M

TABLE OF CONTENTS

LIST OF TABLES

Table 1	Toxicity Data for Constituents of Potential Concern
Table 2	Potential Routes of Exposure to Constituents of Potential Concern
Table 3	Required Levels of Protection for OM&M Tasks

LIST OF FIGURES

Figure 1	Site Vicinity and Location Map
Figure 2	Site Map

ATTACHMENTS

Attachment A	Emergency Response Plan
Attachment B	Hot Work Permit Form
Attachment C	Community Air Monitoring Plan

1.0 INTRODUCTION

1.1 General

In accordance with OSHA requirements contained in 29 CFR 1910.120, this Health and Safety Plan (HASP) describes the specific health and safety practices and procedures to be employed by Benchmark Environmental Engineering & Science, PLLC and TurnKey Environmental Restoration, LLC and employees (referred to jointly hereafter as "Benchmark-TurnKey") during Operation, Maintenance, and Monitoring (OM&M) activities at the 2424 Hamburg Turnpike Site (Site) located at 2424 Hamburg Turnpike in the City of Lackawanna, Erie County, New York. This HASP presents procedures for Benchmark-TurnKey employees who will be involved with OM&M field activities; it does not cover the activities of other contractors, subcontractors or other individuals on the Site. These firms will be required to develop and enforce their own HASPs as discussed in Section 2.0. Benchmark-TurnKey accepts no responsibility for the health and safety of contractor, subcontractor or other personnel.

This HASP presents information on known Site health and safety hazards using available historical information, and identifies the equipment, materials and procedures that will be used to eliminate or control these hazards. Environmental monitoring will be performed during the course of field activities to provide real-time data for on-going assessment of potential hazards.

1.2 Background

The Site property consists of one tax parcel: 1.04 acres. The Site is currently unoccupied with a vacant commercial building consisting of a former automobile service building with four repair bays and eight (former) in-ground hydraulic lifts. Prior to being vacated, the Site was utilized as an automobile filling and service station.

The site is identified with the Tax ID No. 141.59-5-2 and is situated in a mixed commercial and industrial zones area of the City of Lackawanna. The Site is bound by an active gasoline station to the north, a retail store to the south, vacant land to the east and Hamburg Turnpike followed by vacant industrial land to the west (see Figures 1 and 2).

1.3 Known and Suspected Environmental Conditions

Previous investigations have confirmed that the history of being utilized as a gasoline station and automotive repair facility has impacted the Site, which will require remediation prior to redevelopment.

The following lists the site characteristics at the time of the Remedial Investigation (RI).

Surface Soil/Rill Summary:

As described above, the surface soil/fill has only minor SVOC and metal impacts; the only exceedance of CSCOs was benzo(a)pyrene at RI SS-1. Individual concentrations of SVOCs and metals were identified at concentrations slightly above USCOs. The SVOCs and metals identified are ubiquitous to industrial soil/fill and have been identified at numerous nearby sites.

Subsurface Soil/Fill Summary:

GCS was identified on the Site within the footprint of the historic automotive repair building, west of the repair building and north of the former UST excavation area. GCS was noted to include strong petroleum-like odors and PID readings >100 ppm (up to 1,235 ppm). An approximate one-inch thick layer of product was identified north of the former UST excavation area during the Phase II investigation at SB-4/TMW-1. No VOCs, pesticides, herbicides, or PCBs were detected above Part 375 CSCOs. Only one metal, arsenic, was detected slightly above its respective Part 375 CSCO in subsurface soil/fill at two sample locations. Benzo(a)pyrene was detected above Part 375 CSCOs at four RI sample locations and two Phase II sample locations. Five additional PAHs exceeded CSCOs at one Phase II boring location. Total PAH concentrations were reported at less than 500 ppm except for SB-5.

Groundwater Summary:

Petroleum-related VOCs concentrations exceeded GWQS/GVs at the DPE pilot study, RI and Phase II wells located northwest, west and southwest of the historic automotive repair building.

SVOCs were predominantly reported as non-detect, trace (estimated), or detected at concentrations below GWQS/GVs. Only naphthalene at MW-3 and an estimated concentration of phenol at MW-4 exceeded GWQS/GVs.

Total and dissolved metals detected at concentrations above GWQS/GVs include naturally occurring minerals such as iron, manganese, and sodium. Additionally, total arsenic

was detected above its respective GWQS/GV at MW-2 and MW-5; however, dissolved arsenic was not detected.

Herbicides and PCBs were reported as non-detect. Pesticides were non-detect except for an estimated concentration of 4'4'-DDD at MW-5 which was significantly below the GWQS/GV.

The visual and olfactory evidence of impact observed at Phase II temporary well TMW-1 and the petroleum-like odors at RI well MW-3 are likely associated with the GCS present on the Site**.** Removal of GCS and in-ground lifts during planned remedial activities will mitigate these groundwater impacts. Groundwater flows in a north-northwesterly direction.

Interim Remedial Measures were completed between March and April 2017. Activities included limited excavation and off-site disposal of contaminant source areas below the existing auto repair building, including:

- Grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u) and soils exhibiting PID measures exceeding 100 ppm;
- Removal and proper disposal/recycling of existing in-ground auto lifts and contents of, underground piping, and other associated structures;
- Non-aqueous phase liquids;
- Soil with visual waste material or non-aqueous phase liquid; and
- Soils that create nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Clean fill meeting the commercial soil cleanup objective (CSCO) requirements of 6 NYCRR Part 375-6.7(d) was used as backfill for the excavation. Contamination left in place include grossly contaminated media (GCM) below the foundation of the existing building auto repair building (to save the structure) and additional contamination outside and around the former fuel dispensing area to be addressed as part of the final remedy.

After the ROD was issued but before the selected remedy was implemented, Benchmark implemented a Department-approved In-Situ Dual Phase Soil Vapor and Groundwater Extraction System (DPE) Pilot Test Work Plan (PTWP) dated June 2018 and included as Appendix B in this Remedial Action Work Plan (RAWP). The pilot-scale treatability test successfully demonstrated the effectiveness of DPE and provided fundamental design parameters with a preliminary layout of the proposed SVE system.

1.4 Parameters of Interest

Based on the investigation data, the primary Constituents of Concern (COCs) are:

- Soil/fill: GCS, PAHs, and arsenic
- Groundwater: LNAPL and petroleum VOCs

1.5 Overview of Operation, Maintenance, and Monitoring Activities

Benchmark-TurnKey personnel will be on-site to observe and perform operation, maintenance, and monitoring (OM&M) activities. The field activities to be completed are more fully described in the Site Management Plan (SMP). The OM&M activities to be completed are described below:

- The In-Situ Dual Phase Soil Vapor and Groundwater Extraction System will require monthly monitoring to verify the system is operating properly and for routine maintenance.
- Groundwater monitoring will occur semi-annually from select monitoring wells indicated in the SMP.

2.0 ORGANIZATIONAL STRUCTURE

This section of the HASP describes the lines of authority, responsibility and communication as they pertain to health and safety functions at the Site. The purpose of this chapter is to identify the personnel who impact the development and implementation of the HASP and to describe their roles and responsibilities. This chapter also identifies other contractors and subcontractors involved in work operations and establish the lines of communications among them for health and safety matters. The organizational structure described in this chapter is consistent with the requirements of 29 CFR 1910.120(b)(2). This section will be reviewed by the Project Manager and updated as necessary to reflect the current organizational structure at this Site.

2.1 Roles and Responsibilities

All Benchmark-TurnKey personnel on the Site must comply with the minimum requirements of this HASP. The specific responsibilities and authority of management, safety and health, and other personnel on this Site are detailed in the following paragraphs.

2.1.1 Corporate Health and Safety Director

The Benchmark-TurnKey Corporate Health and Safety Director is ***Mr. Thomas H. Forbes, P.E.*** The Corporate Health and Safety Director responsible for developing and implementing the Health and Safety program and policies for Benchmark Environmental Engineering & Science, PLLC and TurnKey Environmental Restoration, LLC, and consulting with corporate management to ensure adequate resources are available to properly implement these programs and policies. The Corporate Health and Safety Director coordinates Benchmark-TurnKey's Health and Safety training and medical monitoring programs and assists project management and field staff in developing site-specific health and safety plans.

2.1.2 Project Manager

The Project Manager for this Site is ***Mr. Michael Lesakowski.*** The Project Manager has the responsibility and authority to direct all Benchmark-TurnKey work operations at the Site. The Project Manager coordinates safety and health functions with the Site Safety and Health Officer, and bears ultimate responsibility for proper implementation of this HASP.

He may delegate authority to expedite and facilitate any application of the program, including modifications to the overall project approach as necessary to circumvent unsafe work conditions. Specific duties of the Project Manager include:

- Preparing and coordinating the Site work plan.
- Providing Benchmark-TurnKey workers with work assignments and overseeing their performance.
- Coordinating health and safety efforts with the Site Safety and Health Officer (SSHO).
- Reviewing the emergency response coordination plan to assure its effectiveness.
- Serving as the primary liaison with Site contractors and the property owner.

2.1.3 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) for this Site is ***Ms. Lori Riker, P.E.***. The qualified alternate SSHO is ***Mr. Bryan Mayback.*** The SSHO reports to the Project Manager. The SSHO is on-site or readily accessible to the Site during all work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SSHO are:

- Managing the safety and health functions for Benchmark-TurnKey personnel on the Site.
- Serving as the point of contact for safety and health matters.
- Ensuring that Benchmark-TurnKey field personnel working on the Site have received proper training (per 29 CFR Part 1910.120(e)), that they have obtained medical clearance to wear respiratory protection (per 29 CFR Part 1910.134), and that they are properly trained in the selection, use and maintenance of personal protective equipment, including qualitative respirator fit testing.
- Performing or overseeing Site monitoring as required by the HASP.
- Assisting in the preparation and review of the HASP.

- Maintaining site-specific safety and health records as described in this HASP.

- Coordinating with the Project Manager, Site Workers, and Contractor's SSHO as necessary for safety and health efforts.

2.1.4 Site Workers

Site workers are responsible for: complying with this HASP or a more stringent HASP, if appropriate (i.e., Contractor and Subcontractor's HASP); using proper PPE; reporting unsafe acts and conditions to the SSHO; and following the safety and health instructions of the Project Manager and SSHO.

2.1.5 Other Site Personnel

Other Site personnel who will have health and safety responsibilities will include the Drilling Contractor and the floor structure and sanitary cleanout Contractor who will be responsible for developing, implementing and enforcing a Health and Safety Plan equally stringent or more stringent than Benchmark-TurnKey's HASP. Benchmark-TurnKey assumes no responsibility for the health and safety of anyone outside its direct employ. Each Contractor's HASP shall cover all non-Benchmark/TurnKey Site personnel. Each Contractor shall assign a SSHO who will coordinate with Benchmark-TurnKey's SSHO as necessary to ensure effective lines of communication and consistency between contingency plans.

In addition to Benchmark-TurnKey and Contractor personnel, other individuals who may have responsibilities in the work zone include subcontractors and governmental agencies performing Site inspection work (i.e., the New York State Department of Environmental Conservation). The Contractor shall be responsible for ensuring that these individuals have received OSHA-required training (29 CFR 1910.120(e)), including initial, refresher and site-specific training, and shall be responsible for the safety and health of these individuals while they are on-site.

3.0 HAZARD EVALUATION

Due to the presence of certain contaminants at the Site, the possibility exists that workers will be exposed to hazardous substances during OM&M. The principal points of exposure would be through direct contact with and incidental ingestion of soil and/or groundwater, and through the inhalation of contaminated particles or vapors. Other points of exposure may include direct contact with groundwater. In addition, the use of drilling and/or medium to large-sized construction equipment (e.g., excavator) will also present conditions for potential physical injury to workers. Further, since work will be performed outdoors, the potential exists for heat/cold stress to impact workers, especially those wearing protective equipment and clothing. Adherence to the medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, establishment work zones and Site control, appropriate decontamination procedures and contingency planning outlined herein will reduce the potential for chemical exposures and physical injuries.

3.1 Chemical Hazards

As discussed in Section 1.3, historic activities have potentially resulted in petroleum VOC impacts to Site soils, groundwater, and subslab vapors. Table 1 lists exposure limits for airborne concentrations of the COPCs identified in Section 1.4 of this HASP. Brief descriptions of the toxicology of the prevalent COPCs and related health and safety guidance and criteria are provided below.

- **Polycyclic Aromatic Hydrocarbons (PAHs)** are formed as a result of the pyrolysis and incomplete combustion of organic matter such as fossil fuel. PAH aerosols formed during the combustion process disperse throughout the atmosphere, resulting in the deposition of PAH condensate in soil, water and on vegetation. In addition, several products formed from petroleum processing operations (e.g., roofing materials and asphalt) also contain elevated levels of PAHs. Hence, these compounds are widely dispersed in the environment. PAHs are characterized by a molecular structure containing three or more fused, unsaturated carbon rings. Seven of the PAHs are classified by USEPA as probable human carcinogens (USEPA Class B2). These are: benzo(a)pyrene; benzo(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; dibenzo(a,h)anthracene; and indeno(1,2,3-cd)pyrene. The primary route of exposure to PAHs is through incidental ingestion and inhalation of contaminated

particulates. PAHs are characterized by an organic odor, and exist as oily liquids in pure form. Acute exposure symptoms may include acne-type blemishes in areas of the skin exposed to sunlight.

- **Petroleum Hydrocarbons:**

  Benzene (CAS #71-43-2) poisoning occurs most commonly through inhalation of the vapor, however, benzene can also penetrate the skin and poison in that way. Locally, benzene has a comparatively strong irritating effect, producing erythema and burning and, in some severe cases, edema and blistering. Exposure to high concentrations of the vapor (i.e., 3,000 ppm or higher) may result in acute poisoning characterized by the narcotic action of benzene on the central nervous system. In acute poisoning, symptoms include confusion, dizziness, tightening of the leg muscles, and pressure over the forehead. Chronic exposure to benzene (i.e., long-term exposure to concentrations of 100 ppm or less) may lead to damage of the blood-forming system. Benzene is very flammable when exposed to heat or flame and can react vigorously with oxidizing materials.

  Ethylbenzene (CAS #100-41-4) is a component of automobile gasoline. Over-exposure may cause kidney, skin liver and/or respiratory disease. Signs of exposure may include dermatitis, irritation of the eyes and mucus membranes, headache. Narcosis and coma may result in more severe cases.

  Toluene (CAS #108-88-3) is a common component of paint thinners and automobile fuel. Acute exposure predominantly results in central nervous system depression. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness, and coordination loss. Repeated exposures may cause removal of lipids from the skin, resulting in dry, fissured dermatitis.

  Xylenes (o, m, and p) (CAS #95-47-6, 108-38-3, and 106-42-3) are colorless, flammable liquids present in paint thinners and fuels. Acute exposure may cause central nervous system depression, resulting in headache, dizziness, fatigue, muscular weakness, drowsiness, and coordination loss. Repeated exposures may also cause removal of lipids from the skin, producing dry, fissured dermatitis. Exposure of high concentrations of vapor may cause eye irritation and damage, as well as irritation of the mucus membranes.

- **Arsenic** is listed as a Group A human carcinogen by the Environmental Protection Agency. Primary exposure routes are ingestion and inhalation. Exposure to arsenic can cause nausea, vomiting, diarrhea, decreased production of red blood cells, fatigue, abnormal heart rhythm, blood-vessel damage, as well as cancer of the liver, bladder, lungs, and skin.

With respect to the anticipated OM&M activities discussed in Section 1.5, possible routes of exposure to the above-mentioned contaminants are presented in Table 2. The use of proper respiratory equipment, as outlined in Section 7.0 of this HASP, will minimize the potential for exposure to airborne contamination. Exposure to contaminants through dermal and other routes will also be minimized through the use of protective clothing (Section 7.0), safe work practices (Section 6.0), and proper decontamination procedures (Section 12.0).

3.2 Physical Hazards

OM&M field activities at the 2424 Hamburg Turnpike Site may present the following physical hazards:

- The potential for physical injury during heavy construction equipment use, such as backhoes, excavators and drilling equipment.
- The potential for heat/cold stress to employees during the summer/winter months (see Section 10.0).
- The potential for slip and fall injuries due to rough, uneven terrain and/or open excavations.

These hazards represent only some of the possible means of injury that may be present during field and sampling activities at the Site. Since it is impossible to list all potential sources of injury, it shall be the responsibility of each individual to exercise proper care and caution during all phases of the work.

4.0 TRAINING

4.1 Site Workers

All personnel performing OM&M activities at the Site (such as, but not limited to, equipment operators, general laborers, and field staff) and who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors/managers responsible for the Site shall receive training in accordance with 29 CFR 1910.120(e) before they are permitted to engage in operations in the exclusion zone or contaminant reduction zone. This training includes an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Additional site-specific training shall also be provided by the SSHO prior to the start of OM&M field activities. A description of topics to be covered by this training is provided below.

4.1.1 Initial and Refresher Training

Initial and refresher training is conducted by a qualified instructor as specified under OSHA 29 CFR 1910.120(e)(5), and is specifically designed to meet the requirements of OSHA 29 CFR 1910.120(e)(3) and 1910.120(e)(8). The training covers, as a minimum, the following topics:

- OSHA HAZWOPER regulations.
- Site safety and hazard recognition, including chemical and physical hazards.
- Medical monitoring requirements.
- Air monitoring, permissible exposure limits, and respiratory protection level classifications.
- Appropriate use of personal protective equipment (PPE), including chemical compatibility and respiratory equipment selection and use.
- Work practices to minimize risk.

- Work zones and Site control.
- Safe use of engineering controls and equipment.
- Decontamination procedures.
- Emergency response and escape.
- Confined space entry procedures.
- Heat and cold stress monitoring.
- Elements of a Health and Safety Plan.
- Spill containment.

Initial training also incorporates workshops for PPE and respiratory equipment use (Levels A, B and C), and respirator fit testing. Records and certification received from the course instructor documenting each employee's successful completion of the training identified above are maintained on file at Benchmark-TurnKey's Buffalo, NY office. Contractors and Subcontractors are required to provide similar documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not been certified as having received health and safety training in conformance with 29 CFR 1910.120(e) is prohibited from working in the exclusion and contamination reduction zones, or to engage in any on-site work activities that may involve exposure to hazardous substances or wastes.

4.1.2 Site Training

Site workers are given a copy of the HASP and provided a site-specific briefing prior to the commencement of work to ensure that employees are familiar with the HASP and the information and requirements it contains. The Site briefing shall be provided by the SSHO prior to initiating field activities and shall include:

- Names of personnel and alternates responsible for Site safety and health.
- Safety, health and other hazards present on the Site.

- The site lay-out including work zones and places of refuge.
- The emergency communications system and emergency evacuation procedures.
- Use of PPE.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Medical surveillance, including recognition of symptoms and signs of over-exposure as described in Chapter 5 of this HASP.
- Decontamination procedures as detailed in Chapter 12 of this HASP.
- The emergency response plan as detailed in Chapter 15 of this HASP.
- Confined space entry procedures, if required, as detailed in Chapter 13 of this HASP.
- The spill containment program as detailed in Chapter 9 of this HASP.
- Site control as detailed in Chapter 11 of this HASP.

Supplemental health and safety briefings will also be conducted by the SSHO on an as-needed basis during the course of the work. Supplemental briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during ongoing Site characterization and analysis. Conditions for which the SSHO may schedule additional briefings include, but are not limited to: a change in Site conditions (e.g., based on monitoring results); changes in the work schedule/plan; newly discovered hazards; and safety incidents occurring during Site work.

4.2 Supervisor Training

On-site safety and health personnel who are directly responsible for or who supervise the safety and health of workers engaged in hazardous waste operations (i.e., SSHO) shall receive, in addition to the appropriate level of worker training described in Section 4.1,

above, 8 additional hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

4.3 Emergency Response Training

Emergency response training is addressed in Appendix A of this HASP, Emergency Response Plan.

4.4 Site Visitors

Each Contractor's SSHO will provide a site-specific briefing to all Site visitors and other non-Benchmark/TurnKey personnel who enter the Site beyond the Site entry point. The site-specific briefing will provide information about Site hazards, the Site layout including work zones and places of refuge, the emergency communications system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

Site visitors will not be permitted to enter the exclusion zone or contaminant reduction zones unless they have received the level of training required for Site workers as described in Section 4.1.

5.0 MEDICAL MONITORING

Medical monitoring examinations are provided to Benchmark-TurnKey employees as stipulated under 29 CFR Part 1910.120(f). These exams include initial employment, annual and employment termination physicals for all Benchmark-TurnKey employees involved in hazardous waste site field operations. Post-exposure examinations are also provided for employees who may have been injured, received a health impairment, or developed signs or symptoms of over-exposure to hazardous substances or were accidentally exposed to substances at concentrations above the permissible exposure limits without necessary personal protective equipment. Such exams are performed as soon as possible following development of symptoms or the known exposure event.

Medical evaluations are performed by Health Works, an occupational health care provider under contract with Benchmark-TurnKey. Health Works is located in Seneca Square Plaza, 1900 Ridge Road, West Seneca, New York 14224. The facility can be reached at (716) 823-5050 to schedule routine appointments or post-exposure examinations.

Medical evaluations are conducted according to the Benchmark-TurnKey Medical Monitoring Program and include an evaluation of the workers' ability to use respiratory protective equipment. The examinations include:

- Occupational/medical history review.
- Physical exam, including vital sign measurement.
- Spirometry testing.
- Eyesight testing.
- Audio testing (minimum baseline and exit, annual for employees routinely exposed to greater than 85db).
- EKG (for employees >40 yrs age or as medical conditions dictate).
- Chest X-ray (baseline and exit, and every 5 years).
- Blood biochemistry (including blood count, white cell differential count, serum multiplastic screening).
- Medical certification of physical requirements (i.e., sight, musculoskeletal,

cardiovascular) for safe job performance and to wear respiratory protection equipment.

The purpose of the medical evaluation is to determine an employee's fitness for duty on hazardous waste sites; and to establish baseline medical data.

In conformance with OSHA regulations, Benchmark-TurnKey will maintain and preserve medical records for a period of 30 years following termination of employment. Employees are provided a copy of the physician's post-exam report, and have access to their medical records and analyses.

6.0 SAFE WORK PRACTICES

All Benchmark-TurnKey employees shall conform to the following safe work practices during all on-site work activities conducted within the exclusion and contamination reduction zones:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth contact is strictly prohibited.
- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above.
- Respiratory protective equipment and clothing must be worn by all personnel entering the Site as required by the HASP or as modified by the Site safety officer. Excessive facial hair (i.e., beards, long mustaches or sideburns) that interferes with the satisfactory respirator-to-face seal is prohibited.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination.
- Medicine and alcohol can synergize the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the Benchmark-TurnKey occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during the workday.
- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.
- On-site personnel shall use the "buddy" system. No one may work alone (i.e., out of earshot or visual contact with other workers) in the exclusion zone.
- Personnel and equipment in the contaminated area shall be minimized, consistent with effective Site operations.
- All employees have the obligation to immediately report and if possible, correct unsafe work conditions.
- Use of contact lenses on-site will not be permitted. Spectacle kits for insertion into full-face respirators will be provided for Benchmark-TurnKey employees, as requested and required.

The recommended specific safety practices for working around the contractor's equipment (e.g., backhoes, bulldozers, excavators, drill rigs etc.) are as follows:

- Although the Contractor and subcontractors are responsible for their equipment and safe operation of the Site, Benchmark-TurnKey personnel are also responsible for their own safety.
- Subsurface work will not be initiated without first clearing underground utility services.
- Heavy equipment should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated or if lines carry high voltage. The Site should also be sufficiently clear to ensure the project staff can move around the heavy machinery safely.
- Care should be taken to avoid overhead wires when moving heavy-equipment from location to location.
- Hard hats, safety boots and safety glasses should be worn at all times in the vicinity of heavy equipment. Hearing protection is also recommended.
- The work Site should be kept neat. This will prevent personnel from tripping and will allow for fast emergency exit from the Site.
- Proper lighting must be provided when working at night.
- Construction activities should be discontinued during an electrical storm or severe weather conditions.
- The presence of combustible gases should be checked before igniting any open flame.
- Personnel shall stand upwind of any construction operation when not immediately involved in sampling/logging/observing activities.
- Personnel will not approach the edge of an unsecured trench/excavation closer than 2 feet.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 Equipment Selection

Personal protective equipment (PPE) will be donned when work activities may result in exposure to physical or chemical hazards beyond acceptable limits, and when such exposure can be mitigated through appropriate PPE. The selection of PPE will be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the Site, the task-specific conditions and duration, and the hazards and potential hazards identified at the Site.

Equipment designed to protect the body against contact with known or suspect chemical hazards are grouped into four categories according to the degree of protection afforded. These categories designated A through D consistent with United States Environmental Protection Agency (USEPA) Level of Protection designation, are:

- **Level A:** Should be selected when the highest level of respiratory, skin and eye protection is needed.

- **Level B:** Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required. Level B protection is the minimum level recommended on initial Site entries until the hazards have been further defined by on-site studies. Level B (or Level A) is also necessary for oxygen-deficient atmospheres.

- **Level C:** Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.

- **Level D:** Should not be worn on any Site with elevated respiratory or skin hazards. This is generally a work uniform providing minimal protection.

OSHA requires the use of certain PPE under conditions where an immediate danger to life and health (IDLH) may be present. Specifically, OSHA 29 CFR 1910.120(g)(3)(iii) requires use of a positive pressure self-contained breathing apparatus, or positive pressure air-line respirator equipped with an escape air supply when chemical exposure levels present a substantial possibility of immediate serious injury, illness or death, or impair the ability to

escape. Similarly, OSHA 29 CFR 1910.120(g)(3)(iv) requires donning totally-encapsulating chemical protective suits (with a protection level equivalent to Level A protection) in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate serious illness, injury or death, or impair the ability to escape.

In situations where the types of chemicals, concentrations, and possibilities of contact are unknown, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components are detailed below for levels A/B, C, and D protection.

7.2 Protection Ensembles

7.2.1 Level A/B Protection Ensemble

Level A/B ensembles include similar respiratory protection, however Level A provides a higher degree of dermal protection than Level B. Use of Level A over Level B is determined by: comparing the concentrations of identified substances in the air with skin toxicity data, and assessing the effect of the substance (by its measured air concentrations or splash potential) on the small area of the head and neck unprotected by Level B clothing.

The recommended PPE for level A/B is:

- Pressure-demand, full-face piece self-contained breathing apparatus (MSHA/-NIOSH approved) or pressure-demand supplied-air respirator with escape self-contained breathing apparatus (SCBA).
- Chemical-resistant clothing. For Level A, clothing consists of totally-encapsulating chemical resistant suit. Level B incorporates hooded one-or two-piece chemical splash suit.
- Inner and outer chemical resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

7.2.2 Level C Protection Ensemble

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing an air-purifying device. The device (when required) must be an air-purifying respirator (MSHA/NIOSH approved) equipped with filter cartridges. Cartridges must be able to remove the substances encountered. Respiratory protection will be used only with proper fitting, training and the approval of a qualified individual. In addition, an air-purifying respirator can be used only if: oxygen content of the atmosphere is at least 19.5% in volume; substances are identified and concentrations measured; substances have adequate warning properties; the individual passes a qualitative fit-test for the mask; and an appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

Recommended PPE for Level C conditions includes:

- Full-face piece, air-purifying respirator equipped with MSHA and NIOSH approved organic vapor/acid gas/dust/mist combination cartridges or as designated by the SSHO.
- Chemical-resistant clothing (hooded, one or two-piece chemical splash suit or disposable chemical-resistant one-piece suit).
- Inner and outer chemical-resistant gloves.
- Chemical-resistant safety boots/shoes.
- Hardhat.

An air-monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored thoroughly when personnel are wearing air-purifying respirators. Continual surveillance using direct-reading instruments is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

7.2.3 Level D Protection Ensemble

As indicated above, Level D protection is primarily a work uniform. It can be worn in

areas where only boots can be contaminated, where there are no inhalable toxic substances and where the atmospheric contains at least 19.5% oxygen.

Recommended PPE for Level D includes:

- Coveralls.
- Safety boots/shoes.
- Safety glasses or chemical splash goggles.
- Hardhat.
- Optional gloves; escape mask; face shield.

7.2.4 Recommended Level of Protection for Site Tasks

Based upon current information regarding both the contaminants suspected to be present at the Site and the various tasks that are included in the OM&M activities, the minimum required levels of protection for these tasks shall be as identified in Table 3.

8.0 EXPOSURE MONITORING

8.1 General

Based on the results of historic sample analysis and the nature of the proposed work activities at the Site, the possibility exist that organic vapors and/or particulates may be released to the air during intrusive construction activities. Ambient breathing zone concentrations may at times, exceed the permissible exposure limits (PELs) established by OSHA for the individual compounds (see Table 1), in which case respiratory protection will be required. Respiratory and dermal protection may be modified (upgraded or downgraded) by the SSHO based upon real-time field monitoring data.

8.1.1 On-Site Work Zone Monitoring

Benchmark-TurnKey personnel will conduct routine, real-time air monitoring during all intrusive construction phases such as excavation, backfilling, drilling, etc. The work area will be monitored at regular intervals using a photo-ionization detector (PID), combustible gas meter and a particulate meter. Observed values will be recorded and maintained as part of the permanent field record.

Additional air monitoring measurements may be made by Benchmark-TurnKey personnel to verify field conditions during subcontractor oversight activities. Monitoring instruments will be protected from surface contamination during use. Additional monitoring instruments may be added if the situations or conditions change. Monitoring instruments will be calibrated in accordance with manufacturer's instructions before use.

8.1.2 Off-Site Community Air Monitoring

In addition to on-site monitoring within the work zone(s), monitoring at the down-wind portion of the Site perimeter will be conducted. This will provide a real-time method for determination of vapor and/or particulate releases to the surrounding community as a result of ground intrusive investigation work.

Ground intrusive activities are defined in the Generic Community Air Monitoring Plan and attached as Appendix C. Ground intrusive activities include soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. Non-intrusive activities include the collection of soil and sediment samples or the

collection of groundwater samples from existing wells. Continuous monitoring is required for ground intrusive activities and periodic monitoring is required for non-intrusive activities. Periodic monitoring consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring while bailing a well, and taking a reading prior to leaving a sampling location. This may be upgraded to continuous if the sampling location is in close proximity to individuals not involved in the Site activity (i.e., on a curb of a busy street). The action levels below will be used during periodic monitoring.

8.2 Monitoring Action Levels

8.2.1 On-Site Work Zone Action Levels

The PID, or other appropriate instrument(s), will be used by Benchmark-TurnKey personnel to monitor organic vapor concentrations as specified in this HASP. Combustible gas will be monitored with the "combustible gas" option on the combustible gas meter or other appropriate instrument(s). In addition, fugitive dust/particulate concentrations will be monitored during major soil intrusion (viz., well/boring installation) using a real-time particulate monitor as specified in this plan. In the absence of such monitoring, appropriate respiratory protection for particulates shall be donned. Sustained readings obtained in the breathing zone may be interpreted (with regard to other Site conditions) as follows for Benchmark-TurnKey personnel:

- Total atmospheric concentrations of unidentified vapors or gases ranging from 0 to 1 ppm above background on the PID) - Continue operations under Level D (see Appendix A).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings from >1 ppm to 5 ppm above background on the PID (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue operations under Level C (see Appendix A).

- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings of >5 ppm to 50 ppm above background on the PID - Continue operations under Level B (see Attachment 1), re-evaluate and alter (if possible) construction methods to achieve lower vapor concentrations.

- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the PID - Discontinue operations and exit the work zone immediately.

The particulate monitor will be used to monitor respirable dust concentrations during all intrusive activities and during handling of Site soil/fill. Action levels based on the instrument readings shall be as follows:

- Less than 50 mg/m^3 - Continue field operations.
- 50-150 mg/m^3 - Don dust/particulate mask or equivalent
- Greater than 150 mg/m^3 - Don dust/particulate mask or equivalent. Initiate engineering controls to reduce respirable dust concentration (viz., wetting of excavated soils or tools at discretion of Site Health and Safety Officer).

Readings from the field equipment will be recorded and documented on the appropriate Project Field Forms. All instruments will be calibrated before use on a daily basis and the procedure will be documented on the appropriate Project Field Forms.

8.2.2 Community Air Monitoring Action Levels

In addition to the action levels prescribed in Section 8.2.1 for Benchmark-TurnKey personnel on-site, the following criteria shall also be adhered to for the protection of downwind receptors consistent with NYSDOH requirements (Appendix C):

- **ORGANIC VAPOR PERIMETER MONITORING:**
  - If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone exceeds 5 ppm above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the sustained organic vapor decreases below 5 ppm over background, work activities can resume with continued monitoring.
  - If the sustained ambient air concentration of organic vapors at the downwind perimeter of the exclusion zone are greater than 5 ppm over background but less than 25 ppm for the 15-minute average, activities can resume provided that: the organic vapor level 200 feet downwind of the working site or half the distance to the nearest off-site residential or commercial structure, whichever

is less, but in no case less than 20 feet, is below 5 ppm over background; and more frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

- If the sustained organic vapor level is above 25 ppm at the perimeter of the exclusion zone for the 15-minute average, the Site Health and Safety Officer must be notified and work activities shut down. The Site Health and Safety Officer will determine when re-entry of the exclusion zone is possible and will implement downwind air monitoring to ensure vapor emissions do not impact the nearest off-site residential or commercial structure at levels exceeding those specified in the ***Organic Vapor Contingency Monitoring Plan*** below. All readings will be recorded and will be available for New York State Department of Environmental Conservation (DEC) and Department of Health (DOH) personnel to review.

o **ORGANIC VAPOR CONTINGENCY MONITORING PLAN:**

- If the sustained organic vapor level is greater than 5 ppm over background 200 feet downwind from the work area or half the distance to the nearest off-site residential or commercial property, whichever is less, all work activities must be halted.

- If, following the cessation of the work activities or as the result of an emergency, sustained organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest off-site residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest off-site residential or commercial structure (20-foot zone).

- If efforts to abate the emission source are unsuccessful and if sustained organic vapor levels approach or exceed 5 ppm above background within the 20-foot zone for more than 30 minutes, or are sustained at levels greater than 10 ppm above background for longer than one minute, then the ***Major Vapor Emission Response Plan*** (see below) will automatically be placed into effect.

o **MAJOR VAPOR EMISSION RESPONSE PLAN:**

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in this Health and Safety Plan and the Emergency Response Plan (Appendix A) will be advised.

2. The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two sustained successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer.

The following personnel are to be notified in the listed sequence in the event that a Major Vapor Emission Plan is activated:

Responsible Person	Contact	Phone Number
SSHO	Police	911
SSHO	State Emergency Response Hotline	(800) 457-7362

Additional emergency numbers are listed in the Emergency Response Plan included as Appendix A.

- **EXPLOSIVE VAPORS:**
  - Sustained atmospheric concentrations of greater than 10% LEL in the work area - Initiate combustible gas monitoring at the downwind portion of the Site perimeter.
  - Sustained atmospheric concentrations of greater than 10% LEL at the downwind Site perimeter – Halt work and contact local Fire Department.

- **AIRBORNE PARTICULATE COMMUNITY AIR MONITORING**

Respirable (PM-10) particulate monitoring will be performed on a continuous basis at the upwind and downwind perimeter of the exclusion zone. The monitoring will be performed using real-time monitoring equipment capable of measuring PM-10 and integrating over a period of 15-minutes for comparison to the airborne particulate action levels. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. All readings will be recorded and will be available for NYSDEC and NYSDOH review. Readings will be interpreted as follows:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m^3) greater than the background (upwind perimeter) reading 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 provided that the downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and that visible dust is not migrating from the work area.

- If, after implementation of dust suppression techniques downwind PM-10 levels are greater than 150 ug/m^3 above the upwind level, work activities must be stopped and dust suppression controls re-evaluated. Work can resume provided that supplemental dust suppression measures and/or other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

Pertinent emergency response information including the telephone number of the Fire Department is included in the Emergency Response Plan (Appendix A).

9.0 SPILL RELEASE/RESPONSE

This chapter of the HASP describes the potential for and procedures related to spills or releases of known or suspected petroleum and/or hazardous substances on the Site. The purpose of this Section of the HASP is to plan appropriate response, control, counter-measures and reporting, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii). The spill containment program addresses the following elements:

- Potential hazardous material spills and available controls.
- Initial notification and evaluation.
- Spill response.
- Post-spill evaluation.

9.1 Potential Spills and Available Controls

An evaluation was conducted to determine the potential for hazardous material and oil/petroleum spills at this Site. For the purpose of this evaluation, hazardous materials posing a significant spill potential are considered to be:

- CERCLA Hazardous Substances as identified in 40 CFR Part 302, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

- Extremely Hazardous Substances as identified in 40 CFR Part 355, Appendix A, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

- Hazardous Chemicals as defined under Section 311(e) of the Emergency Planning and Community Right-To-Know Act of 1986, where such chemicals are present or will be stored in excess of 10,000 lbs.

- Toxic Chemicals as defined in 40 CFR Part 372, where such chemicals are present or will be stored in excess of 10,000 lbs.

- Chemicals regulated under 6NYCRR Part 597, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

Oil/petroleum products are considered to pose a significant spill potential whenever the following situations occur:

- The potential for a "harmful quantity" of oil (including petroleum and non-petroleum-based fuels and lubricants) to reach navigable waters of the U.S. exists (40 CFR Part 112.4). Harmful quantities are considered by USEPA to be volumes that could form a visible sheen on the water or violate applicable water quality standards.

- The potential for any amount of petroleum to reach any waters of NY State, including groundwater, exists. Petroleum, as defined by NY State in 6NYCRR Part 612, is a petroleum-based heat source, energy source, or engine lubricant/maintenance fluid.

- The potential for any release, to soil or water, of petroleum from a bulk storage facility regulated under 6NYCRR Part 612. A regulated petroleum storage facility is defined by NY State as a site having stationary tank(s) and intra-facility piping, fixtures and related equipment with an aggregate storage volume of 1,100 gallons or greater.

The evaluation indicates that, based on Site history and decommissioning records, a hazardous material spill and/or a petroleum product spill is not likely to occur during OM&M activities.

9.2 Initial Spill Notification and Evaluation

Any worker who discovers a hazardous substance or oil/petroleum spill will immediately notify the Project Manager and SSHO. The worker will, to the best of his/her ability, report the material involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, if any, and any associated injuries. The Emergency Response Plan presented in Appendix A of this HASP will immediately be implemented if an emergency release has occurred.

Following initial report of a spill, the Project Manager will make an evaluation as to whether the release exceeds RQ levels. If an RQ level is exceeded, the Project Manager will notify the Site owner and NYSDEC at 1-800-457-7362 within 2 hours of spill discovery. The Project Manager will also determine what additional agencies (e.g., USEPA) are to be contacted regarding the release, and will follow-up with written reports as required by the applicable regulations.

9.3 Spill Response

For all spill situations, the following general response guidelines will apply:

- Only those personnel involved in overseeing or performing containment operations will be allowed within the spill area. If necessary, the area will be roped, ribboned, or otherwise blocked off to prevent unauthorized access.
- Appropriate PPE, as specified by the SSHO, will be donned before entering the spill area.
- Ignition points will be extinguished/removed if fire or explosion hazards exist.
- Surrounding reactive materials will be removed.
- Drains or drainage in the spill area will be blocked to prevent inflow of spilled materials or applied materials.

For minor spills, the Contractor will maintain a Spill Control and Containment Kit in the Field Office or other readily accessible storage location. The kit will consist of, at a minimum, a 50 lb. bag of "speedy dry" granular absorbent material, absorbent pads, shovels, empty 5-gallon pails and an empty open-top 55-gallon drum. Spilled materials will be absorbed, and shoveled into a 55-gallon drum for proper disposal (NYSDEC approval will be secured for on-site treatment of the impacted soils/absorbent materials, if applicable). Impacted soils will be hand-excavated to the point that no visible signs of contamination remains, and will be drummed with the absorbent.

In the event of a major release or a release that threatens surface water, a spill response contractor will be called to the Site. The response contractor may use heavy equipment (e.g., excavator, backhoe, etc.) to berm the soils surrounding the spill Site or create diversion trenching to mitigate overland migration or release to navigable waters. Where feasible, pumps will be used to transfer free liquid to storage containers. Spill control/cleanup contractors in the Western New York area that may be contacted for assistance include:

- The Environmental Service Group of NY, Inc.: (716) 695-6720
- Environmental Products and Services, Inc.: (716) 447-4700
- Op-Tech: (716) 873-7680

9.4 Post-Spill Evaluation

If a reportable quantity of hazardous material or oil/petroleum is spilled as determined by the Project Manager, a written report will be prepared as indicated in Section 9.2. The report will identify the root cause of the spill, type and amount of material released, date/time of release, response actions, agencies notified and/or involved in cleanup, and procedures to be implemented to avoid repeat incidents. In addition, all re-useable spill cleanup and containment materials will be decontaminated, and spill kit supplies/disposable items will be replenished.

10.0 HEAT/COLD STRESS MONITORING

Since some of the work activities at the Site will be scheduled for both the summer and winter months, measures will be taken to minimize heat/cold stress to Benchmark-TurnKey employees. The Site Safety and Health Officer and/or his or her designee will be responsible for monitoring Benchmark-TurnKey field personnel for symptoms of heat/cold stress.

10.1 Heat Stress Monitoring

Personal protective equipment may place an employee at risk of developing heat stress, a common and potentially serious illnesses often encountered at construction, landfill, waste disposal, industrial or other unsheltered sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain temperature equilibrium (via evaporation and convection), and require increased energy expenditure due to its bulk and weight.

Proper training and preventive measures will mitigate the potential for serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat (i.e., eight fluid ounces must be ingested for approximately every 1 lb of weight lost). The normal thirst

mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost perspiration. When heavy sweating occurs, workers should be encouraged to drink more.

- Train workers to recognize the symptoms of heat related illness.

Heat-Related Illness - Symptoms:

- Heat rash may result from continuous exposure to heat or humid air.

- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms; pain in the hands, feet and abdomen.

- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; fainting.

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 100 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest periods stay the same, If the pulse rate is 100 beats per minute at the beginning of the nest rest period, the following work cycle should be further shortened by 33%.

- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period

should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period remains the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the work cycle may be further shortened by 33%. Oral temperature should be measured at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No Benchmark-TurnKey employee will be permitted to continue wearing semi-permeable or impermeable garments when his/her oral temperature exceeds 100.6 degrees Fahrenheit.

10.2 Cold Stress Monitoring

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- **Frostbite** occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:

    1) **Frost nip** - This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102 to 108 degrees Fahrenheit) and drinking a warm beverage. Do not rub skin to generate friction/ heat.

    2) **Superficial Frostbite** - This is the second stage of the freezing process. It is characterized by a whitish gray area of tissue, which will be firm to the touch but will yield little pain. The treatment is identical for Frost nip.

    3) **Deep Frostbite** - In this final stage of the freezing process the affected tissue will be cold, numb and hard and will yield little to no pain. Treatment is identical to that for Frost nip.

- **Hypothermia** is a serious cold stress condition occurring when the body loses heat at a rate faster than it is produced. If untreated, hypothermia may be fatal. The stages of hypothermia may not be clearly defined or visible at first, but generally include:

    1) Shivering
    2) Apathy (i.e., a change to an indifferent or uncaring mood)

3) Unconsciousness
4) Bodily freezing

Employees exhibiting signs of hypothermia should be treated by medical professionals. Steps that can be taken while awaiting help include:

1) Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)

2) Perform active re-warming with hot liquids for drinking (Note: do not give the victim any liquid containing alcohol or caffeine) and a warm water bath (102 to 108 degrees Fahrenheit).

3) Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the Site Health and Safety Officer to encourage the following:

- Education of workers to recognize the symptoms of frostbite and hypothermia.
- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.
- Personnel should remain active and keep moving.
- Personnel should be allowed to take shelter in a heated areas, as necessary.
- Personnel should drink warm liquids (no caffeine or alcohol if hypothermia has set in).
- For monitoring the body's recuperation from excess cold, oral temperature recordings should occur:
  - At the Site Safety Technicians discretion when suspicion is based on changes in a worker's performance or mental status.
  - At a workers request.
  - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind chill less than 20 degrees Fahrenheit or wind chill

less than 30 degrees Fahrenheit with precipitation).

- As a screening measure, whenever anyone worker on-site develops hypothermia.

Any person developing moderate hypothermia (a core body temperature of 92 degrees Fahrenheit) will not be allowed to return to work for 48 hours without the recommendation of a qualified medical doctor.

11.0 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for construction activities will be established on a daily basis and communicated to all employees and other Site users by the SSHO. It shall be each Contractor's Site Safety and Health Officer's responsibility to ensure that all Site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- Exclusion Zone ("Hot Zone") - The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. Flagging tape will delineate the zone. All personnel entering the Exclusion Zone must wear the prescribed level of personal protective equipment identified in Section 7.

- Contamination Reduction Zone - The zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated.

- Support Zone - The part of the site that is considered non-contaminated or "clean." Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

In the absence of other task-specific work zone boundaries established by the SSHO, the following boundaries will apply to all investigation and construction activities involving disruption or handling of Site soils or groundwater:

- Exclusion Zone: 50 foot radius from the outer limit of the sampling/construction activity.

- Contaminant Reduction Zone: 100 foot radius from the outer limit of the sampling/construction activity.

- Support Zone: Areas outside the Contaminant Reduction Zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by the SSHO. Only personnel who are essential to the

completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of all personnel must be approved by the SSHO.

The SSHO will maintain a Health and Safety Logbook containing the names of Benchmark-TurnKey workers and their level of protection. The zone boundaries may be changed by the SSHO as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

12.0 DECONTAMINATION

12.1 Decontamination for Benchmark-TurnKey Employees

The degree of decontamination required is a function of a particular task and the environment within which it occurs. The following decontamination procedure will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions that may arise at the Site. All Benchmark-TurnKey personnel on-site shall follow the procedure below, or the Contractor's procedure (if applicable), whichever is more stringent.

Station 1 - Equipment Drop: Deposit visibly contaminated (if any) re-useable equipment used in the contamination reduction and exclusion zones (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic sheeting.

Station 2 - Boots and Gloves Wash and Rinse: Scrub outer boots and outer gloves. Deposit tape and gloves in waste disposal container.

Station 3 - Tape, Outer Boot and Glove Removal: Remove tape, outer boots and gloves. Deposit tape and gloves in waste disposal container.

Station 4 - Canister or Mask Change: If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot cover donned, and worker returns to duty.

Station 5 - Outer Garment/Face Piece Removal: Protective suit removed and deposited in separate container provided by Contractor. Face piece or goggles are removed if used. Avoid touching face with fingers. Face piece and/or goggles deposited on plastic sheet. Hard hat removed and placed on plastic sheet.

Station 6 - Inner Glove Removal: Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in waste disposal container.

Following PPE removal, personnel shall wash hands, face and forearms with absorbent wipes. If field activities proceed for duration of 6 consecutive months or longer, shower facilities will be provided for worker use in accordance with OSHA 29 CFR 1910.120(n).

12.2 Decontamination for Medical Emergencies

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (e.g., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination efforts unless exposure to a Site contaminant would be considered "Immediately Dangerous to Life or Health."

12.3 Decontamination of Field Equipment

The Contractor in accordance with his approved Health and Safety Plan in the Contamination Reduction Zone will conduct decontamination of heavy equipment. As a minimum, this will include manually removing heavy soil contamination, followed by steam cleaning on an impermeable pad.

Benchmark-TurnKey personnel will conduct decontamination of all tools used for sample collection purposes. It is expected that all tools will be constructed of nonporous, nonabsorbent materials (i.e., metal), which will aid in the decontamination effort. Any tool or part of a tool made of porous, absorbent material (i.e., wood) will be placed into suitable containers and prepared for disposal.

Decontamination of bailers, split-spoons, spatula knives, and other tools used for environmental sampling and examination shall be as follows:

- Disassemble the equipment
- Water wash to remove all visible foreign matter.
- Wash with detergent.
- Rinse all parts with distilled-deionized water.
- Allow to air dry.
- Wrap all parts in aluminum foil or polyethylene.

13.0 CONFINED SPACE ENTRY

OSHA 29 CFR 1910.146 identifies a confined space as a space that is large enough and so configured that an employee can physically enter and do assigned work, has limited or restricted means for entry and exit, and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, trenches, storage tanks, process vessels, pits, sewers, tunnels, underground utility vaults, pipelines, sumps, wells, and excavations.

Confined space entry by Benchmark-TurnKey employees is not anticipated to be necessary to complete the OM&M activities identified in Section 2.0. In the event that the scope of work changes or confined space entry appears necessary, the Project Manager will be consulted to determine if feasible engineering alternatives to confined space entry can be implemented. If confined space entry by Benchmark-TurnKey employees cannot be avoided through reasonable engineering measures, task-specific confined space entry procedures will be developed and a confined-space entry permit will be issued through Benchmark-TurnKey's corporate Health and Safety Director. Benchmark-TurnKey employees shall not enter a confined space without these procedures and permits in place.

14.0 FIRE PREVENTION AND PROTECTION

14.1 General Approach

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper Site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

14.2 Equipment and Requirements

Fire extinguishers will be provided by each Contractor and are required on all heavy equipment and in each field trailer. Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary. Recharge or replacement shall be mandatory immediately after each use.

14.3 Flammable and Combustible Substances

All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons. All tanks, containers and pumping equipment, whether portable or stationary, used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.

14.4 Hot Work

If the scope of work necessitates welding or blowtorch operation, the hot work permit presented in Appendix B will be completed by the SSHO and reviewed/issued by the Project Manager.

15.0 EMERGENCY INFORMATION

In accordance with OSHA 29 CFR Part 1910, an Emergency Response Plan is attached to this HASP as Appendix A. The hospital route map is presented within Appendix A as Figure 1.

16.0 REFERENCES

1. New York State Department of Environmental Conservation. *DER-10; Technical Guidance for Site Investigation and Remediation.* May 2010.

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY

TABLE 1

TOXICITY DATA FOR CONSTITUENTS OF POTENTIAL CONCERN

2424 Hamburg Turnpike Site
Lackawanna, New York

Parameter	Synonyms	CAS No.	Code	Concentration Limits		
				PEL	TLV	IDLH
Volatile Organic Compounds (VOCs): ppm						
Benzene	Benzol, Phenyl hydride	71-43-2	Ca	1	0.5	500
Ethylbenzene	Ethylbenzol, Phenylethane	100-41-4	*none*	100	100	800
Toluene	Methyl benzene, Methyl benzol	108-88-3	C-300	200	50	500
Xylenes, Total	o-, m-, p-isomers	1330-20-7	*none*	100	100	900
Semi-volatile Organic Compounds (SVOCs) : ppm						
Benzo(a)anthracene	*none*	56-55-3	*none*	--	--	--
Benzo(a)pyrene	*none*	50-32-8	*none*	--	--	--
Benzo(b)fluoranthene	*none*	205-99-2	*none*	--	--	--
Benzo(k)fluoranthene	*none*	207-08-9	*none*	--	--	--
Chrysene	*none*	218-01-9	*none*	--	--	--
Dibenzo(a,h)anthracene	*none*	53-70-3	*none*	--	--	--
Fluoranthene	*none*	206-44-0	*none*	--	--	--
Indeno(1,2,3-cd)pyrene	*none*	193-39-5	*none*	--	--	--
Naphthalene	Naphthalin, Tar camphor, White tar	91-20-3	*none*	10	10	250
Phenanthrene	*none*	85-01-8	*none*	--	--	--
Pyrene	*none*	129-00-0	*none*	--	--	--
Inorganic Compounds: mg/m ^{2}						
Arsenic	*none*	7440-38-2	Ca	0.01	0.01	5

Ca = NIOSH considers constituent to be a potential occupational carcinogen.
IDLH = Immediately Dangerous to Life or Health.
TLV = Threshold Limit Value, established by American Conference of Industrial Hygienists (ACGIH), equals the maximum exposure concentration allowable for 8 hours/day @ 40 hours/week.

TLVs are the amounts of chemicals in the air that almost all healthy adult workers are predicted to be able to tolerate without adverse effects. There are three types.

TLV-TWA (TLV-Time-Weighted Average) which is averaged over the normal eight-hour day/forty-hour work week. (Most TLVs.)

TLV-STEL or Short Term Exposure Limits are 15 minute exposures that should not be exceeded for even an instant. It is not a stand alone value but is accompanied by the TLV-TWA.

TLV-C or Ceiling limits are the concentration that should not be exceeded during any part of the working exposure.

Unless the initials "STEL" or "C" appear in the Code column, the TLV value should be considered to be the eight-hour TLV-TWA.

PEL = Permissible Exposure Limit, established by OSHA, equals the maximium exposure conconcentration allowable for 8 hours per day @ 40 hours per week

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY

TABLE 2

POTENTIAL ROUTES OF EXPOSURE TO THE CONSTITUENTS OF POTENTIAL CONCERN

2424 Hamburg Turnpike Site
Lackawanna, New York

Activity [1]	Direct Contact with Soil/Fill	Inhalation of Vapors or Dust	Direct Contact with Groundwater
Remedial Investigation Tasks			
Groundwater Sampling			x
Dual Phase Extraction System Operation and Maintenance	x	x	x

Notes:

1. Activity as described in Section 1.5 of the Health and Safety Plan.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 3

REQUIRED LEVELS OF PROTECTION
FOR OM&M ACTIVITIES

2424 Hamburg Turnpike
Lackawanna, New York

Activity	Respiratory Protection [1]	Clothing	Gloves [2]	Boots [2, 3]	Other Required PPE/Modifications [2, 4]
Remedial Investigation Tasks					
Groundwater Sampling	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS
Dual Phase Extraction System Operation and Maintenance	Level D (upgrade to Level C if necessary)	Work Uniform or Tyvek	L/N	outer: L inner: STSS	HH SGSS

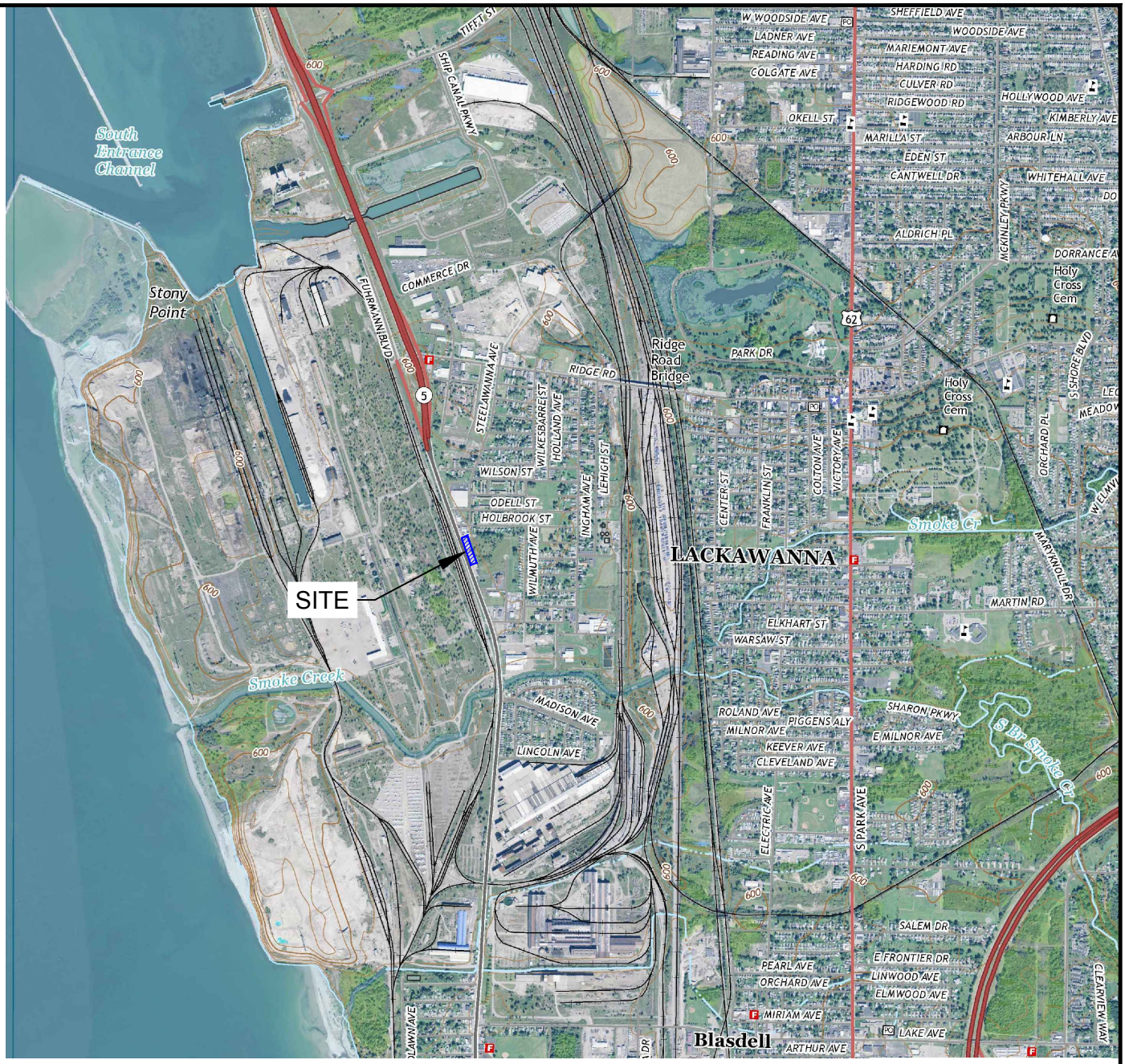
Notes:

1. Respiratory equipment shall conform to guidelines presented in Section 7.0 of this HASP. The Level C requirement is an air-purifying respirator equiped with organic compound/acid
2. HH = hardhat; L= Latex; L/N = latex inner glove, nitrile outer glove; N = Nitrile; SGSS = safety glasses with sideshields; STSS = steel toe safety shoes.
3. Latex outer boot (or approved overboot) required whenever contact with contaminated materials may occur. SSHO may downgrade to STSS (steel-toed safety shoes) if contact will be limited to cover/replacement soils.
4. Dust masks shall be donned as directed by the SSHO (site safety and health officer) or site safety technician whenever potentially contaminated airborne particulates (i.e., dust) are present

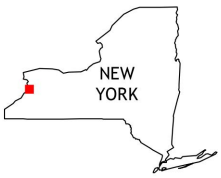
FIGURES

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\HASP\Figure 1; Site Location and Vicinity Map.dwg

FIGURE 1



APPROXIMATE SCALE 1" = 2,500'
BASE MAP IS USGS 2016 BUFFALO SE QUADRANGLE.



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

PROJECT NO.: 0345-015-001

DATE: AUGUST 2019

DRAFTED BY: RFL/CCB

SITE LOCATION & VICINITY MAP

HEALTH AND SAFETY PLAN

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PREPARED FOR

2424 HAMBURG TURNPIKE, LLC

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\HASP\Figure 2; Site Plan.dwg

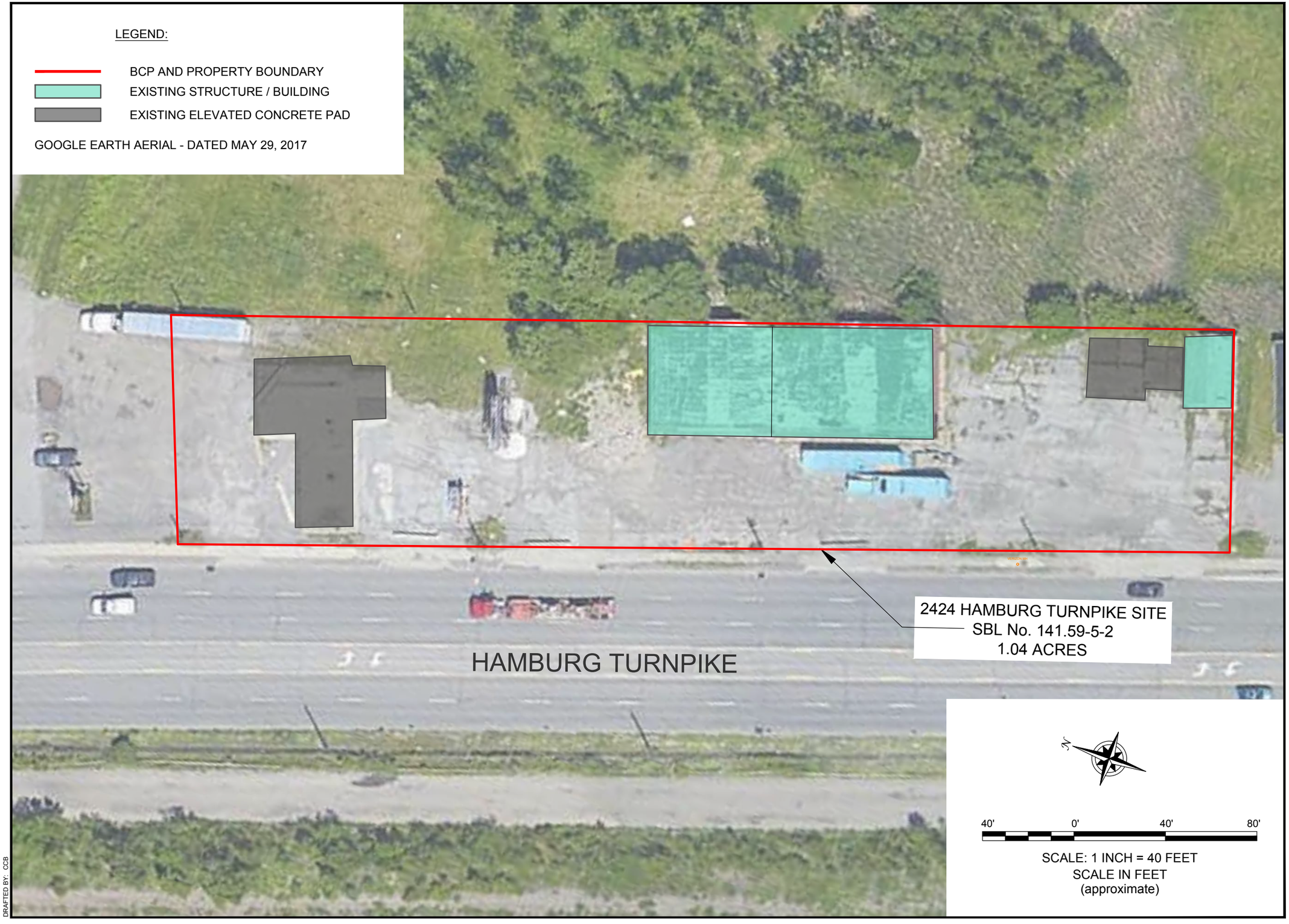
LEGEND:

BCP AND PROPERTY BOUNDARY

EXISTING STRUCTURE / BUILDING

EXISTING ELEVATED CONCRETE PAD

GOOGLE EARTH AERIAL - DATED MAY 29, 2017



N

40' 0' 40' 80'

SCALE: 1 INCH = 40 FEET
SCALE IN FEET
(approximate)

DATE: AUGUST 2019
DRAFTED BY: CCB

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

SITE PLAN (AERIAL)

HEALTH AND SAFETY PLAN
2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK
PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

FIGURE 2

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

ATTACHMENT A

EMERGENCY RESPONSE PLAN

BENCHMARK TURNKEY

EMERGENCY RESPONSE PLAN
for
BROWNFIELD CLEANUP PROGRAM
OM&M ACTIVITIES

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

October 2019 0345-015-001

Prepared for:

2424 HAMBURG TURNPIKE, LLC

Prepared by:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716) 856-0599

2424 HAMBURG TURNPIKE SITE
HEALTH AND SAFETY PLAN FOR OM&M ACTIVITIES
ATTACHMENT A: EMERGENCY RESPONSE PLAN

TABLE OF CONTENTS

1.0 GENERAL 1

2.0 PRE-EMERGENCY PLANNING 2

3.0 ON-SITE EMERGENCY RESPONSE EQUIPMENT 3

4.0 EMERGENCY PLANNING MAPS 4

5.0 EMERGENCY CONTACTS 5

6.0 EMERGENCY ALERTING & EVACUATION 6

7.0 EXTREME WEATHER CONDITIONS 8

8.0 EMERGENCY MEDICAL TREATMENT & FIRST AID 9

9.0 EMERGENCY RESPONSE CRITIQUE & RECORD KEEPING 10

10.0 EMERGENCY RESPONSE TRAINING 11

LIST OF FIGURES

Figure A-1 Hospital Route Map

1.0 GENERAL

This report presents the site-specific Emergency Response Plan (ERP) referenced in the Site Health and Safety Plan (HASP) prepared for Operation, Maintenance, and Monitoring (OM&M) activities at the 2424 Hamburg Turnpike Site located at 2424 Hamburg Turnpike in Lackawanna, New York. This attachment of the HASP describes potential emergencies that may occur at the Site; procedures for responding to those emergencies; roles and responsibilities during emergency response; and training all workers must receive in order to follow emergency procedures. This ERP also describes the provisions this Site has made to coordinate its emergency response planning with other contractors on-site and with off-site emergency response organizations.

This ERP is consistent with the requirements of 29 CFR 1910.120(l) and provides the following site-specific information:

- Pre-emergency planning.
- Personnel roles, lines of authority, and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Evacuation routes and procedures.
- Decontamination procedures.
- Emergency medical treatment and first aid.
- Emergency alerting and response procedures.
- Critique of response and follow-up.
- Emergency personal protective equipment (PPE) and equipment.

2.0 PRE-EMERGENCY PLANNING

This Site has been evaluated for potential emergency occurrences, based on site hazards, the required work tasks, the site topography, and prevailing weather conditions. The results of that evaluation indicate the potential for the following site emergencies to occur at the locations indicated.

Type of Emergency:

1. Medical, due to physical injury

Source of Emergency:

1. Slip/trip/fall

Location of Source:

1. Non-specific

3.0 ON-SITE EMERGENCY RESPONSE EQUIPMENT

Emergency procedures may require specialized equipment to facilitate worker rescue, contamination control and reduction, or post-emergency clean up. Emergency response equipment available on the Site is listed below. The equipment inventory and storage locations are based on the potential emergencies described above. This equipment inventory is designed to meet on-site emergency response needs and any specialized equipment needs that off-site responders might require because of the hazards at this Site but not ordinarily stocked.

Any additional personal protective equipment (PPE) required and stocked for emergency response is also listed in below. During an emergency, the Emergency Response Coordinator (ERC) is responsible for specifying the level of PPE required for emergency response. At a minimum, PPE used by emergency responders will comply with Section 7.0, Personal Protective Equipment, of this HASP. Emergency response equipment is inspected at regular intervals and maintained in good working order. The equipment inventory is replenished as necessary to maintain response capabilities.

Emergency Equipment	Quantity	Location
First Aid Kit	1	Site Vehicle
Chemical Fire Extinguisher	2 (minimum)	All heavy equipment and Site Vehicle

Emergency PPE	Quantity	Location
Full-face respirator	1 for each worker	Site Vehicle
Chemical-resistant suits	4 (minimum)	Site Vehicle

4.0 EMERGENCY PLANNING MAPS

An area-specific map of the Site will be developed on a daily basis during performance of field activities. The map will be marked to identify critical on-site emergency planning information, including: emergency evacuation routes, a place of refuge, an assembly point, and the locations of key site emergency equipment. Site zone boundaries will be shown to alert responders to known areas of contamination. There are no major topographical features, however the direction of prevailing winds/weather conditions that could affect emergency response planning are also marked on the map. The map will be posted at site-designated place of refuge and inside the Benchmark-TurnKey personnel field vehicle.

5.0 EMERGENCY CONTACTS

The following identifies the emergency contacts for this ERP.

Emergency Telephone Numbers:

Project Officer: *Paul H. Werthman*
Work: (716) 856-0599
Mobile: (716) 998-4151

Project Manager: *Michael Lesakowski*
Work: (716) 856-0635
Mobile: (716) 818-3954

Corporate Health and Safety Director: *Thomas H. Forbes, P.E.*
Work: (716) 856-0599
Mobile: (716) 864-1730

Site Safety and Health Officer (SSHO): *Lori Riker, P.E.*
Work: (716) 856-0599
Mobile: (716) 870-1165

Alternate SSHO: *Bryan Mayback*
Work: (716) 856-0635
Mobile: (716) 289-1072

BUFFALO MERCY HOSPITAL (ER):	(716) 826-7000
FIRE:	911
AMBULANCE:	911
BUFFALO POLICE:	911
STATE EMERGENCY RESPONSE HOTLINE:	(800) 457-7362
NATIONAL RESPONSE HOTLINE:	(800) 424-8802
NYSDOH:	(716) 847-4385
NYSDEC:	(716) 851-7220
NYSDEC 24-HOUR SPILL HOTLINE:	(800) 457-7252

The Site location is:
2424 Hamburg Turnpike
Lackawanna, New York 14218
Site Phone Number: (Insert Cell Phone or Field Trailer): Cellular Phone on-Site

6.0 EMERGENCY ALERTING & EVACUATION

Internal emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radio headsets or field telephones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of each contractor's Site Health and Safety Officer to ensure all personnel entering the site understand an adequate method of internal communication. Unless all personnel are otherwise informed, the following signals shall be used.

1) Emergency signals by portable air horn, siren, or whistle: two short blasts, personal injury; continuous blast, emergency requiring site excavation.

2) Visual signals: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/ everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

If evacuation notice is given, site workers leave the worksite with their respective buddies, if possible, by way of the nearest exit. Emergency decontamination procedures detailed in Section 12.0 of the HASP are followed to the extent practical without compromising the safety and health of site personnel. The evacuation routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by rehearsals and inputs from emergency response organizations. Wind direction indicators are located so that workers can determine a safe up wind or cross wind evacuation route and assembly area if not informed by the emergency response coordinator at the time the evacuation alarm sounds. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the construction Site Health and Safety Officer to review evacuation routes and procedures as necessary and to inform all Benchmark-TurnKey workers of any changes.

Personnel exiting the site will gather at a designated assembly point. To determine that everyone has successfully exited the site, personnel will be accounted for at the assembly site. If any worker cannot be accounted for, notification is given to the SSHO (***Lori Riker***

or ***Bryan Mayback***) so that appropriate action can be initiated. Contractors and subcontractors on this site have coordinated their emergency response plans to ensure that these plans are compatible and that source(s) of potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

7.0 EXTREME WEATHER CONDITIONS

In the event of adverse weather conditions, the Site Safety and Health Officer in conjunction with the Contractor's SSHO will determine if engineering operations can continue without sacrificing the health and safety of site personnel. Items to be considered prior to determining if work should continue include but are not limited to:

- Potential for heat/cold stress.
- Weather-related construction hazards (e.g., flooding or wet conditions producing undermining of structures or sheeting, high wind threats, etc).
- Limited visibility.
- Potential for electrical storms.
- Limited site access/egress (e.g., due to heavy snow)

8.0 EMERGENCY MEDICAL TREATMENT & FIRST AID

Personnel Exposure:

The following general guidelines will be employed in instances where health impacts threaten to occur acute exposure is realized:

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to Buffalo General Hospital.
- Inhalation: Move to fresh air and, if necessary, transport to Hospital.
- Ingestion: Decontaminate and transport to Hospital.

Personal Injury:

Minor first-aid will be applied on-site as deemed necessary. In the event of a life threatening injury, the individual should be transported to Hospital via ambulance. The Site Health and Safety Officer will supply available chemical specific information to appropriate medical personnel as requested.

First aid kits will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the SSHO to ensure that the expended items are replaced.

Directions to Mercy Hospital (see Figure A-1):

The following directions describe the best route from the Site to Mercy Buffalo General Hospital which is 4 miles away:

- Travel north along Hamburg Turnpike (Route 5) (1.5 miles)
- Travel east along Ridge Road (2.5 miles)
- Turn left onto Abbott Road (1.5 miles)
- Hospital on the left (565 Abbott Road)

9.0 EMERGENCY RESPONSE CRITIQUE & RECORD KEEPING

Following an emergency, the SSHO and Project Manager shall review the effectiveness of this Emergency Response Plan (ERP) in addressing notification, control and evacuation requirements. Updates and modifications to this ERP shall be made accordingly. It shall be the responsibility of each contractor to establish and assure adequate records of the following:

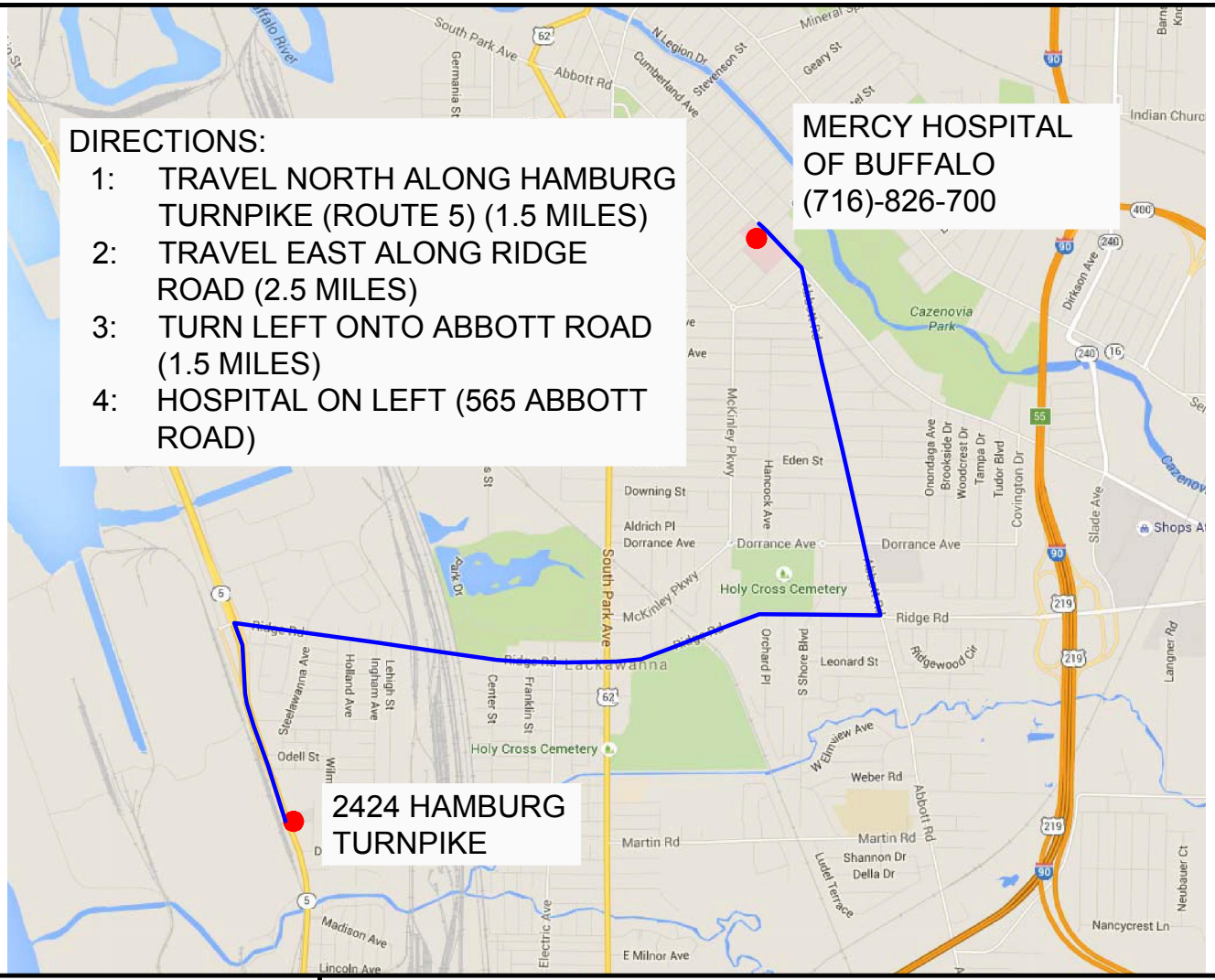
- Occupational injuries and illnesses.
- Accident investigations.
- Reports to insurance carrier or State compensation agencies.
- Reports required by the client.
- Records and reports required by local, state, federal and/or international agencies.
- Property or equipment damage.
- Third party injury or damage claims.
- Environmental testing logs.
- Explosive and hazardous substances inventories and records.
- Records of inspections and citations.
- Safety training.

10.0 EMERGENCY RESPONSE TRAINING

Persons who enter the worksite, including visitors, shall receive a site-specific briefing about anticipated emergency situations and the emergency procedures by the SSHO. Where this site relies on off-site organizations for emergency response, the training of personnel in those off-site organizations has been evaluated and is deemed adequate for response to this site.

FIGURE

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\Site Management Plan\ERP\Figure A-1; Hospital Rout Map.dwg



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

PROJECT NO.: 0345-015-001

DATE: AUGUST 2019

DRAFTED BY: CMC/CCB

HOSPITAL ROUTE MAP

HEALTH AND SAFETY PLAN

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PREPARED FOR

2424 HAMBURG TURNPIKE, LLC

FIGURE A-1

DISCLAIMER:
PROPERTY OF BENCHMARK EES, PLLC. IMPORTANT: THIS DRAWING PRINT IS LOANED FOR MUTUAL ASSISTANCE AND AS SUCH IS SUBJECT TO RECALL AT ANY TIME. INFORMATION CONTAINED HEREON IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY FORM FOR THE BENEFIT OF PARTIES OTHER THAN NECESSARY SUBCONTRACTORS & SUPPLIERS WITHOUT THE WRITTEN CONSENT OF BENCHMARK EES, PLLC.

ATTACHMENT B

HOT WORK PERMIT FORM

BENCHMARK TURNKEY

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

HOT WORK PERMIT

PART 1 - INFORMATION

Issue Date:

Date Work to be Performed: Start: Finish (permit terminated):

Performed By:

Work Area:

Object to be Worked On:

PART 2 - APPROVAL

(for 1, 2 or 3: mark Yes, No or NA)*

Will working be on or in: Finish (permit terminated):

1. Metal partition, wall, ceiling covered by combustible material?	yes	no
2. Pipes, in contact with combustible material?	yes	no
3. Explosive area?	yes	no

* = If any of these conditions exist (marked "yes"), a permit will not be issued without being reviewed and approved by Thomas H. Forbes (Corporate Health and Safety Director). Required Signature below.

PART 3 - REQUIRED CONDITIONS**

(Check all conditions that must be met)

	PROTECTIVE ACTION		PROTECTIVE EQUIPMENT
	Specific Risk Assessment Required		Goggles/visor/welding screen
	Fire or spark barrier		Apron/fireproof clothing
	Cover hot surfaces		Welding gloves/gauntlets/other:
	Move movable fire hazards, specifically		Wellintons/Knee pads
	Erect screen on barrier		Ear protection: Ear muffs/Ear plugs
	Restrict Access		B.A.: SCBA/Long Breather
	Wet the ground		Respirator: Type:
	Ensure adequate ventilation		Cartridge:
	Provide adequate supports		Local Exhaust Ventilation
	Cover exposed drain/floor or wall cracks		Extinguisher/Fire blanket
	Fire watch (must remain on duty during duration of permit)		Personal flammable gas monitor
	Issue additional permit(s):		

Other precautions:

** Permit will not be issued until these conditions are met.

SIGNATURES

Orginating Employee: Date:

Project Manager: Date:

Part 2 Approval: Date:

ATTACHMENT C

NYSDOH GENERIC COMMUNITY AIR MONITORING PLAN

BENCHMARK TURNKEY

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

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 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 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 DEC/NYSDOH staff.

Continuous monitoring will be required 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 basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. 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.

1. 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.

2. 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.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) 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.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) 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/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 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/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX E

DPE SYSTEM O&M MANUAL AND FORMS

OPERATIONS & MAINTENANCE MANUAL

TURNKEY

"2424 HAMBURG SYSTEM"

OCTOBER 2017

Provided By:

SPECIALTY SYSTEMS INTEGRATORS INC.
14150 23rd Ave N; Plymouth, Minnesota 55447 | tel: 763-450-2600 | WWW.2SSI.COM | email: sales@2ssi.com

LEGEND

- SOLENOID VALVE
- BUTTERFLY VALVE
- GLV — GLOBE VALVE VALVE
- BV — BALL VALVE
- GV — GATE VLAVE
- CV — SWING CHECK VLAVE
- THREADED UNION
- SP — SAMPLE VLAVE
- VALVE NORMALLY OPEN
- VALVE NORMALLY CLOSED
- VRV — VACUUM RELIEF VALVE
- PRV — PRESSURE RELIEF VALVE
- PF — PARTICULATE FILTER
- PI — PRESSURE INDICATOR
- VI — VACUUM INDICATOR
- TI — TEMPERATURE INDICATOR
- SG — SIGHT TUBE
- LS x — LEVEL SWITCH No (x)
- PS x — PRESSURE (VACUUM) SWITCH No (x)
- PT x — ANALOG PRESSURE TRANSMITTER No (x)
- TT x — ANALOG TEMPERATURE TRANSMITTER No (x)
- FT x — ANALOG FLOW TRANSMITTER No (x)
- VT x — ANALOG VACUUM TRANSMITTER No (x)
- LEL x — ANALOG LEL TRANSMITTER No (x)
- LA Hx — HIGH LEVEL ALARM No (x)
- FA Lx — LOW FLOW ALARM No (x)
- VA Lx — LOW VACUUM ALARM No (x)
- VA Hx — HIGH VACUUM ALARM No (x)
- LEL Hx — HIGH LEL ALARM No (x)
- MP x — MOTOR OVERLOAD No (x)
- x — FATAL ALARM No (x)
- XX x — CONTROL PANEL READOUT
- M — MOTOR
- FNPT CONNECTION

LINE DESIGNATION:

2 – VA – PV

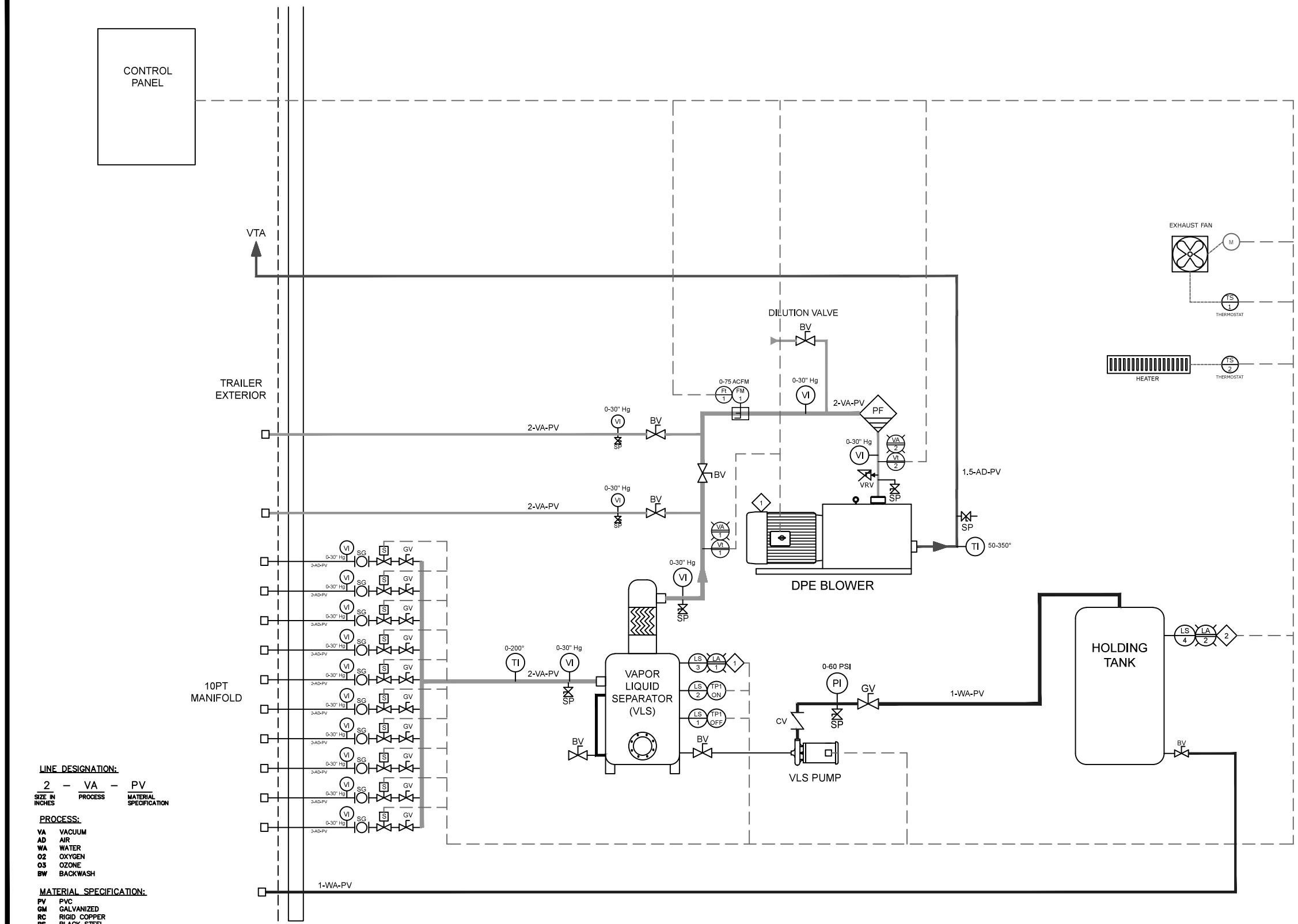
2 = SIZE IN INCHES; VA = PROCESS; PV = MATERIAL SPECIFICATION

PROCESS:

VA	VACUUM
AD	AIR
WA	WATER
O2	OXYGEN
O3	OZONE
BW	BACKWASH

MATERIAL SPECIFICATION:

PV	PVC
GM	GALVANIZED
RC	RIGID COPPER
BS	BLACK STEEL
TU	TUBING

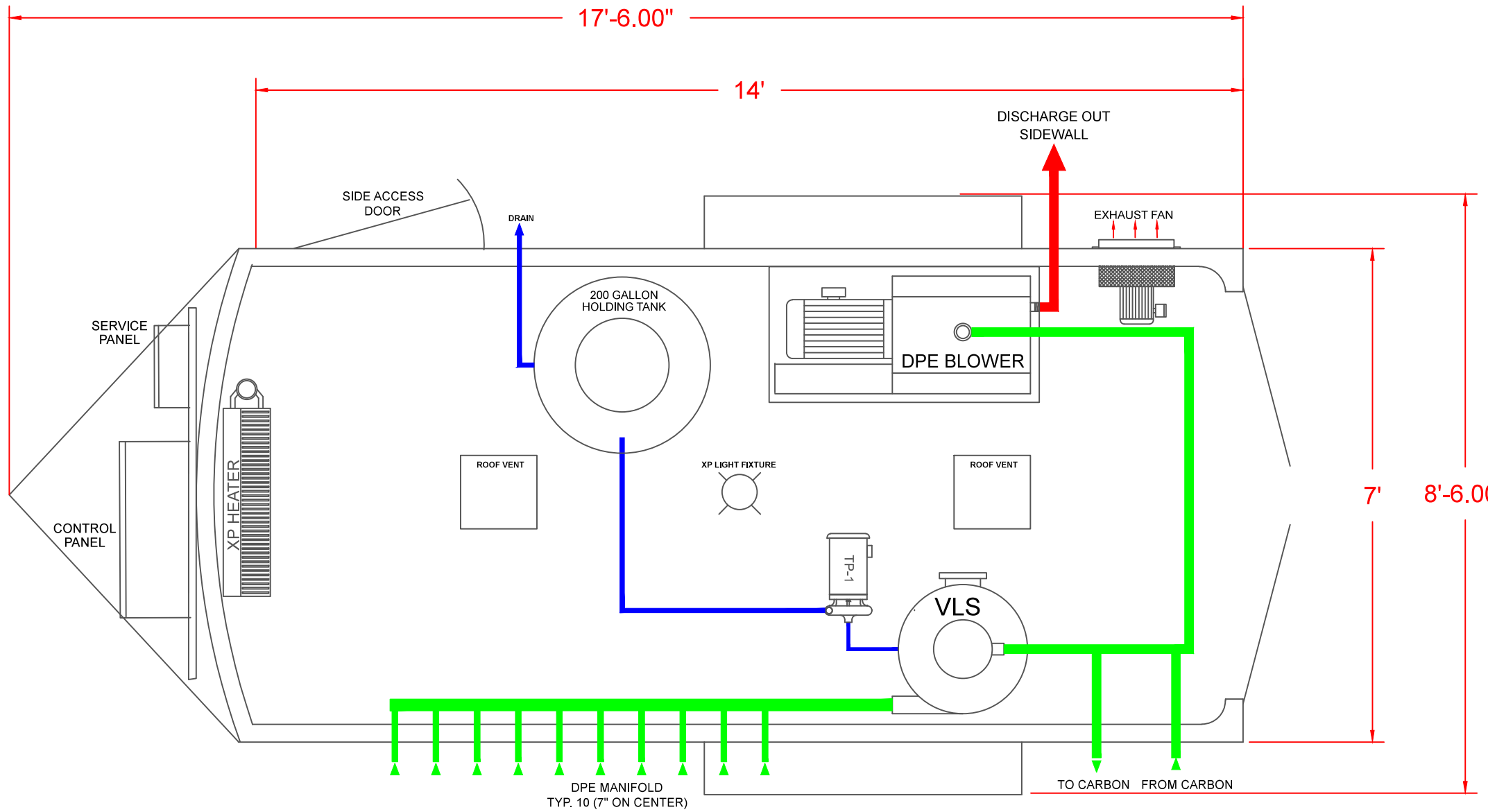


SPECIALTY SYSTEMS INTEGRATORS
14150 23rd Avenue North, Plymouth, MN 55447
Tel: 763 450 2600 Fax: 763 450 2601 www.2ssi.com

TITLE:

PROCESS & INSTRUMENTATION DIAGRAM
TURNKEY ENVIRONMENTAL
HIGH VACUUM TRAILER SYSTEM

DWN: MV	DATE: 7/27/2017
CHKD: MV	DRAWING #: 2022-P&ID
REV.: 1	



APPROVAL SIGNATURE: _____ DATE: _____

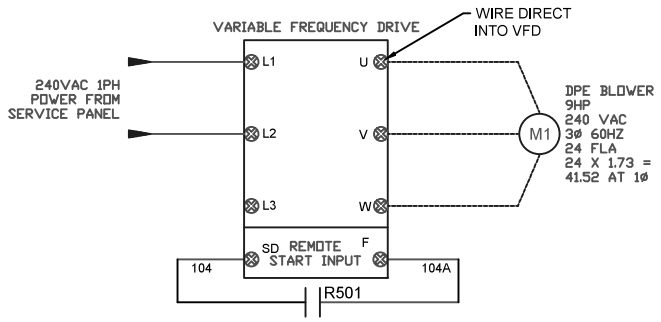
SPECIALTY SYSTEMS INTEGRATORS
14150 23rd Avenue North, Plymouth, MN 55447
Tel: 763 450 2600 Fax: 763 450 2601 www.2ssi.com

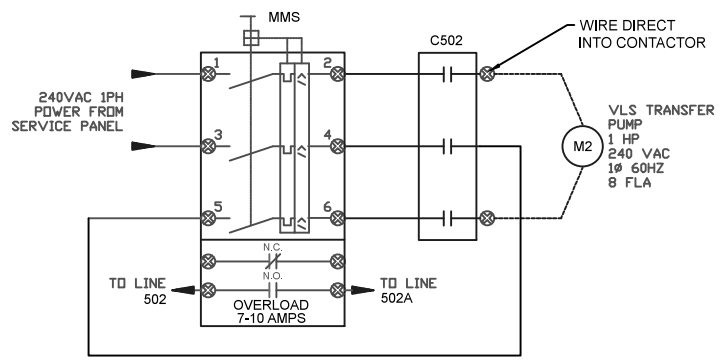
TITLE:
EQUIPMENT PLAN VIEW
TURNKEY ENVIRONMENTAL
HIGH VACUUM TRAILER SYSTEM

DWN: MV	DATE: 7/28/2017
CHKD: MV	DRAWING #: 2022-Plan View
REV.: 1	

MAIN DISCONNECT
AND BRANCH CIRCUIT PROTECTION PROVIDED
BY INSTALLER

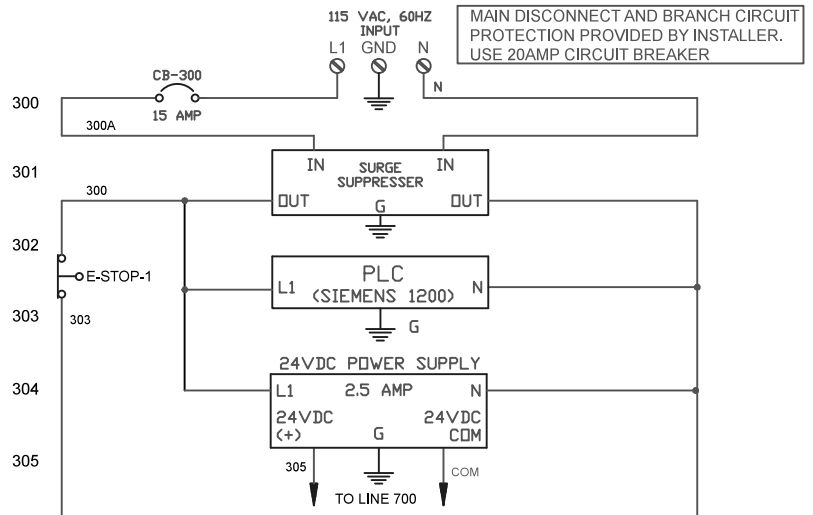
TOTAL FLA = 29.79 AMPs @ 240VAC 1Ø





L1 L2 L3

INTENTIONALLY LEFT BLANK



303

N

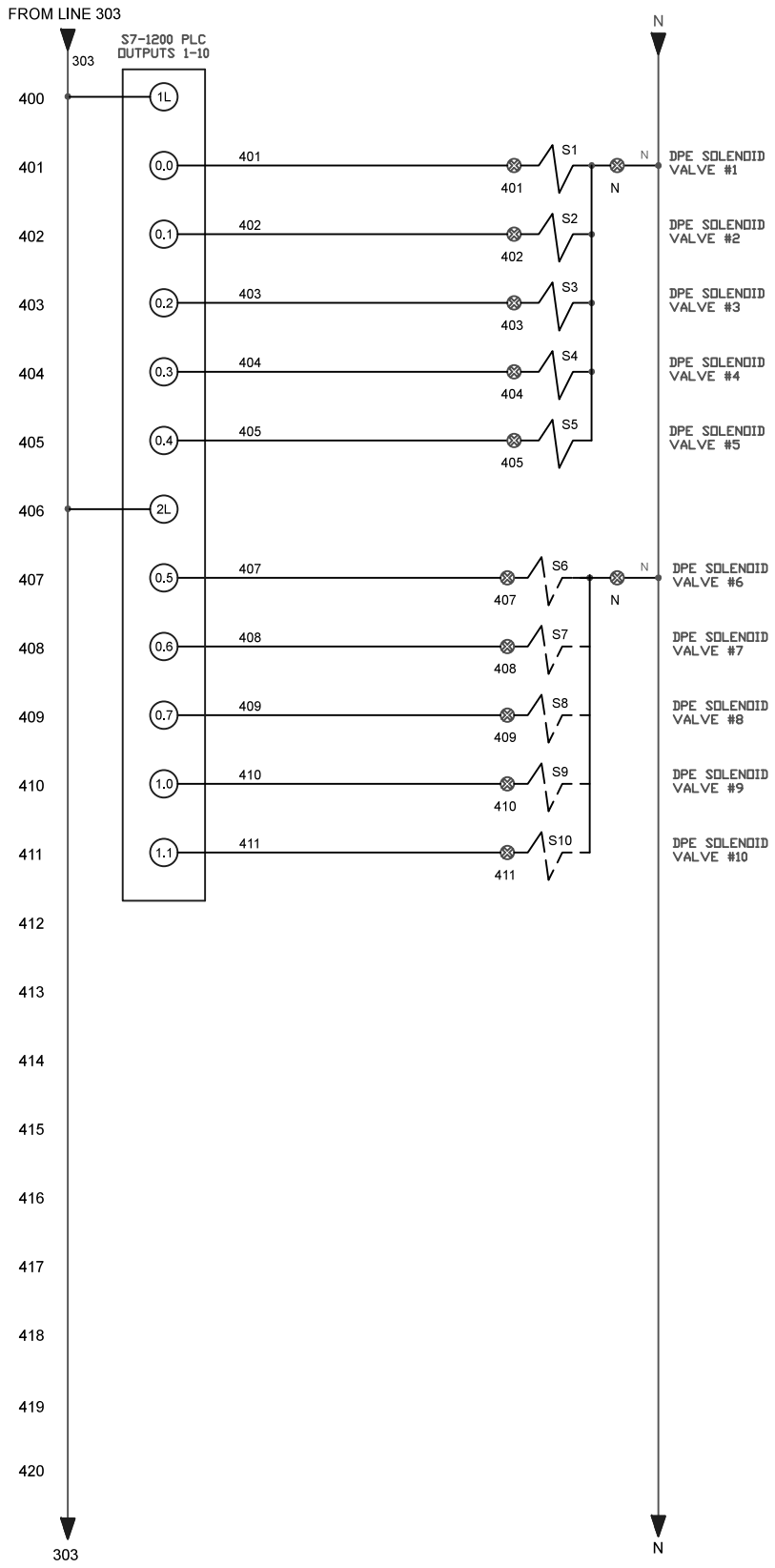
- POWER DISTRIBUTION BLOCK: TORQUE FIELD WIRING TO 120 IN/LBS
- ALL FIELD WIRING BELOW 100 AMPS SHALL BE COPPER 60° C
  ABOVE 100 AMPS USE 75° C WIRE
  DASHED LINE = FIELD DEVICE

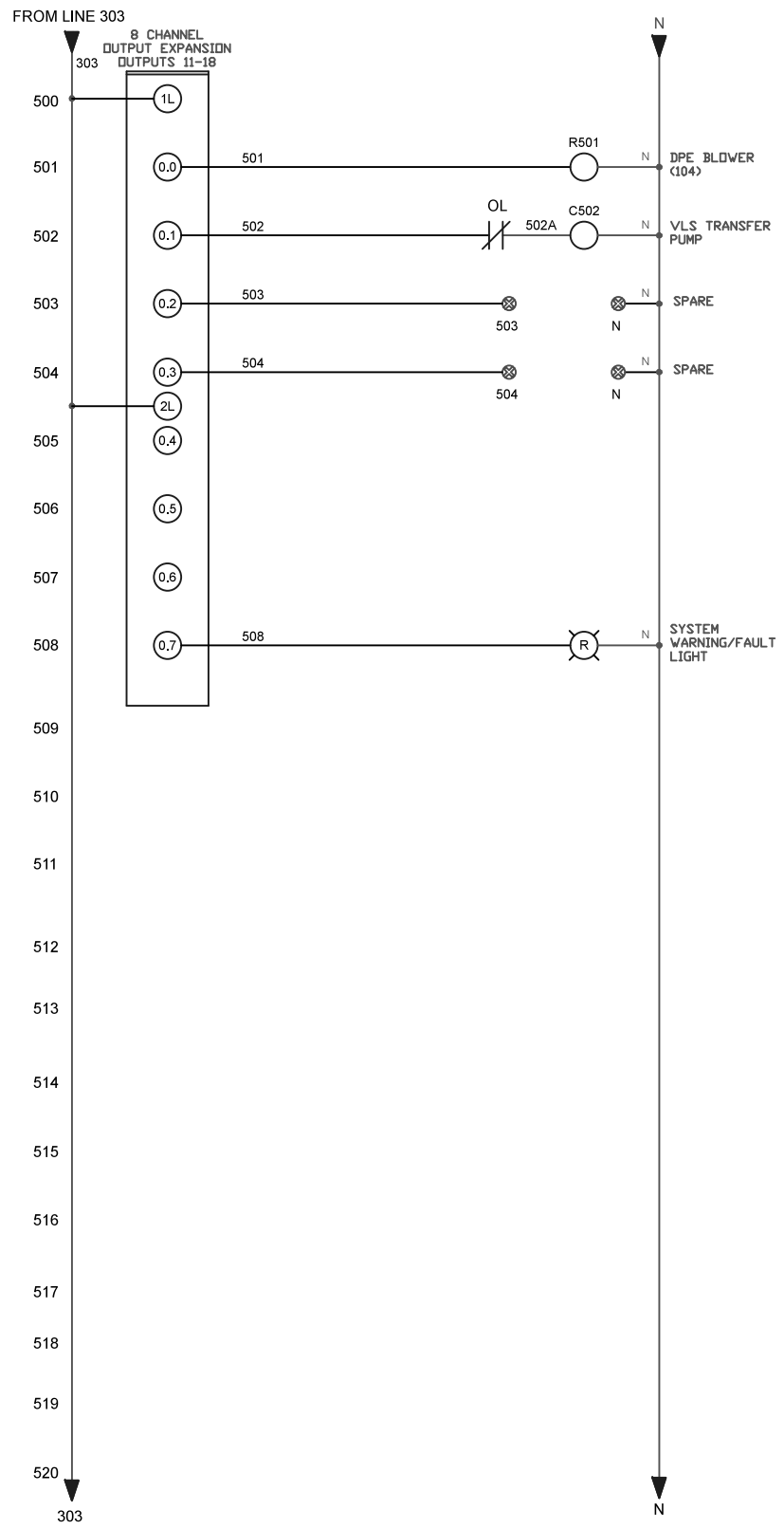
SPECIALTY SYSTEMS INTEGRATORS INC.
14150 23rd Ave N; Plymouth, Minnesota 55447 | tel: 763-450-2600 | WWW.2SSI.COM | email: sales@2ssi.com

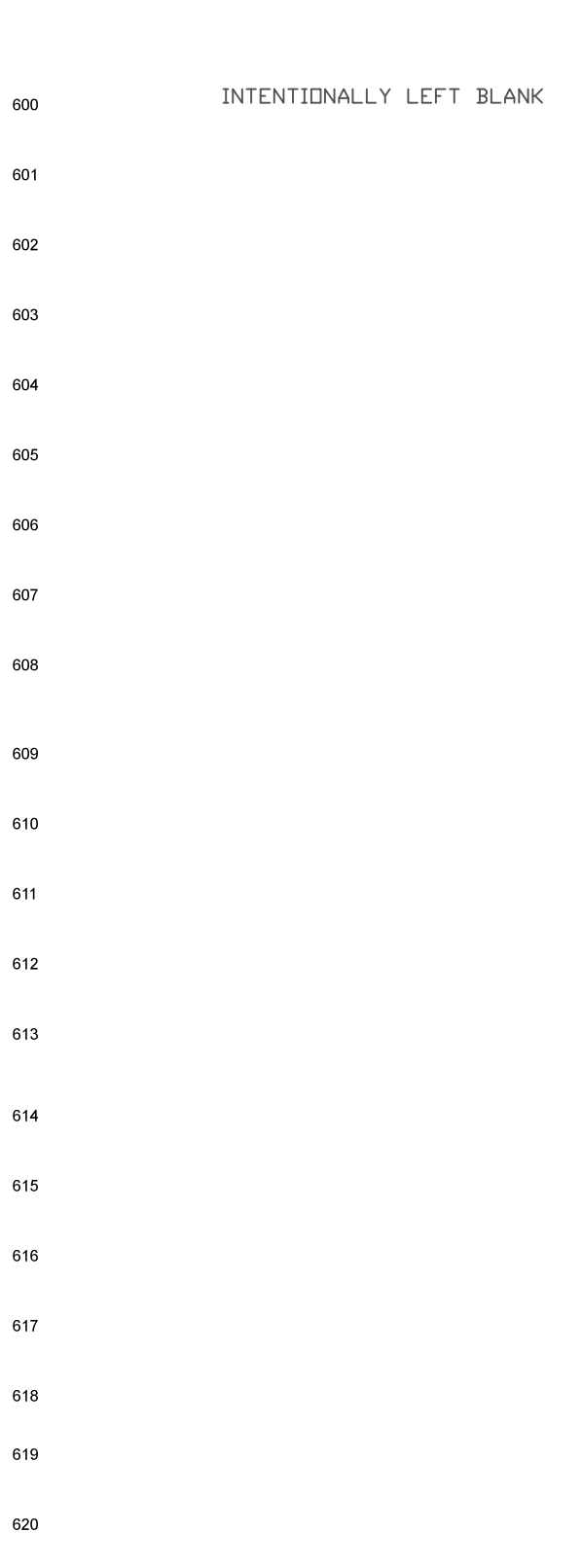
TITLE:

Control Panel Schematics
TURNKEY ENVIRONMENTAL
DPE TRAILER SYSTEM

DWN: MV	DATE: 7/26/2017
CHKD: MV	DRAWING #: 2022-1
REV.: 0	







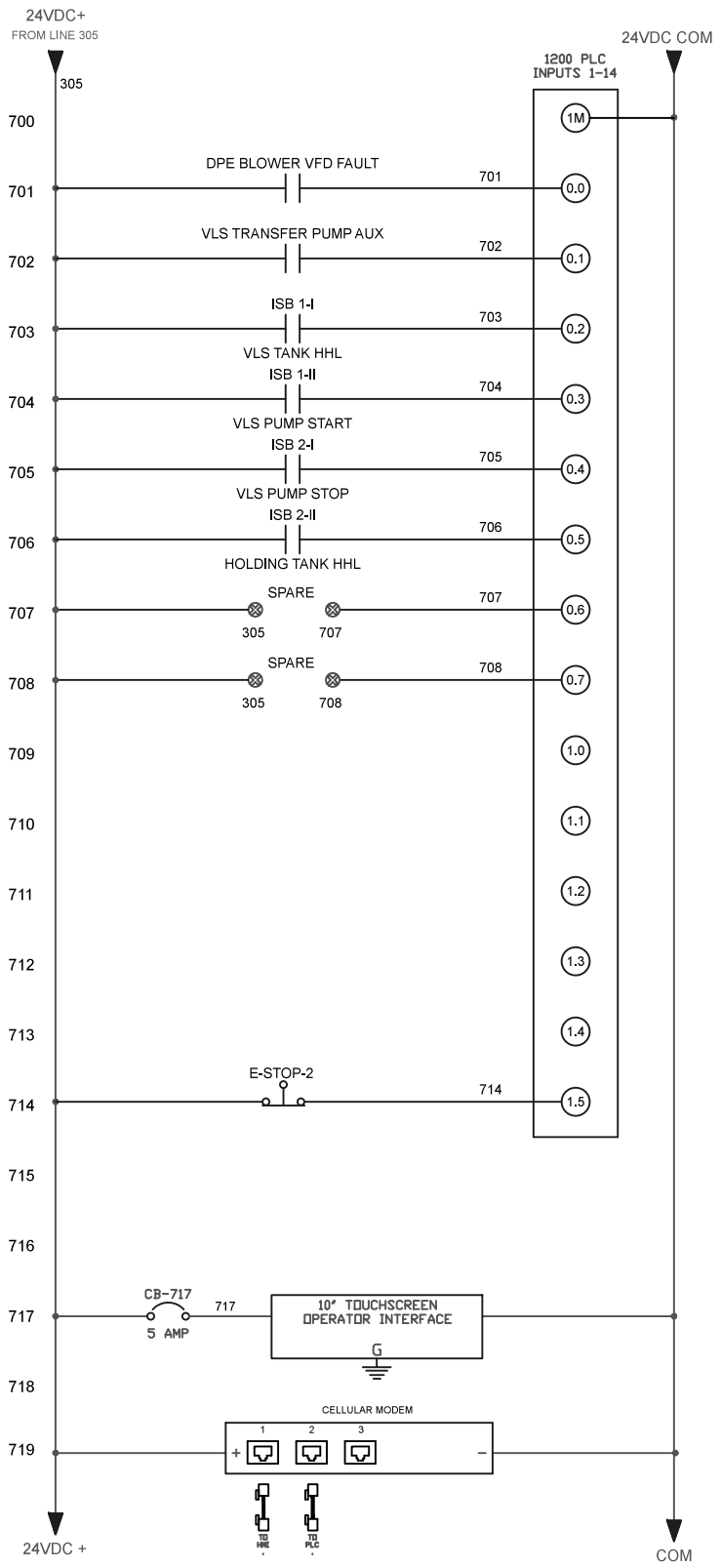
INTENTIONALLY LEFT BLANK

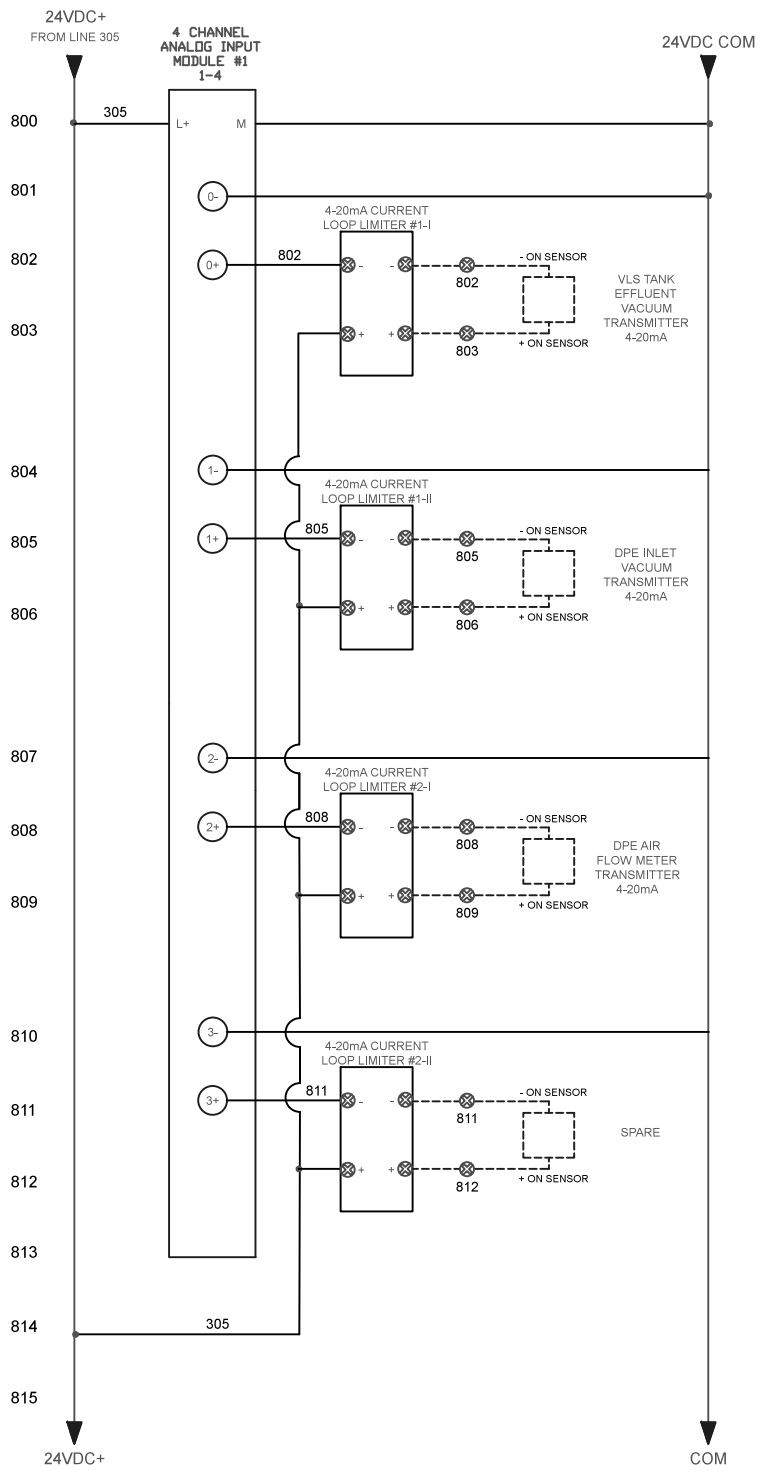
SPECIALTY SYSTEMS INTEGRATORS INC.
14150 23rd Ave N; Plymouth, Minnesota 55447 | tel: 763-450-2600 | WWW.2SSI.COM | email: sales@2ssi.com

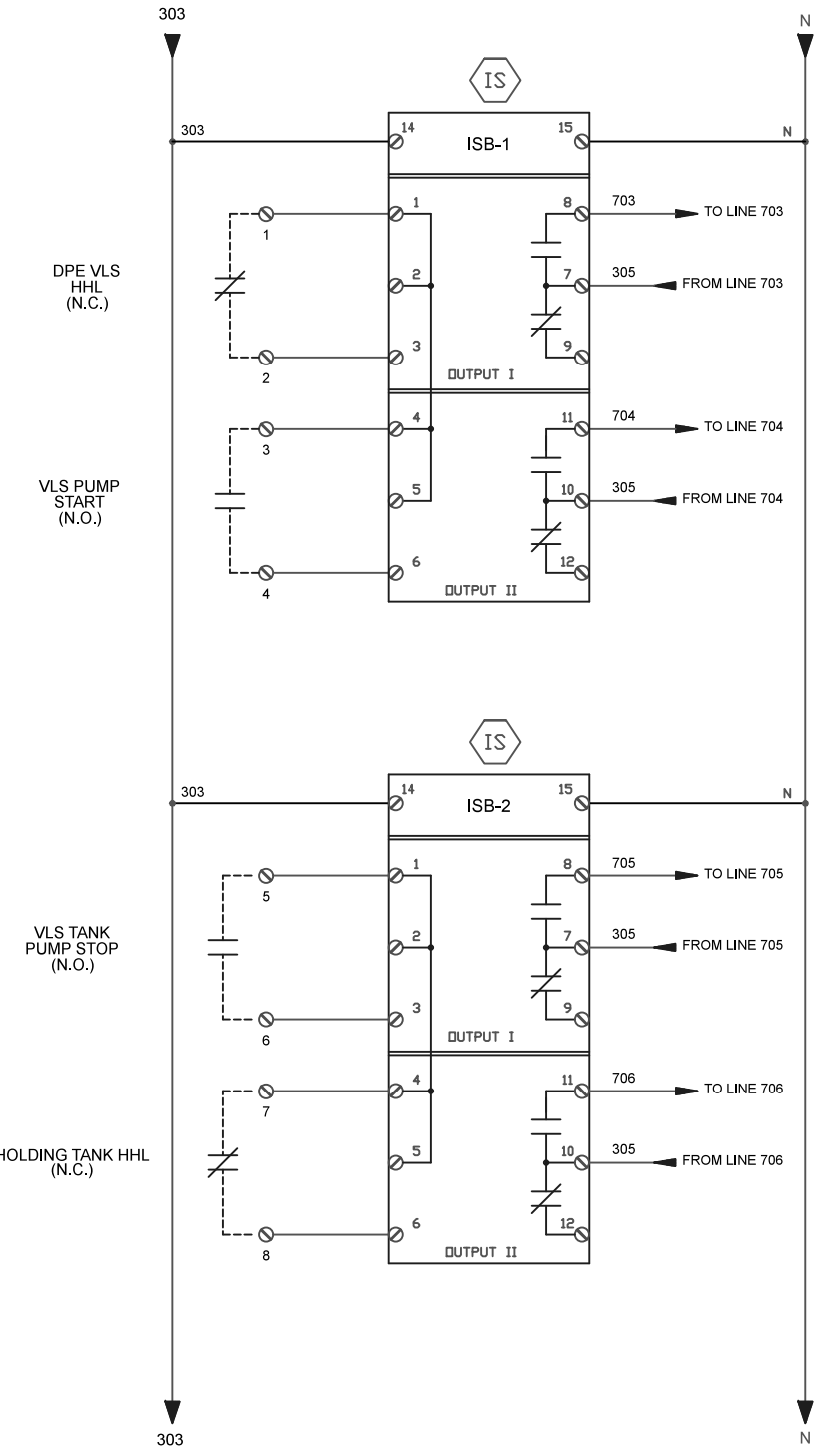
TITLE:
Control Panel Schematics
TURNKEY ENVIRONMENTAL
DPE TRAILER SYSTEM

- POWER DISTRIBUTION BLOCK: TORQUE FIELD WIRING TO 120 IN/LBS
- ALL FIELD WIRING BELOW 100 AMPS SHALL BE COPPER 60° C
  ABOVE 100 AMPS USE 75° C WIRE
  DASHED LINE = FIELD DEVICE

DWN:	MV
CHKD:	MV
REV.:	0
DATE:	7/26/2017
DRAWING #:	2022-2







SPECIALTY SYSTEMS INTEGRATORS INC.
14150 23rd Ave N; Plymouth, Minnesota 55447 | tel: 763-450-2600 | WWW.2SSI.COM | email: sales@2ssi.com

TITLE:

Control Panel Schematics
TURNKEY ENVIRONMENTAL
DPE TRAILER SYSTEM

- POWER DISTRIBUTION BLOCK: TORQUE FIELD WIRING TO 120 IN/LBS
- ALL FIELD WIRING BELOW 100 AMPS SHALL BE COPPER 60° C
  ABOVE 100 AMPS USE 75° C WIRE
  DASHED LINE = FIELD DEVICE

DWN:	MV
CHKD:	MV
REV.:	0
DATE:	7/26/2017
DRAWING #:	2022-3

MINK DRY CLAW VACUUM PUMP

Model MM 1322 AV

DESCRIPTION

The Busch MM Series positive displacement vacuum pumps feature a compact rotary claw design that is air cooled, dry-running and non-contacting. These features along with quality construction results in a pump that offers extremely high reliability and a long service life. All Busch MM series vacuum pumps are covered by a standard 3 year warranty.

MAINTENANCE-FREE

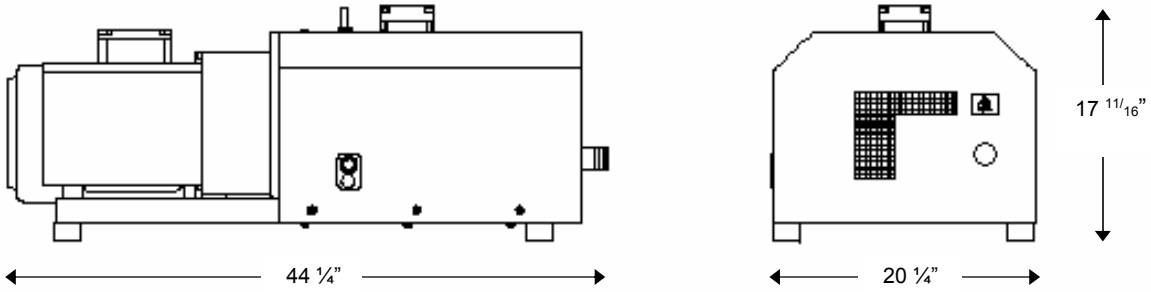
Non-contacting design – eliminates internal wear and parts to replace.

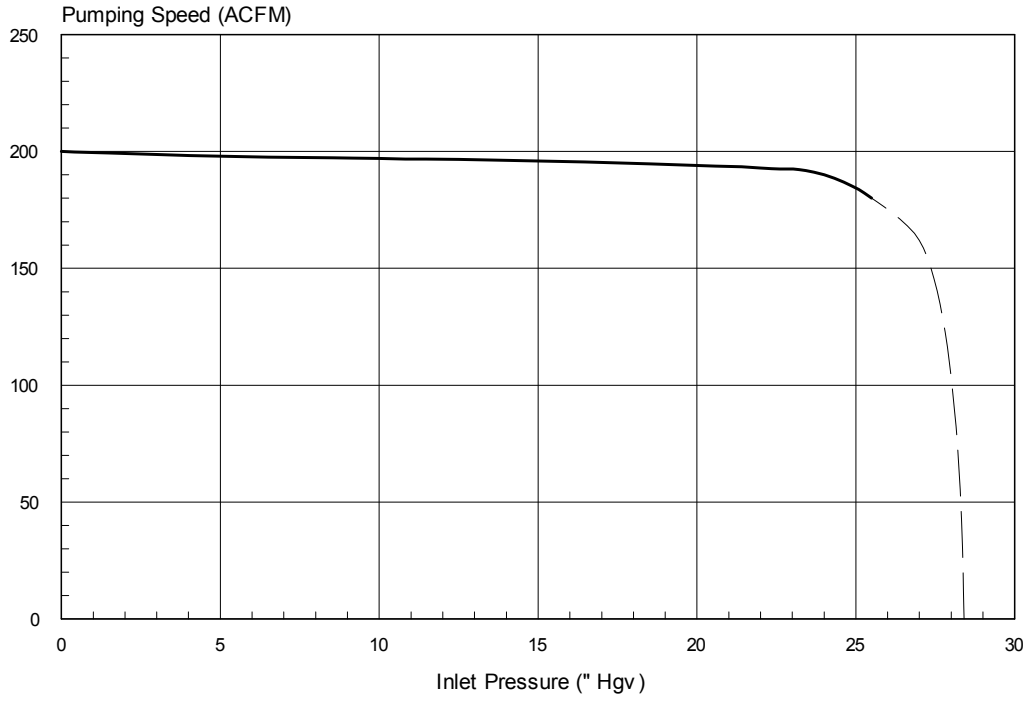
Air Cooled – no water levels to check and no cooling system to maintain.

Dry Running – no sealing or lubricating oil is required in the pumping chamber.

MM 1322 AV Specifications

Displacement CFM	Nominal ACFM	End Vac " Hgv	NEMA Motor HP	Standard Voltage	Pump RPM	Sound dBa	Inlet Size	Outlet Size	Weight Lbs.
218	200	28.4	10.0	208-230/460	3600	82	2" NPT	1 ¼" NPT	532





Busch, Inc.
516 Viking Drive
Virginia beach, VA 23452
Phone (757) 463-7800
FAX (757) 463-7407
www.buschpump.com

For more information call
1-800-USA-PUMP

Holland, Spain, Switzerland, Sweden, Turkey, Denmark, England, Australia, Italy, France, China, Germany, Taiwan, Japan, Austria, Canada

Models and specifications are subject to change without notice

Installation and Operating Instructions

Vacuum Pumps
Mink MM 1324, 1202, 1252, 1322, 1200, 1250,1320 AV

Busch LLC
516 Viking Drive
Virginia Beach, VA 23452
Phone: (757) 463-7800
Fax: (757) 463-7407

P/N 0872.918.120 / 0911

Table of Contents

Preface 2
Product Description 3
Use 3
Principle of Operation 3
Cooling 4
Start Controls 4
Safety 4
Intended Use 4
Safety Notes 4
Noise Emission 4
Transport 4
Transport in Packaging 4
Transport without Packaging 4
Storage 5
Short-term Storage 5
Conservation 5
Installation and Commissioning 5
Installation Prerequisites 5
Mounting Position and Space 5
Suction Connection 5
Gas Discharge 6
Electrical Connection / Controls 6
Installation 6
Mounting a NEMA-Motor with BoWex-Coupling 6
Mounting 6
Checking Synchronising Gear Oil 6
Connecting Electrically 6
Connection Scheme Three-Phase Motor 7
Connecting Lines/Pipes 7
Recording of Operational Parameters 7
Operation Notes 7
Use 7
Conveying Condensable Vapours 8
Maintenance 8
Maintenance Schedule 8
Monthly: 8
Every 3 Months: 9
Every 6 Months: 9
Every Year: 9
Every 20000 Operating Hours, At the Latest after 6 Years: . 9
Changing Synchronising Gear Oil 9
Overhaul 9
Removal from Service 9
Temporary Removal from Service 9
Recommissioning 9
Dismantling and Disposal 10
Troubleshooting 11
Sectional Drawing 14
Spare Parts 15
Spare Parts Kits 15
Accessories 15
Oil 15
EC-Declaration of Conformity 16
Technical Data 19
Busch – All over the World in Industry 20

Preface

Congratulations on your purchase of the Busch vacuum pump. With watchful observation of the field's requirements, innovation and steady development Busch delivers modern vacuum and pressure solutions worldwide.

These operating instructions contain information for

- product description,
- safety,
- transport,
- storage,
- installation and commissioning,
- maintenance,
- overhaul,
- troubleshooting and
- spare parts

of the vacuum pump.

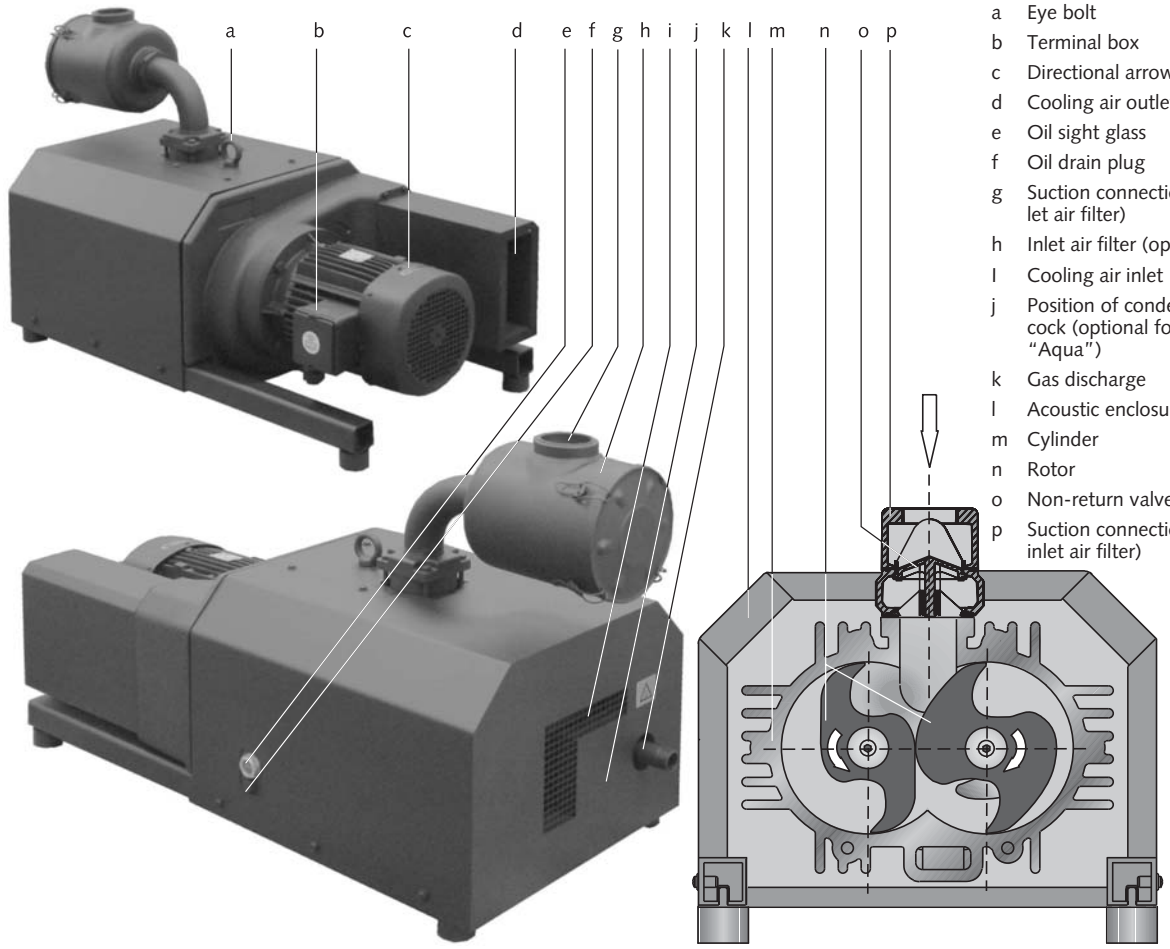
Version drive with integrated frequency inverter:

The drive with integrated frequency inverter is subject to a separate instruction manual.

For the purpose of these instructions, "handling" the vacuum pump means the transport, storage, installation, commissioning, influence on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

Prior to handling the vacuum pump these operating instructions shall be read and understood. If anything remains to be clarified please contact your Busch representative!

Keep these operating instructions and, if applicable, other pertinent operating instructions available on site.



a Eye bolt
b Terminal box
c Directional arrow
d Cooling air outlet
e Oil sight glass
f Oil drain plug
g Suction connection (with inlet air filter)
h Inlet air filter (optional)
I Cooling air inlet
j Position of condensate drain cock (optional for version "Aqua")
k Gas discharge
l Acoustic enclosure
m Cylinder
n Rotor
o Non-return valve
p Suction connection (without inlet air filter)

Product Description

Use

The vacuum pump is intended for

– the suction

of

– air and other dry, non-aggressive, non-toxic and non-explosive gases

Conveying media with a lower or higher density than air leads to an increased thermal and/or mechanical load on the vacuum pump and is permissible only after prior consultation with Busch.

Max. allowed temperature of the inlet gas: 40 °C

Standard-version:

The gas shall be free from vapours that would condensate under the temperature and pressure conditions inside the vacuum pump.

Version "Aqua":

The vacuum pump features the corrosion protection coating CPC and is capable of conveying water vapour (→ page 8: Conveying Condensable Vapours). Conveyance of other vapours shall be agreed upon with Busch. Conveyance of water or other liquids in liquid phase increases the power consumption and shall therefore be avoided (risk of drive overload).

The vacuum pump is intended for the placement in a non-potentially explosive environment.

Max. permissible number of startings per hour: 12

Vacuum pumps MM 1324 AV standard-version are thermally suitable for continuous operation down to ultimate pressure.

Vacuum pumps MM 1324 AV Version "Aqua" are thermally suitable for continuous operation at intake pressures down to 200 hPa abs (200 mbar abs). By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed intake pressure will not be underrun.

Vacuum pumps MM 1202 AV, MM 1200 AV, MM 1252 AV and MM 1250 AV are thermally suitable for continuous operation at intake pressures down to 100 hPa abs (100 mbar abs). By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed intake pressure will not be underrun.

Vacuum pumps MM 1322 AV and MM 1320 AV (version 600...3600 min^{-1}) are thermally suitable for continuous operation at intake pressures down to 150 hPa abs (150 mbar abs). MM 1320 AV (version 600...4200 min^{-1}) are thermally suitable for continuous operation at intake pressures down to 200 hPa abs (200 mbar abs). By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed intake pressure will not be underrun.

Version "Aqua":

The safety valve on the vacuum pump protects the vacuum pump against overheating only. It is not designed for frequent use and must therefore not be used as a system pressure regulating valve.

Principle of Operation

The vacuum pump works on the claw principle.

The components are dimensioned such, that on the one hand there is never contact between the two claws or between a claw and the cylinder, on the other hand the gaps are small enough to keep the clearance loss between the chambers low.

In order to avoid the suction of solids, the vacuum pump is equipped with a screen (715) in the suction connection.

In order to avoid reverse rotation after switching off, the vacuum pump is equipped with a non-return valve (o, 714).

The vacuum pump compresses the inlet gas absolutely oil-free. A lubrication of the pump chamber is neither necessary nor allowed.

Cooling

The vacuum pump is cooled by

- radiation of heat from the surface of the vacuum pump
- the air flow from the fan wheel of the drive motor
- the process gas
- the air flow from the fan wheel on the shaft of the vacuum pump

Start Controls

The vacuum pump comes without start controls. The control of the vacuum pump is to be provided in the course of installation.

Safety

Intended Use

Definition: For the purpose of these instructions, "handling" the vacuum pump means the transport, storage, installation, commissioning, influence on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

The vacuum pump is intended for industrial use. It shall be handled only by qualified personnel.

The allowed media and operational limits (→ page 3: Product Description) and the installation prerequisites (→ page 5: Installation Prerequisites) of the vacuum pump shall be observed both by the manufacturer of the machinery into which the vacuum pump is to be incorporated and by the operator.

The maintenance instructions shall be observed.

Prior to handling the vacuum pump these installation and operating instructions shall be read and understood. If anything remains to be clarified please contact your Busch representative!

Safety Notes

The vacuum pump has been designed and manufactured according to state-of-the-art methods. Nevertheless, residual risks may remain. These operating instructions highlight potential hazards where appropriate. Safety notes are tagged with one of the keywords DANGER, WARNING and CAUTION as follows:

DANGER

Disregard of this safety note will always lead to accidents with fatal or serious injuries.

WARNING

Disregard of this safety note may lead to accidents with fatal or serious injuries.

CAUTION

Disregard of this safety note may lead to accidents with minor injuries or property damage.

Noise Emission

For the sound pressure level in free field according to EN ISO 2151 → page 19: Technical Data.

CAUTION

The vacuum pump emits noise of high intensity in a narrow band.

Risk of damage to the hearing.

Persons staying in the vicinity of a non noise insulated vacuum pump over extended periods shall wear ear protection.

Transport

Transport in Packaging

Packed on a pallet the vacuum pump is to be transported with a forklift.

Transport without Packaging

In case the vacuum pump is packed in a cardboard box with inflated cushions:

- ◆ Remove the inflated cushions from the box

In case the vacuum pump is in a cardboard box cushioned with rolled corrugated cardboard:

- ◆ Remove the corrugated cardboard from the box

In case the vacuum pump is laid in foam:

- ◆ Remove the foam

In case the vacuum pump is bolted to a pallet or a base plate:

- ◆ Remove the bolting between the vacuum pump and the pallet/base plate

In case the vacuum pump is fastened to the pallet by means of tightening straps:

- ◆ Remove the tightening straps

CAUTION

Do not walk, stand or work under suspended loads.

- ● Make sure that the eyebolt (a, 615) is in faultless condition (replace a damaged, e.g. bent eyebolt with a new one)
- ● Make sure that the eyebolt (a, 615) is fully screwed in and tightened by hand
- ● Attach lifting gear securely to the eyebolt (a, 615) on the synchronising gear

When the vacuum pump is equipped with a very heavy drive motor and would hang very inclined (>10 °) on the synchronising gear eyebolt alone:

- ◆ Attach lifting gear securely to the eyebolts on the synchronising gear (a, 615) and on the drive motor

In case the drive motor comes without an eyebolt or the eyebolt on the drive motor is located at an unfavourable position:

- ◆ Loop a belt/rope with suitable length and strength around the flange of the drive motor

- ● Attach the lifting gear to a crane hook with safety latch
- ● Lift the vacuum pump with a crane

In case the vacuum pump was bolted to a pallet or a base plate:

- ◆ Remove the stud bolts from the rubber feet

Storage

Short-term Storage

- Make sure that the suction connection and the gas discharge are closed (leave the provided plugs in)
- Store the vacuum pump
  - if possible in original packaging,
  - indoors,
  - dry,
  - dust free and
  - vibration free

Conservation

In case of adverse ambient conditions (e.g. aggressive atmosphere, frequent temperature changes) conserve the vacuum pump immediately. In case of favourable ambient conditions conserve the vacuum pump if a storage of more than 3 months is scheduled.

- Make sure that all ports are firmly closed; seal all ports that are not sealed with PTFE-tape, gaskets or o-rings with adhesive tape

Note: VCI stands for "volatile corrosion inhibitor". VCI-products (film, paper, cardboard, foam) evaporate a substance that condenses in molecular thickness on the packed good and by its electro-chemical properties effectively suppresses corrosion on metallic surfaces. However, VCI-products may attack the surfaces of plastics and elastomers. Seek advice from your local packaging dealer! Busch uses CORTEC VCI 126 R film for the overseas packaging of large equipment.

- Wrap the vacuum pump in VCI film
- Store the vacuum pump
  - if possible in original packing,
  - indoors,
  - dry,
  - dust free and
  - vibration free.

For commissioning after conservation:

- Make sure that all remains of adhesive tape are removed from the ports
- Commission the vacuum pump as described in the chapter Installation and Commissioning (→ page 5)

Installation and Commissioning

Installation Prerequisites

CAUTION

In case of non-compliance with the installation prerequisites, particularly in case of insufficient cooling:

Risk of damage or destruction of the vacuum pump and adjoining plant components!

Risk of injury!

The installation prerequisites must be complied with.

- Make sure that the integration of the vacuum pump is carried out such that the essential safety requirements of the Machine Directive 2006/42/EC are complied with (in the responsibility of the designer of the machinery into which the vacuum pump is to be incorporated; → page 16: note in the EC-Declaration of Conformity)

Mounting Position and Space

- Make sure that the environment of the vacuum pump is not potentially explosive
- Make sure that the following ambient conditions will be complied with:
  - ambient temperature: 0 ... 40 °C
  - ambient pressure: atmospheric
- Make sure that the environmental conditions comply with the protection class of the drive motor (according to the nameplate)
- Make sure that the vacuum pump will be placed or mounted horizontally
- Make sure that the base for placement / mounting base is even
- Make sure that in order to warrant a sufficient cooling there will be a clearance of minimum 1 m between the vacuum pump and nearby walls
- Make sure that no heat sensitive parts (plastics, wood, cardboard, paper, electronics) will touch the surface of the vacuum pump
- Make sure that the installation space or location is vented such that a sufficient cooling of the vacuum pump is warranted

CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.

Risk of burns!

- Make sure that the vacuum pump will not be touched inadvertently during operation, provide a guard if appropriate
- Make sure that the sight glass (e, 76) of the synchronising gear will remain accessible

In case the synchronising gear oil change is planned to be carried out on location:

- ◆ Make sure that the drain port (f, 80) and the filling port (72) of the synchronising gear will remain easily accessible

Suction Connection

CAUTION

Intruding foreign objects or liquids can destroy the vacuum pump.

In case the inlet gas can contain dust or other foreign solid particles:

- ◆ Make sure that a suitable filter (5 micron or less) is installed upstream the vacuum pump
- Make sure that the suction line fits to the suction connection (g/p) of the vacuum pump
- Make sure that the gas will be sucked through a vacuum-tight flexible hose or a pipe

In case of using a pipe:

- ◆ Make sure that the pipe will cause no stress on the vacuum pump's connection, if necessary use an expansion joint
- Make sure that the line size of the suction line over the entire length is at least as large as the suction connection (g/p) of the vacuum pump

In case the length of the suction line exceeds 2 m it is prudent to use larger line sizes in order to avoid a loss of efficiency and an overload of the vacuum pump. Seek advice from your Busch representative!

In case the vacuum shall be maintained after shutdown of the vacuum pump:

- ◆ Provide a manual or automatic operated valve (= non-return valve) in the suction line

Version "Aqua", if very humid process gases and/or adverse operating cycles bear the risk, that condensates remain in the vacuum pump:

- ◆ Provide a shut-off valve, a drip-leg and a drain cock in the suction line, so that condensates can be drained from the suction line
- ◆ Provide a valve for the unthrottled suction of ambient air (ambient air valve) between the shut-off valve and the vacuum pump (in order to dry the vacuum pump after process end).
- ◆ For non ultimate-pressure-proof vacuum pumps provide a vacuum relief valve (suitable for continuous operation) for the throttled aspiration of ambient air during warming up.
- ◆ Make sure that the anti-pulsation chamber is equipped with a condensate drain cock (j) (optional; if the condensate drain cock is missing contact the Busch service)

- ● Make sure that the suction line does not contain foreign objects, e.g. welding scales

Gas Discharge

The discharged gas must flow without obstruction. It is not permitted to shut off or throttle the discharge line or to use it as a pressurised air source.

The following guidelines for the discharge line do not apply, if the aspirated air is discharged to the environment right at the vacuum pump.

- ● Make sure that the discharge line fits to the gas discharge (k) of the vacuum pump

In case of using a pipe:

- ◆ Make sure that the pipe will cause no stress on the vacuum pump's connection, if necessary use an expansion joint

- ● Make sure that the line size of the discharge line over the entire length is at least 2"

In case the length of the discharge line exceeds 2 m it is prudent to use larger line sizes in order to avoid a loss of efficiency and an overload of the vacuum pump. Seek advice from your Busch representative!

- ● Make sure that the discharge line either slopes away from the vacuum pump or provide a liquid separator or a drip leg with a drain cock, so that no liquids can back up into the vacuum pump

Electrical Connection / Controls

- ● Make sure that the stipulations acc. to the EMC-Directive 2004/108/EC and Low-Voltage-Directive 2006/95/EC as well as the EN-standards, electrical and occupational safety directives and the local or national regulations, respectively, are complied with (this is the responsibility of the designer of the machinery into which the vacuum pump is to be incorporated; → page 16: note in the EC-Declaration of Conformity).
- ● Make sure that the power supply for the drive motor is compatible with the data on the nameplate of the drive motor
- ● Make sure that an overload protection according to EN 60204-1 is provided for the drive motor
- ● Make sure that the drive of the vacuum pump will not be affected by electric or electromagnetic disturbance from the mains; if necessary seek advice from the Busch service

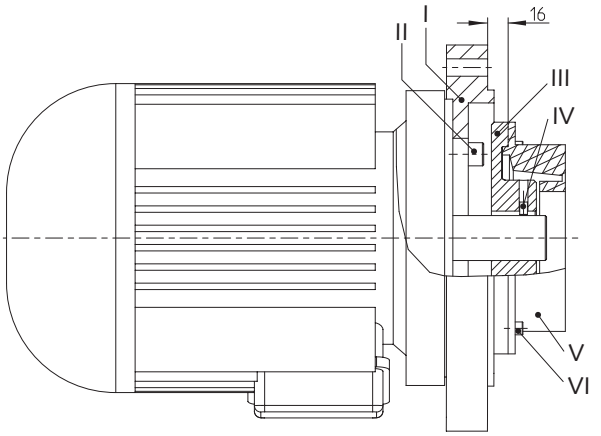
In case of mobile installation:

- ◆ Provide the electrical connection with grommets that serve as strain-relief

Installation

Mounting a NEMA-Motor with BoWex-Coupling

For certain markets the vacuum pump is available without motor, but with a NEMA-adaptor flange and a BoWex-coupling.



- ● Remove the NEMA-adaptor flange (I) from the vacuum pump
- ● Pull the elastomer part (V) together with the hub (III) off the shaft of the vacuum pump
- ● Mount the NEMA-adaptor flange (I) on the motor (the bolts (II) are not part of the Busch scope of delivery)
- ● Undo the cylinder screws (VI) and remove the elastomer part (V) from the hub (III)
- ● Make sure that the parallel key is inserted into the motor shaft
- ● Push the hub (III) onto the motor shaft such that the mounting face of the hub (III) will be located 16±1 mm before the mounting face of the NEMA-adaptor flange (I) (→ sketch)
- ● Fasten the hub (III) on the motor shaft using the set screw (IV)
- ● Apply thread locking agent on the threads of the cylinder screws (VI)
- ● Mount the elastomer part (V) on the hub (III) with the cylinder screws (VI) and tighten the cylinder screws with 14 Nm
- ● Mount the motor on the vacuum pump

Mounting

- ● Make sure that the installation prerequisites (→ page 5) are complied with
- ● Set down or mount the vacuum pump at its location

Checking Synchronising Gear Oil

The vacuum pump is delivered with oil filled synchronising gear.

The level shall be slightly above the middle of the sight glass (e, 76).

- ● Check on the sight glass (e, 76) that the proper amount of oil is filled

Connecting Electrically

WARNING

Risk of electrical shock, risk of damage to equipment.

Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations:
- IEC 364 or CENELEC HD 384 or DIN VDE 0100, respectively,
- IEC-Report 664 or DIN VDE 0110,
- BGV A2 (VBG 4) or corresponding national accident prevention regulation.

CAUTION

The connection schemes given below are typical. Depending on the specific order or for certain markets deviating connection schemes may apply.

Risk of damage to the drive motor!

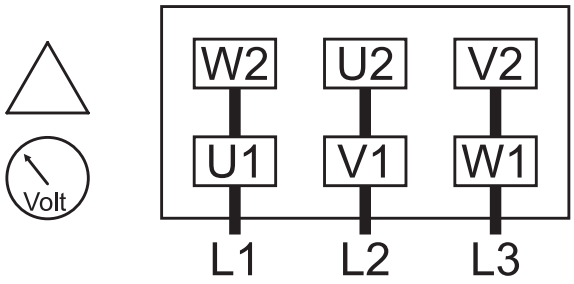
The inside of the terminal box shall be checked for drive motor connection instructions/schemes.

Note: For the connection of a drive with integrated frequency inverter see the separate operating instructions!

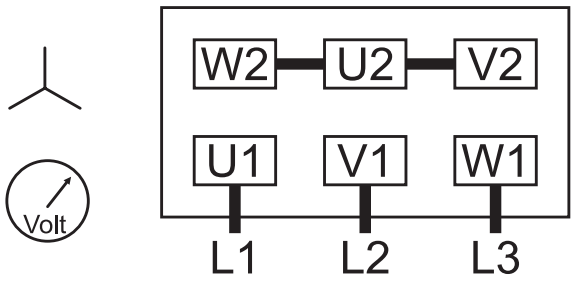
- Electrically connect the drive motor
- Connect the protective earth conductor

Connection Scheme Three-Phase Motor

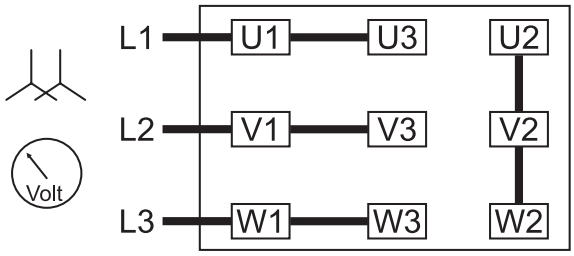
Delta connection (low voltage):



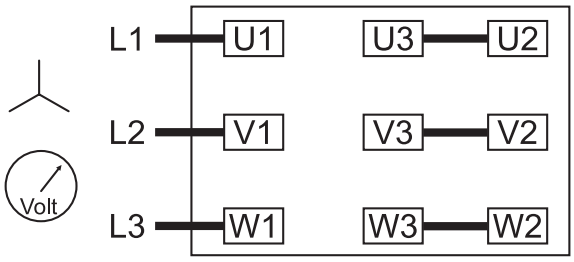
Star connection (high voltage):



Double star connection, multi-voltage motor with 9 terminals (low voltage):



Star connection, multi-voltage motor with 9 terminals (high voltage):



CAUTION

Operation in the wrong direction of rotation can destroy the vacuum pump in short time.

Prior to starting-up it must be made sure that the vacuum pump is operated in the proper direction (clockwise rotating field).

Version with three-phase motor:

- Determine the intended direction of rotation with the arrow (c) (stuck on or cast)
- "Bump" the drive motor
- Watch the fan wheel of the drive motor and determine the direction of rotation just before the fan wheel stops

If the rotation must be changed:

- Switch any two of the drive motor wires (three-phase motor)

Connecting Lines/Pipes

- Connect the suction line
- Connect the discharge line

Installation without discharge line:

- Make sure that the gas discharge (k) is open

- Make sure that all provided covers, guards, hoods etc. are mounted
- Make sure that cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way

Recording of Operational Parameters

As soon as the vacuum pump is operated under normal operating conditions:

- Measure the drive motor current and record it as reference for future maintenance and troubleshooting work

Operation Notes

Use

CAUTION

The vacuum pump is designed for operation under the conditions described below.

In case of disregard risk of damage or destruction of the vacuum pump and adjoining plant components!

Risk of injury!

The vacuum pump must only be operated under the conditions described below.

The vacuum pump is intended for

– the suction

of

– air and other dry, non-aggressive, non-toxic and non-explosive gases

Conveying media with a lower or higher density than air leads to an increased thermal and/or mechanical load on the vacuum pump and is permissible only after prior consultation with Busch.

Max. allowed temperature of the inlet gas: 40 °C

Standard-version:

The gas shall be free from vapours that would condensate under the temperature and pressure conditions inside the vacuum pump.

Version “Aqua”:

The vacuum pump features the corrosion protection coating CPC and is capable of conveying water vapour (→ page 8: Conveying Condensable Vapours). Conveyance of other vapours shall be agreed upon with Busch. Conveyance of water or other liquids in liquid phase increases the power consumption and shall therefore be avoided (risk of drive overload).

The vacuum pump is intended for the placement in a non-potentially explosive environment.

Max. permissible number of startings per hour: 12

Vacuum pumps MM 1324 AV standard-version are thermally suitable for continuous operation down to ultimate pressure.

Vacuum pumps MM 1324 AV Version “Aqua” are thermally suitable for continuous operation at intake pressures down to 200 hPa abs (200 mbar abs). By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed intake pressure will not be underrun.

Vacuum pumps MM 1202 AV, MM 1200 AV, MM 1252 AV and MM 1250 AV are thermally suitable for continuous operation at intake pressures down to 100 hPa abs (100 mbar abs). By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed intake pressure will not be underrun.

Vacuum pumps MM 1322 AV and MM 1320 AV (version 600...3600 min^{-1}) are thermally suitable for continuous operation at intake pressures down to 150 hPa abs (150 mbar abs). MM 1320 AV (version 600...4200 min^{-1}) are thermally suitable for continuous operation at intake pressures down to 200 hPa abs (200 mbar abs). By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed intake pressure will not be underrun.

Version “Aqua”:

The safety valve on the vacuum pump protects the vacuum pump against overheating only. It is not designed for frequent use and must therefore not be used as a system pressure regulating valve.

CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.

Risk of burns!

The vacuum pump shall be protected against contact during operation, it shall cool down prior to a required contact or heat protection gloves shall be worn.

CAUTION

The vacuum pump emits noise of high intensity in a narrow band.

Risk of damage to the hearing.

Persons staying in the vicinity of a non noise insulated vacuum pump over extended periods shall wear ear protection.

- Make sure that all provided covers, guards, hoods etc. remain mounted
- Make sure that protective devices will not be disabled
- Make sure that cooling air inlets and outlets will not be covered or obstructed and that the cooling air flow will not be affected adversely in any other way
- Make sure that the installation prerequisites (→ page 5: Installation Prerequisites) are complied with and will remain complied with, particularly that a sufficient cooling will be ensured

Conveying Condensable Vapours

Version “Aqua”:

CAUTION

Due to the corrosion protection coating CPC the vacuum pump is capable of conveying water vapour.

Very humid process gases and/or adverse operating cycles can lead to residual condensates, though, which cause corrosion.

If this is the case, it is necessary to counteract residual condensates by warming up the vacuum pump, conveyance of ambient air after process end and regular draining of the anti-pulsation chamber (j).

- Close the shut-off valve in the suction line
- Warm up the vacuum pump for approx. 10 minutes

At process start:

- Open the shut-off valve in the suction line

At the process end:

- Close the shut-off valve in the suction line
- Open the ambient air valve
- Operate the vacuum pump for another approx. 10 minutes
- Close the ambient air valve
- Regularly drain condensate from the anti-pulsation chamber (j)

Maintenance

DANGER

In case the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in filters.

Danger to health during inspection, cleaning or replacement of filters.

Danger to the environment.

Personal protective equipment must be worn during the handling of contaminated filters.

Contaminated filters are special waste and must be disposed of separately in compliance with applicable regulations.

CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.

Risk of burns!

- Prior to disconnecting connections make sure that the connected pipes/lines are vented to atmospheric pressure

Maintenance Schedule

Note: The maintenance intervals depend very much on the individual operating conditions. The intervals given below shall be considered as starting values which should be shortened or extended as appropriate. Particularly heavy duty operation, such like high dust loads in the environment or in the process gas, other contaminations or ingress of process material, can make it necessary to shorten the maintenance intervals significantly.

Monthly:

- Make sure that the vacuum pump is shut down and locked against inadvertent start up

In case an inlet air filter (h) is installed:

- ◆ Check the inlet air filter (h), if necessary replace

In case of operation in a dusty environment:

- ◆ Clean as described under → page 9: Every 6 Months:

Every 3 Months:

- Make sure that the vacuum pump is shut down
- Check the level of the synchronising gear oil

The level shall be slightly above the middle of the sight glass (e, 76).

The level of the synchronising gear should stay constant over the lifetime of the oil. If the level does fall, the gear is leaky and the vacuum pump requires repair (Busch service).

Every 6 Months:

- Make sure that the housing is free from dust and dirt, clean if necessary
- Make sure that the vacuum pump is shut down and locked against inadvertent start up
- Remove the acoustic enclosure

Note: Make sure that the foam mats do **not** get soaked with water

- Clean the fan cowlings, fan wheels, the ventilation grilles and cooling fins
- Mount the acoustic enclosure

Every Year:

- Make sure that the vacuum pump is shut down and locked against inadvertent start up

In case an inlet air filter (h) is installed:

- ◆ Replace the inlet air filter (h)

- Check the inlet screen (715), clean if necessary

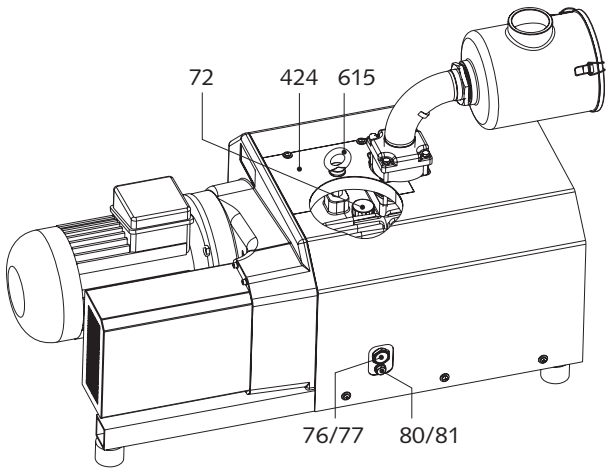
Every 20000 Operating Hours, At the Latest after 6 Years:

Note: The change interval of 20000 operating hours is valid for the gear oil Busch VE 101 only. Other gear oils reduce the change interval.

- Change the synchronising gear oil

Changing Synchronising Gear Oil

- Make sure that the vacuum pump is shut down and locked against inadvertent start up



- Remove the eyebolt (a, 615)
- Remove the lid (424)
- Undo the venting valve (72) for venting
- Place a drain tray underneath the drain plug (f, 80)
- Open the drain plug (f, 80) and drain the oil
- Make sure that the seal ring on the drain plug (f, 80) is serviceable, replace if necessary
- Firmly reinsert the drain plug (f, 80) together with the seal ring
- Remove the venting valve (72) completely
- Fill in new gear oil until the level is slightly above the middle of the sight glass (e, 76)
- Make sure that the seal ring on the venting valve (72) is undamaged, if necessary replace the venting valve (72)
- Firmly reinsert the venting valve (72) together with the seal ring
- Mount the lid (424)
- Reinsert the eyebolt (a, 615)
- Dispose of the used oil in compliance with applicable regulations

Overhaul

CAUTION

In order to achieve best efficiency and a long life the vacuum pump was assembled and adjusted with precisely defined tolerances.

This adjustment will be lost during dismantling of the vacuum pump.

It is therefore strictly recommended that any dismantling of the vacuum pump that is beyond of what is described in this manual shall be done by Busch service.

DANGER

In case the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in pores, gaps and internal spaces of the vacuum pump.

Danger to health during dismantling of the vacuum pump.

Danger to the environment.

Prior to shipping the vacuum pump shall be decontaminated as good as possible and the contamination status shall be stated in a "Declaration of Contamination" (form downloadable from www.busch-vacuum.com).

Busch service will only accept vacuum pumps that come with a completely filled in and legally binding signed "Declaration of Contamination" (form downloadable from www.busch-vacuum.com).

Removal from Service

Temporary Removal from Service

- Prior to disconnecting pipes/lines make sure that all pipes/lines are vented to atmospheric pressure

Recommissioning

- Observe the chapter Installation and Commissioning (→ page 5)

Dismantling and Disposal

DANGER

In case the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in pores, gaps and internal spaces of the vacuum pump.

Danger to health during dismantling of the vacuum pump.

Danger to the environment.

During dismantling of the vacuum pump personal protective equipment must be worn.

The vacuum pump must be decontaminated prior to disposal.

- Drain the oil
- Make sure that materials and components to be treated as special waste have been separated from the vacuum pump
- Make sure that the vacuum pump is not contaminated with harmful foreign material

According to the best knowledge at the time of printing of this manual the materials used for the manufacture of the vacuum pump involve no risk.

- Dispose of the used oil in compliance with applicable regulations
- Dispose of the vacuum pump as scrap metal

Troubleshooting

WARNING

Risk of electrical shock, risk of damage to equipment.

Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations:
- IEC 364 or CENELEC HD 384 or DIN VDE 0100, respectively,
- IEC-Report 664 or DIN VDE 0110,
- BGV A2 (VBG 4) or equivalent national accident prevention regulation.

CAUTION

During operation the surface of the vacuum pump may reach temperatures of more than 70 °C.

Risk of burns!

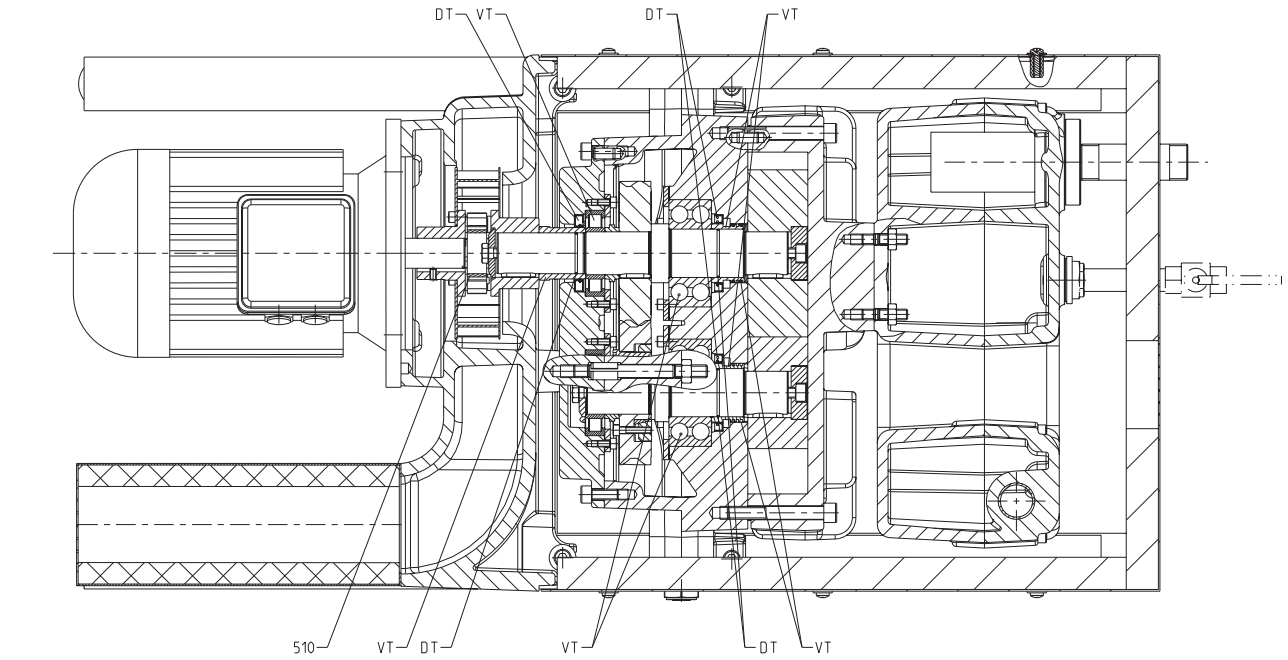
Let the vacuum pump cool down prior to a required contact or wear heat protection gloves.

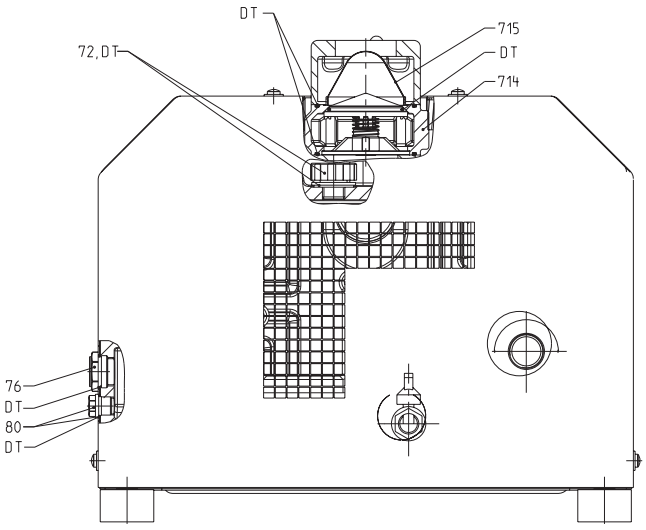
Problem	Possible Cause	Remedy
The vacuum pump does not reach the usual pressure The drive motor draws a too high current (compare with initial value after commissioning) Evacuation of the system takes too long	The vacuum system or suction line is not leak-tight	Check the hose or pipe connections for possible leak
	In case a vacuum relief valve/regulating system is installed: The vacuum relief valve/regulating system is misadjusted or defective	Adjust, repair or replace, respectively
	The screen (715) in the suction connection (g/p) is partially clogged	Clean the screen (715) If cleaning is required too frequently install a filter upstream
	In case a filter (h) is installed on the suction connection (g/p): The filter (h) on the suction connection (g/p) is partially clogged	Clean or replace the inlet air filter (h), respectively
	Partial clogging in the suction, discharge or pressure line	Remove the clogging
	Long suction, discharge or pressure line with too small diameter	Use larger diameter
	The valve disk of the inlet non-return valve is stuck in closed or partially open position	Disassemble the inlet, clean the screen (715) and the valve (o, 714) as required and reassemble
	Internal parts are worn or damaged	Repair the vacuum pump (Busch service)
The gas conveyed by the vacuum pump smells displeasing	Process components evaporating under vacuum	Check the process, if applicable
The vacuum pump does not start	The drive motor is not supplied with the correct voltage or is overloaded	Supply the drive motor with the correct voltage
	The drive motor starter overload protection is too small or trip level is too low	Compare the trip level of the drive motor starter overload protection with the data on the nameplate, correct if necessary In case of high ambient temperature: set the trip level of the drive motor starter overload protection 5 percent above the nominal drive motor current
	One of the fuses has blown	Check the fuses
	The connection cable is too small or too long causing a voltage drop at the vacuum pump	Use sufficiently dimensioned cable

	The vacuum pump or the drive motor is blocked	Make sure the drive motor is disconnected from the power supply Remove the fan cover Try to turn the drive motor with the vacuum pump by hand If the unit is still frozen: remove the drive motor and check the drive motor and the vacuum pump separately If the vacuum pump is blocked: Repair the vacuum pump (Busch service)
	The drive motor is defective	Replace the drive motor (Busch service) (the proper function of the fan wheel requires the precise adjustment of the coupling on the motor shaft and on the pump shaft; therefore the motor can be mounted by the Busch service only)
The vacuum pump is blocked	Solid foreign matter has entered the vacuum pump	Repair the vacuum pump (Busch service) Make sure the suction line is equipped with a screen If necessary additionally provide a filter
	Corrosion in the vacuum pump from remaining condensate	Repair the vacuum pump (Busch service) Check the process Observe the chapter Conveying Condensable Vapours (→ page 8)
	Version with three-phase motor: The vacuum pump was run in the wrong direction	Repair the vacuum pump (Busch service) When connecting the vacuum pump make sure the vacuum pump will run in the correct direction (→ page 6: Installation)
The drive motor is running, but the vacuum pump stands still	The coupling between the drive motor and the vacuum pump is defective	Replace the coupling element (the proper function of the fan wheel requires the precise adjustment of the coupling on the motor shaft and on the pump shaft; therefore the coupling element can be replaced by the Busch service only)
The vacuum pump starts, but labours or runs noisily or rattles The drive motor draws a too high current (compare with initial value after commissioning)	Loose connection(s) in the drive motor terminal box Version with three-phase-motor: Not all drive motor coils are properly connected The drive motor operates on two phases only	Check the proper connection of the wires against the connection diagram (particularly on motors with six coils) Tighten or replace loose connections
	Version with three-phase motor: The vacuum pump runs in the wrong direction	Verification and rectification → page 5: Installation and Commissioning
	Foreign objects in the vacuum pump Stuck bearings	Repair the vacuum pump (Busch service)
The vacuum pump runs very noisily	Defective bearings	Repair the vacuum pump (Busch service)
	Worn coupling element	Replace the coupling element
	Low oil level in the synchronising gear	The synchronising gear is leaky Repair the vacuum pump (Busch service)
	Synchronising gear damaged due to operation with low oil level	Repair the vacuum pump (Busch service)
The vacuum pump runs very hot	Insufficient air ventilation	Make sure that the cooling of the vacuum pump is not impeded by dust/dirt Clean the fan cowlings, the fan wheels, the ventilation grilles and the cooling fins Install the vacuum pump in a narrow space only if sufficient ventilation is ensured

	Ambient temperature too high	Observe the permitted ambient temperatures
	Temperature of the inlet gas too high	Observe the permitted temperatures for the inlet gas
	Mains frequency or voltage outside tolerance range	Provide a more stable power supply
	Partial clogging of filters or screens Partial clogging in the suction, discharge or pressure line	Remove the clogging
	Long suction, discharge or pressure line with too small diameter	Use larger diameter

Sectional Drawing





Spare Parts

Note: When ordering spare parts or accessories acc. to the table below please always quote the type ("Type") and the serial no. ("No") of the vacuum pump. This will allow Busch service to check if the vacuum pump is compatible with a modified or improved part.

The exclusive use of genuine spare parts and consumables is a pre-requisite for the proper function of the vacuum pump and for the granting of warranty, guarantee or goodwill.

Your point of contact for service and spare parts in the United Kingdom:

Busch (UK) Ltd.
Hortonwood 30-35
Telford
Shropshire
TF1 7YB
Tel: 01952 677 432
Fax: 01952 677 423

Your point of contact for service and spare parts in Ireland:

Busch Ireland Ltd.
A10-11 Howth Junction Business Centre
Kilbarrack, Dublin 5
Tel: +353 (0)1 8321466
Fax: +353 (0)1 8321470

Your point of contact for service and spare parts in the USA:

Busch Inc.
516-B Viking Drive
Virginia Beach, VA 23452
Tel: 1-800-USA-PUMP (872-7867)

Your point of contact for service and spare parts in Canada:

Busch Vacuum Technics Inc.
1740, Boulevard Lionel Bertrand
Boisbriand (Montréal)
Québec J7H 1N7
Tel: 450 435 6899
Fax: 450 430 5132

Your point of contact for service and spare parts in Australia:

Busch Australia Pty. Ltd.
30 Lakeside Drive
Broadmeadows, Vic. 3047
Tel: (03) 93 55 06 00
Fax: (03) 93 55 06 99

Your point of contact for service and spare parts in New Zealand:

Busch New Zealand Ltd.
Unit D, Arrenway Drive
Albany, Auckland 1311
P O Box 302696
North Harbour, Auckland 1330
Tel: 0-9-414 7782
Fax: 0-9-414 7783

Find the list of Busch companies all over the world (by the time of the publication of these installation and operating instructions) on
→ page 20 (rear cover page).

Find the up-to-date list of Busch companies and agencies all over the world on the internet at **www.busch-vacuum.com**.

Pos.	Part	Qty	Part no.
72	Venting valve (=oil fill plug) with seal ring	1	0543 107 407
76	Sight glass	1	0583 000 001
77	Seal ring for sight glass	1	0480 000 271
80	Plug with magnet and seal ring	1	0415 134 870
81	Seal ring for plug with magnet	1	0482 137 352
714	Inlet flange, lower part, with non-return valve	1	0916 000 670
715	Screen	1	0534 000 041
—	Filter cartridge, paper, for inlet filter (optional)	1	0532 000 004
—	Filter cartridge, polyester, for inlet filter (optional)	1	0532 121 864

Spare Parts Kits

Spare parts kit	Part no.
Overhaul kit (incl. set of seals, marking "VT" and "DT"; insert for flexible coupling for Rotex only)	0993 134 022
Set of seals (marking "DT")	0990 134 021

Accessories

Accessories	Description	Part no.
Inlet air filter	inlet-side, horizontal, with paper cartridge, to separate solids	0945 000 071
Liquid and dust separator STF 0250	to protect against solids and liquids on the suction side	0962 117 387
Liquid separator LSS 0250	to protect against condensate and liquids on the suction side	0965 117 784
Liquid separator LSA 0250	to protect against condensate and liquids on the suction side, with automatic draining	0965 117 780

Oil

Denomination	Busch R 550
ISO-VG	100
Base	Diester
Density [g/cm³]	0.96
Kinematic viscosity at 40 °C [mm²/s]	95
Kinematic viscosity at 100 °C [mm²/s]	9.5
Flashpoint [°C]	255
Pourpoint [°C]	–30
Part number 1 l packaging	0831 000 099
Part number 5 l packaging	0831 000 100
Filling quantity, approx. [l]	1

EC-Declaration of Conformity

Note: This Declaration of Conformity and the CE-mark affixed to the nameplate are valid for the vacuum pump within the Busch-scope of delivery. When this vacuum pump is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process acc. to the Directive Machinery 2006/42/EC for the superordinate machine, issue the Declaration of Conformity for it and affix the CE-mark.

For maintenance of this Declaration of Conformity of vacuum pumps without a drive may only be used a drive with a written consent of Busch.

We

Busch Produktions GmbH
Schauinslandstr. 1
79689 Maulburg
Germany

declare that vacuum pumps **MM 1324, 1202, 1252, 1322, 1200, 1250, 1320 AV**

in accordance with the European Directives:

- "Machinery" 2006/42/EC,
- "Electrical Equipment Designed for Use within Certain Voltage Limits" (so called "Low Voltage") 2006/95/EC,
- "Electromagnetic Compatibility" 2004/108/EC,

have been designed and manufactured to the following specifications:

Standard	Title of the Standard
Harmonised Standards	
EN ISO 12100-1 EN ISO 12100-2	Safety of machinery - Basic concepts, general principles of design - Part 1 and 2
EN ISO 13857	Safety of machinery - Safety distances to prevent hazard zones being reached by the upper and lower limbs
EN 1012-1 EN 1012-2	Compressors and vacuum pumps - Safety requirements - Part 1 and 2
EN ISO 2151	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61000-6-1 EN 61000-6-2	Electromagnetic compatibility (EMC) - Generic immunity standards
EN 61000-6-3 EN 61000-6-4	Electromagnetic compatibility (EMC) - Generic emission standards

Manufacturer	Person authorised to compile the technical file
Dr.-Ing. Karl Busch	**Andrej Riwe**
General director	Technical writer

Technical Data

For motor connection parameters see nameplate

Type	Frequency [Hz]	Ultimate pressure standard-version [hPa abs = mbar abs]	Ultimate pressure version "Aqua" [hPa abs = mbar abs]	Nominal motor rating [kW]	Nominal speed [min⁻¹]	Nominal suction capacity [m³/h]	Sound pressure level (EN ISO 2151) at 400 hPa (=mbar) abs. suction pressure [db(A)]	Weight [kg]	Ambient temperature range [°C]	Ambient pressure	Synchronising gear oil qty [l]	Synchronising gear oil filled ex-works
MM 1324 AV	50	60	200*	4.0	1500	160	70	~245 ... 260	0 ... 40	atmospheric	1	Busch R 550
	60			4.2	1800	192	74					
MM 1202 AV	50	100*		4.3	3000	200	75	~230				
	60			5.2	3600	240	79					
MM 1252 AV	50			5.1	3000	250	75	~240 ... 250				
	60			6.8	3600	300	79					
MM 1322 AV	50	150*		6.0	3000	300	77	~260 ... 285				
	60			7.6	3600	360	82					
MM 1200 AV	50/60	100*			600-3600**	max. 240	79	~240				
MM 1250 AV						max. 300		~250				
MM 1320 AV		150*		8.1		max. 360	82	~260				
MM 1320 AV		200*		8.1	600-4200**	max. 420	86					

*to be limited by means of process control and/or vacuum relief valves

**see nameplate of the vacuum pump

Busch – All over the World in Industry

www.busch-vacuum.com

Australia
Busch Australia Pty. Ltd.
30 Lakeside Drive
Broadmeadows, Vic. 3047
Tel: (03) 93 55 06 00
Fax: (03) 93 55 06 99

Austria
Busch Austria GmbH
Industriepark Nord
2100 Korneuburg
Tel: 02262 / 756 65-0
Fax: 02262 / 756 65-20

Belgium
Busch N.V./Busch SA
Kruinstraat 7
9160 Lokeren
Tel: (0)9 / 348 47 22
Fax: (0)9 / 348 65 35

Brazil
Busch do Brasil Ltda.
Rod. Edgard Máximo Zambotto, Km 64
13240-000 Jarinú-SP
Tel: (55) 11-4016 1400
Fax: (55) 11-4016 1077

Canada
Busch Vacuum Technics Inc.
1740, Boulevard Lionel Bertrand
Boisbriand (Montréal)
Québec J7H 1N7
Tel: 450 435 6899
Fax: 450 430 5132

China
Busch Vacuum (Shanghai) Co., Ltd
18 Bin Yang Road, Shanghai
China 200235
Tel: +86 21 6436 1919
Fax: +86 21 5031 5766

Czech Republic
Busch Vakuum s.r.o.
Pra ákova 10
619 00 Horní Heršpice
Brno
Tel.: +420 543 42 48 55
Fax: +420 543 42 48 56

Denmark
Busch Vakuumteknik A/S
Parallelvej 11
8680 Ry
Tel: +45 87 88 07 77
Fax: +45 87 88 07 88

Finland
Busch Vakuumteknik Oy
Sinikellonpolku 3
01300 VANTAA
Tel: 09 774 60 60
Fax: 09 774 60 666

France
Busch France S.A.
Parc Technologique
de Bois Chaland CE 2922
91029 Evry Cedex
Tel: 01 69 89 89 89
Fax: 01 60 86 16 74

Germany
Dr.-Ing. K. Busch GmbH
Schauinslandstr. 1
79689 Maulburg
Tel: (0 76 22) 6 81-0
Fax: (0 76 22) 6 81-194
e-mail: sec.bu@busch.de

Dr.-Ing. K. Busch GmbH
Niederlassung Nord
Ernst-Abbe-Str. 1-3
25451 Quickborn
Tel: (0 41 06) 7 99 67-0
Fax: (0 41 06) 7 99 67-77

Dr.-Ing. K. Busch GmbH
Niederlassung West
Nordring 35
64807 Dieburg
Tel: (0 60 71) 92 82-0
Fax: (0 60 71) 14 71

Dr.-Ing. K. Busch GmbH
Niederlassung Süd-Ost
Gewerbestraße 3
90579 Langenzenn
Tel: (09 01) 90 25-0
Fax: (09 01) 90 25-25

Dr.-Ing. K. Busch GmbH
Außenstelle Zella-Mehlis
Am Rain 11
98544 Zella-Mehlis
Tel: (0 36 82) 46 92 71
Fax: (0 36 82) 46 92 73

Ireland
Busch Ireland Ltd.
A10-11 Howth Junction Business Centre
Kilbarrack, Dublin 5
Tel: 00353 1 832 1466
Fax: 00353 1 832 1470

Italy
Busch Italia S.r.l.
Via Ettore Majorana, 16
20054 Nova Milanese
Tel: 0362 370 91
Fax: 0362 370 999

Japan
Nippon Busch K.K.
1-23-33, Megumigaoka
Hiratsuka City, Kanagawa
Japan 259-1220
Tel: 0463-50-4000
Fax: 0463-50-4004

Korea
Busch Korea Ltd.
392-1 Yangji-Ri, Yangji-Myun,
Yongin-si, Kyunggi-Do
Tel: 031) 321-8114
Fax: 031) 321 4330

Malaysia
Busch (Malaysia) Sdn Bhd.
6 Jalan Taboh 33/22
Shah Alam Technology Park
Section 33
40400 Shah Alam
Selangor D. E.
Tel: 03 5122 2128
Fax: 03 5122 2108

Netherlands
Busch B.V.
Pompmolenlaan 2
3447 GK Woerden
Postbus 2091
3440 DB Woerden
Tel: (0)348 - 462300
Fax: (0)348 - 422939

New Zealand
Busch New Zealand Ltd.
Unit D, Arrenway Drive
Albany, Auckland 1311
P O Box 302696
North Harbour, Auckland 1330
Tel: 0-9-414 7782
Fax: 0-9-414 7783

Norway
Busch Vakuumteknikk AS
Hestehagen 2
1440 Drøbak
Tel: 64 98 98 50
Fax: 64 93 66 21

Poland
Busch Polska Sp. z o.o.
Ul. Chopina 27
87800 Wtoctawek
Tel: (054) 2315400
Fax: (054) 2327076

Singapore
Busch Vacuum Singapore Pte Ltd
20 Shaw Road
#01-03 Ching Shine Building
Singapore 36 79 56
Tel: (65) 6 408 0866
Fax: (65) 6 288 0877

Spain
Busch Ibérica S.A.
C/. Penedès, 47-49
08192 Sant Quirze del Vallès
Tel: 93 721 77 77
Fax: 93 721 42 07

Sweden
Busch Vakuumteknik AB
Bråta Industriområde
435 33 Mölnlycke
Tel: 031 - 338 00 80
Fax: 031 - 338 00 89

Switzerland
Busch AG
Waldweg 22
4312 Magden
Tel: 061 / 845 90 90
Fax: 061 / 845 90 99

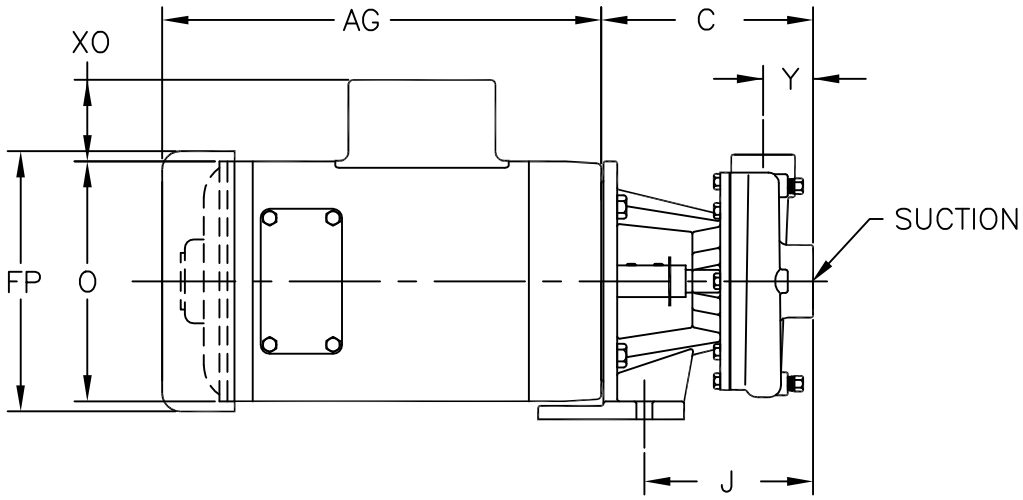
Taiwan
Busch Taiwan Corporation
8F, No.5, Lane 155, Sec. 3, Pei Shen Rd.
Shen Keng Hsiang,
Taipei Hsien,
Taiwan (222), R.O.C
Tel: (02) 2662 0775
Fax: (02) 2662 0796

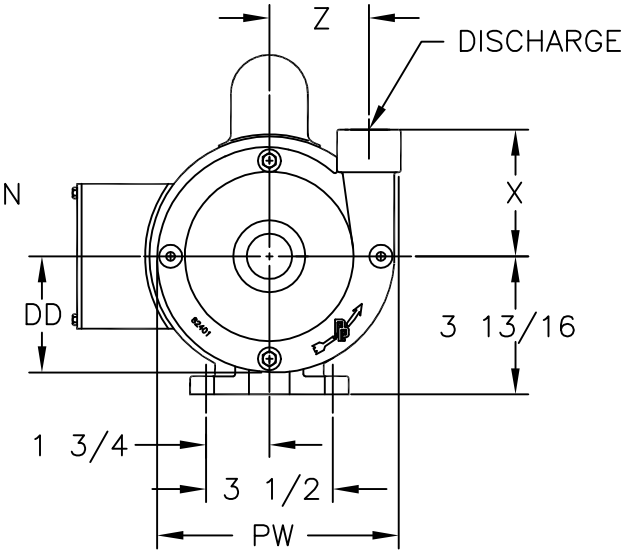
Turkey
VAKUTEK
Emlak Kredi Ishani No: 179
81130 Üsküdar-Istanbul
Tel: (216) 310 0573
Fax: (216) 343 5126

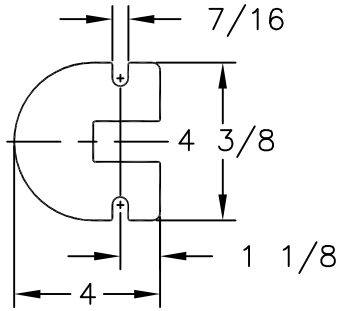
United Kingdom
Busch (UK) Ltd
Hortonwood 30-35
Telford
Shropshire
TF1 7YB
Tel: 01952 677 432
Fax: 01952 677 423

USA
Busch LLC
516 Viking Drive
Virginia Beach, VA 23452
Tel: (757) 463-7800
Fax: (757) 463-7407

DESCRIPTION	REF. NO.	DATE	REV.
CD100/150 CI CLOSE COUPLED MOTOR PUMP ASSEMBLY	O-CDCIH	2/03/95	A







NOTE:
MOTOR DIMENSIONS WILL VARY BY MODEL AND MAKE, DIMENSIONS ARE TO BE USED FOR REFERENCE ONLY.

ALL DIMENSIONS HAVE BENN ROUNDED TO THE NEAREST 1/16".

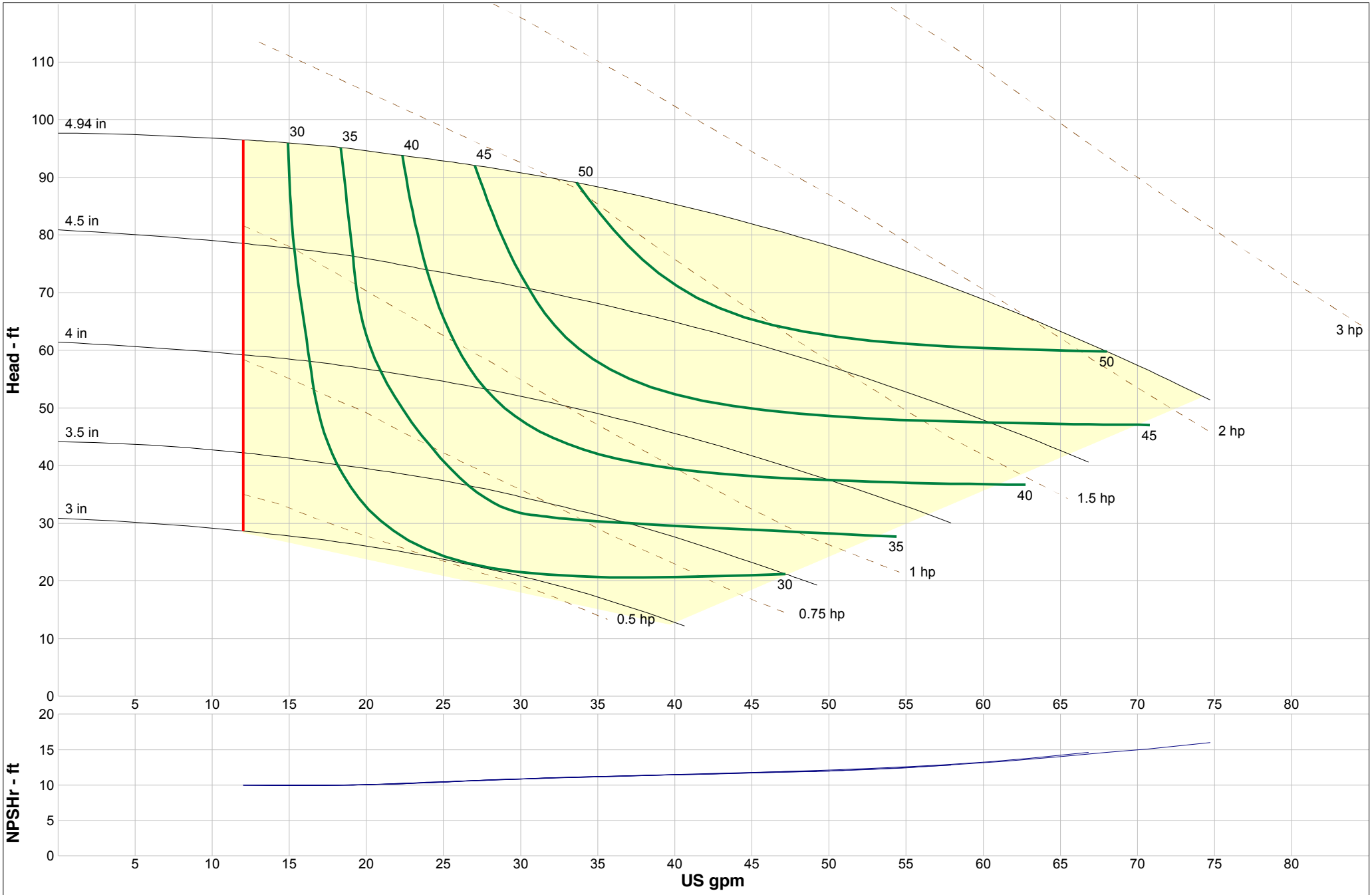
	MOTOR END DIMENSIONS			
HP RPM FRM	AG	FP	O	XO
1/4 1800 56C	7 3/4	6 1/8	5 3/8	2 1/16
1/3 1800 56C	8 1/4	6 1/8	5 3/8	2 1/16
1/2 1800 56C	8 3/4	6 1/8	5 3/8	2 1/16
1/3 3600 56C	8 1/2	6 1/8	5 3/8	2 1/16
1/2 3600 56C	8 3/4	6 1/8	5 3/8	2 1/16
3/4 3600 56C	9 1/4	6 1/8	5 3/8	2 1/16
1 3600 56C	9 3/4	6 1/8	5 3/8	2 1/16
1 1/2 3600 56C	10 1/2	7 3/16	6 7/8	2 1/4
2 3600 56C	11 1/8	7 3/16	6 7/8	2 1/4
3 3600 56C	12 3/8	7 3/16	6 7/8	2 1/4
5 3600 184C	13 5/8	8 1/2	7 7/8	2 1/4

	PUMP END DIMENSIONS								
	C	DD	PW	X	Y	Z	J	SUCTION	DISCHG
CD100 CI	5 7/8	3 3/16	6 11/16	3 1/2	1 3/8	2 3/4	4 5/8	1 1/4	1"
CD150 CI	6 13/16	4 1/16	7 15/16	3 13/16	2 1/8	3 1/16	5 5/8	2"	1 1/2

19950504.0931

PRICE PUMP CO.
#1 Pump Way P.O. Box Q
Sonoma, CA 95476 (707) 938-8441
707-FAX 938-0764

FACTORY FAX TRANSMITTAL DRAWING



Company:
Name:
8/25/2011

Price Pump Company
Catalog: Price Close Coupled Pumps.60, Vers 1.2
CD100/CD150 - 3600

Model: CD100 AI/AB
Speed: 3500 rpm
Dia: 4.94 in
Curve: CD001-1

PRICE® PUMP CO.

Price® Pump Co.

INSTALLATION, OPERATING AND MAINTENANCE MANUAL

TYPE CD CENTRIFUGAL PUMPS

MODELS: CD 100/150

PLEASE FILL IN FROM PUMP NAMEPLATE

Pump Model_____

Spec. No._____

Serial No._____

RETAIN MANUAL FOR REFERENCE

Price® Pump Company
21775 8th. Street East
Sonoma, CA 95476
Tel: 707-938-8441
Fax 707-938-0764
Email: sales@pricepump.com

Congratulations

You are now the owner of a Price® Pump Co. Centrifugal Pump. This pump was carefully inspected and subjected to final performance tests before being released for shipment. In order to achieve maximum performance and reliability, please follow the simple instructions in this manual.

RECOMMENDED PRECAUTIONS

1. For satisfactory operation and safety, maximum system pressure must not exceed 350 psi* (24.6kg/sq cm).

2. For satisfactory operation and safety, maximum fluid temperature must not exceed 300°F* (121°C).

3. No modifications, additions or deletions should be made to the pump without prior approval of the factory.

4. Drain pump completely and flush with water before servicing a pump handling volatile or harmful liquids.

READ CAREFULLY THE CAUTION BELOW

The performance of your Price® Pump Co. Centrifugal Pump is based on clean, room temperature, water with suction conditions as shown on the performance curves. If used to pump liquids other than water, pump performance may differ from rated performance based on the different specific gravity, temperature, viscosity, etc. of the liquid being pumped. A standard pump, however, may not be safe for pumping all types of liquids, such as toxic, volatile or chemical liquids, or liquids under extreme temperatures or pressures.

Please consult Price® Pump Co. technical specifications as well as local codes and general references to determine the appropriate pump for your particular application. Since it is impossible for us to anticipate every application of a Price® Centrifugal pump, if you plan to use the pump for a non-water application, contact Price® Pump Co. beforehand to determine whether such application may be appropriate and safe under the operating conditions. Failure to do so could result in property damage or personal harm.

* Depends on seal materials and seal type

Visit our website for product information and technical support

www.pricepump.com

INSTALLATION / OPERATING INSTRUCTIONS
CENTRIFUGAL PUMPS

Warning

Before installing, repairing or performing maintenance on this pump, read these instructions completely.

Disconnect power to pump before servicing to avoid dangerous or fatal electrical shock.

Match supply voltage and frequency to motor nameplate values. Incorrect voltage can cause fire or serious motor damage and void warranty.

Ground motor before connection to electrical power supply! Failure to ground motor can cause severe or fatal electrical shock!

Do not ground to gas supply line!

Before disassembling pump, be certain all liquid has been removed. If pump was used to pump hazardous or toxic fluid, it must be decontaminated prior to disassembly.

Close Coupled Motor Pumps

It is suggested that these pumps be firmly bolted to a level surface. Adequate air movement around motor will help prevent overheating.

Do not over tighten inlet and outlet piping or volute may be damaged.

Power Frame Mounted Pumps

Power Frame mounted pumps must be mounted on a rigid base that will not warp or flex. Each pump must be mounted such that the pump shaft centerline is in-line with the driver shaft centerline. Pads and/or shims will be required on the pump, the driver or both to insure proper alignment. The two shafts should not touch each other (end to end) and the distance between them depends on the coupling used to connect them.

Misalignment will cause vibration, bearing failure and void warranty. Pumps are rough aligned at the factory but must be realigned after shipment and installation.

Pulley driven pump must have pulleys inline and proper belt tightness practices followed.

Direction of Rotation

Note: Motor shaft rotation is viewed from the suction end of pump. A rotational arrow is shown on the front of the pump volute casing. Incorrect rotation can cause pump damage, failure or reduced performance, voiding warranty. It is best to check rotation by momentarily energizing or jogging the motor prior to filling pump with liquid.

Warning! Do not operate pump without liquid as damage may result to the pump internal wear surfaces.

Plumbing

All piping needs to be supported independently of the pump. Piping connections should not exert any stress on the pump volute or fittings.

Suction Piping (Inlet)

(Horizontal Pumps)

Suction line must provide adequate suction pressure and even (Laminar) liquid flow for proper pump operation. Air, entrapped in the suction line due to leaks or improper piping design, may cause the pump to lose prime. Non-priming pumps must have their suction 'flooded' at start up (see datasheets for minimum NPSHR). Also, the suction line must provide sufficient pressure (NPSH) and even flow to pump inlet to prevent pump cavitation. The suction pipe entering the pump should be straight and a minimum length of 5 times and preferably 10 times the pump inlet diameter. Elbows, fittings or valves installed close to the pump inlet can disrupt liquid flow and cause cavitation. Suction lines must be at least the same diameter as the pump inlet or larger if possible.

Price Pump Company recommends against using foot valves in the suction line to maintain liquid in the pump when it's not operating. If foot valves are used, due to suction lift conditions, they must be properly maintained to avoid leaks resulting from wear or fouling. Suction piping must be designed to prevent vapor from being trapped in high spots in the piping. This condition may cause the pump to vapor lock.

Discharge Piping (Outlet)

To control flow and discharge head, it is advisable to install a valve (globe, ball, or other adjustable and non-leak type) in the discharge line adjacent to the pump. The valve may be closed during system repairs to prevent backflow. By installing a check valve in the discharge line, backflow can also be prevented during maintenance or during periods of pump stoppage.

Operation

All centrifugal pumps must be filled with liquid prior to start up. It is suggested that during initial start up the discharge valve be closed and then opened as the motor reaches full rpm's. If pump does not build up pressure as motor speed increases, shut down and make sure that liquid flow into pump is not restricted (see "Troubleshooting").

Note: A centrifugal pumps flow rate and head (pressure) will vary with the amount of resistance (pipe friction and flow restrictions) in the discharge line. As the valve on the discharge line opens, the flow rate and motor amperes draw will increase and head (pressure) will decrease. As the valve on the discharge line is closed, the flow rate and amperes draw will decrease and the head (pressure) will increase.

If resistance in the discharge line is not sufficient, the pump will operate at a condition of maximum flow, sometimes called "end of curve" performance. Maximum horse-power is required to operate at this point and motor overload may result. If excessive amperes draw and motor overload is occurring, reduce the system flow rate by installing a valve or orifice in the discharge line to control (restrict) the pumps flow rate. Alternatively, reduce pump head by trimming impeller to a smaller diameter.

Consult Price Pump or a local Price Pump distributor for assistance.

www.appsupport@pricepump.com

1. Pump fails to build head pressure:

Check for:

a. Pump not primed.

b. Incorrect pump rotation.

c. Driver speed too low.

d. Suction line restricted.

e. Driver failure.

f. Plugged or damaged impeller.

g. Pump or impeller undersized.

h. Pump cavitation.

i. Improper impeller clearance.

2. Pump fails to provide enough flow rate.

Check for:

a. System resistance too high.

b. Pump undersized.

c. Pump not primed.

d. Driver speed too low.

e. Poor suction conditions.

f. Improper impeller clearance.

3. Excessive noise or vibration during operation.

Check for:

a. Motor bearing failing.

b. Pump cavitation.

c. Improper impeller clearance.

4. Leaking mechanical seal.

Check for:

a. Improper assembly.

b. Worn or cracked seal faces.

c. Abrasive material in fluid.

d. Liquid flashing at seal faces (Fluid temperature too high).

e. Seal pressure rating too low for the service.

f. Chemical attack of seal components.

g. Seal operated dry or with a liquid having poor lubricating properties.

5. Pump gradually loses pressure and head.

Check for:

a. Increasing temperature causing cavitation or liquid vaporization.

b. Driver failure.

c. Suction lift too high.

d. Air entering suction line.

6. Motor overheating.

Check for:

a. Excessive flow and amp draw (Throttle discharge).

b. Low voltage or frequency.

c. Flow rate too low with resulting heat rise.

d. Bearing failure.

e. System temperature too high.

REPAIR AND MAINTENANCE

Before attempting any repairs under warranty, contact Price Pump to obtain factory authorization. Repairs carried out without authorization may void warranty. Many causes of pump failure are due to improper system design. Refer to the trouble shooting list in this manual before carrying out pump inspection or repair.

DISASSEMBLY

1. Disconnect power source to motor.

2. Disconnect electrical connections tagging wires carefully to preserve correct rotation. Loosen motor base.

3. Remove pump and motor assembly to repair area.

4. Remove volute from pump.

5. Unscrew and remove impeller lockdown and lock washers. Slide impeller off shaft. Do not throw away the shaft key.

6. Remove seal head from the shaft. **Type 6A:** Remove seal head from bracket. **Type 21:** Slide seal head from the shaft. **Type 9:** Loosen set screws and slide seal head off shaft.

7. Remove four motor bolts and remove bracket from motor.

8. Remove seal seat from bracket. Use wooden or plastic dowel to tamp the seat from the bracket.

REASSEMBLY

If PEO (pump end only) go assembling PEO

1. Clean seat cavity of the bracket thoroughly.

2. Thoroughly clean pump shaft. Assure that the shaft is not grooved and that there is no evidence of pitting or fretting. If the shaft is grooved, fretted or worn, replace it.

3. Install the pump shaft onto the motor shaft, aligning set screws of the pump shaft with the keyway of the motor shaft. Install slinger between the pump shaft setscrews.

4. **Type 6A**

a. Place bracket on firm surface with seat cavity (pump end) up. Using a tool (1-19/64"ID x 1-5/8" OD x 1/2" deep), press seal into seal cavity with carbon face of seal (volute end up) up. Press until flange is seated in seal cavity of bracket. Press only on outer flange of seal. Avoid touching carbon surface.

b. Place bracket on motor (aligning the base if applicable). Secure bracket with four motor bolts.

c. Pull pump shaft forward until shoulder of pump shaft contacts back of bracket and slightly snug one setscrew to hold shaft in place.

d. Apply small amount of oil (vegetable or other light oil) on the pump shaft and I.D. of seat elastomer. Gently place seat on end of shaft with ceramic face down toward seal. After sliding impeller onto shaft, seat will be properly located.

e. Slide impeller onto shaft ensuring seat is pushed flush with shoulder of shaft and impeller hub.

f. Install shaft key, impeller flat washer, lock washers and lockdown bolt. Tighten securely to 10ft.lbs. Caution: Serviceable Loctite (or equivalent) must be used on lockdown bolt. Lock washer pairs must be assembled 'cam face' to 'cam face'. See diagram.

g. Loosen pump shaft set screw.

h. Install new volute gasket/o-ring and mount volute to bracket. Secure with bolts and tighten evenly.

i. **Setting impeller clearance:**

Slide pump shaft forward until impeller touches volute. Slide shaft back .010-.015". Tighten pump shaft set screws. Turn shaft by hand to ensure impeller does not rub against volute. Proceed to step 9.

5. **For Type 21, 8, 9 seals:**

a. Place the bracket on a firm surface with the seat cavity (pump end) up.

b. Place a small amount of vegetable oil on the seat cup or o- ring seat. Place the seat in the seat cavity with the polished face up toward the pump end.

c. Evenly push seat into cavity with fingers then gently tap seat into place with a wooden dowel or plastic rod (1-1/8" outside diameter). To help ensure the seat is not damaged place the cardboard disk supplied with the seal over the seat face.

6. Place bracket on motor (aligning the base if applicable). Secure bracket with four motor bolts.

7. Pull pump shaft forward until shoulder of pump shaft contacts back of bracket and slightly snug one setscrew to hold shaft in place

8. Install seal head assembly

For Type 21 Seals:

a. Lubricate shaft and seal elastomer with oil (vegetable or other light oil).

b. Install rotary seal head onto pump shaft and slide toward seat until carbon face contacts ceramic seat.

c. Install seal spring and retainer.

d. Installing impeller. Install key in pump shaft. Slide impeller onto shaft ensuring that the spring retainer does not slip between the shoulder of the shaft and the hub of the impeller. Install impeller flat washer, lock washers and lockdown. Tighten securely to 10 ft. lbs. **Caution:** Serviceable Loctite (or equivalent) must be used on lockdown bolt. Lock washer pairs must be assembled 'cam face' to 'cam face'. See diagram

e. Loosen pump shaft set screw.

f. Install new volute gasket/o-ring and mount volute to bracket. Secure with bolts and tighten evenly.

g. Slide pump shaft forward until impeller touches volute. Slide shaft back with a screwdriver **.010"-.015".** Tighten pump shaft set screws. Turn shaft by hand to ensure impeller does not rub against volute. Proceed to step 9.

For Type 8 & 9 Seals:

a. Install impeller. Install key in pump shaft. Slide impeller onto shaft and install impeller washer and lockdown bolt. Tighten securely.

b. Loosen pump shaft set screw.

c. Install new volute gasket/o-ring and mount volute to bracket. Tighten at least two bolts at this time.

d. Slide pump shaft forward until impeller touches volute. Slide shaft back **.010"-.015".** Tighten pump shaft set screws. Turn shaft by hand to ensure impeller does not rub against volute.

Remove volute and impeller.

e. Install seal head onto pump shaft sliding gently past shoulder of shaft. Slide seal head toward seat until carbon face contacts ceramic seat. Tighten seal head setscrews to pump shaft. Remove clips in seal head and discard.

j. Reinstall impeller, flat washer, lock washers and lockdown bolt. Tighten securely (10 ft. lbs.)

Caution: Serviceable Loctite (or equivalent) must be used on lockdown bolt. Lock washer pairs must be assembled 'cam face' to 'cam face'. See diagram

k. Install new volute gasket and mount volute to bracket. Secure with bolts and tighten evenly.

l. Rotate pump shaft by hand to ensure impeller does not rub against volute.

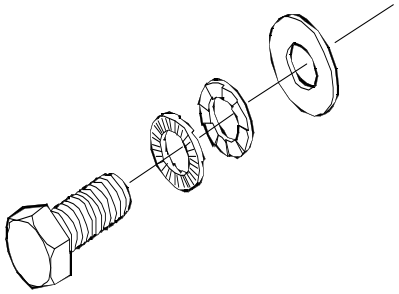
9. Return pump to installation, reconnect electric connections.

10. Start pump momentarily to observe shaft rotation. If rotation corresponds to the rotation arrow, pump may be put into service. If rotation is incorrect, switch any two leads on 3-phase motors. Check wiring diagram of motor for proper single phase rotation.

11. Remove top pipe plug (if applicable) from the front of volute and prime pump thoroughly, making sure all entrapped air is purged.

12. Start pump allowing adequate time to purge all air from system. Observe any gauges, flow meters, etc. to see of pump performs properly.

DIAGRAM OF
LOCKDOWN ASSEMBLY



INSTALLING A PEO (PUMP END ONLY) STUB SHAFT PUMP

a. Place the bracket on a firm surface, loosen stub shaft setscrews and carefully remove shipping plug.

b. Place motor in an upright position with motor shaft pointing upward. Make sure motor shaft and end bell flange are free of burrs and surfaces are clean.

c. Align PEO stub shaft setscrews (if applicable) with motor shaft keyway and carefully slid the PEO onto the motor shaft until it sits firmly onto the motor end bell flange.

d. Oriented the PEO's discharge port or base to preferred motor configuration while referencing the motors electrical box position.

e. Install flange bolts and tighten. (Install pump base if applicable)

f. Reposition pump back onto motor base.

g. Refer to pump Reassembly Instructions and proceed to **setting the impeller clearance** (if applicable).

INSTALLING A PEO (PUMP END ONLY) NON-STUB SHAFT PUMP

a. Carefully un-pack all components received with your shipment and remove any shipping plugs.

b. Place the bracket on a firm surface with the seat cavity (pump end) up. Follow seal Installation / reassembly instructions contained within this manual.

c. Make sure motor shaft and motor end bell flange are free of burrs and surfaces are clean.

d. Carefully place the Bracket assembly over the motor shaft and align bracket with motor end bell flange.

e. Install impeller, gasket or o-ring, volute and volute mounting bolts.

f. Oriented the PEO's discharge port or base to preferred motor configuration while referencing the motors electrical box position.

g. Install motor flange bolts and tighten all bolts to proper torque. (Install pump base if applicable)

Type 21 C Face Style Double Seal Installation

(For Type CD, RC, LT & MS Series Pumps)

Double Seal pumps are generally used for one of these reasons:

1. To avoid seal damage when pumping abrasives.

2. To manage seal temperature when pumping hot liquids.

3. To prevent pump fluid from leaking to atmosphere when pumping toxic or other hazardous liquids.

A double seal must have pressure to the seal chamber at a minimum of 5 PSI preferable 10 PSI above pump pressure.

Flow rate through seal chamber will depend upon pump fluid temperature. Minimum flow rate should be **1 GPM** for CD, RC, LT & MS Series Pumps. Flow rates may have to be increased with higher temperatures. Check the seal chamber discharge fluid temperature to be sure fluid is below boiling. We suggest a 140°F to 150°F temperature range. If seal cooling liquid flashes, seal may become damaged. Seal chamber fluid should enter at the bottom and discharge at the top to avoid entrapped air in the chamber. Be sure to prime the secondary pumping system properly as you would any other system.

CAUTION: Always Pressurize the Seal Chamber before starting the main pump!

In a pumping system that starts and stops automatically, insure that both pumps start at the same time.

REASSEMBLY:

1. Clean seat cavity of the bracket and seal plate thoroughly.

2. Thoroughly clean pump shaft. Assure that the shaft is not grooved and that there is no evidence of pitting or fretting. Polish the shaft with extra fine emery cloth and clean the keyway. If the shaft is grooved, fretted or worn, replace it.

3. Install the pump shaft onto the motor shaft, aligning set screws of the pump shaft with the keyway of the motor shaft. Ensure all debris and burrs are removed from the motor shaft and that the slinger is in place.

4. Place bracket on motor (aligning the base if applicable). Secure bracket with four motor bolts.

5. Pull out pump shaft as far as it will go toward volute end and slightly tighten one set screw to hold shaft in place

6. Place a small amount of vegetable oil (or equivalent) on the seat cup. Install seats into seat plate and bracket with polished faces up. Evenly push seat into seat cavity with fingers, then gently tap seat into place with a wooden dowel or plastic rod (1-1/8" outside diameter). To help ensure the seat is not damaged, place the cardboard disk supplied with the seal under the end of the dowel to prevent damaging the seat face.

7. Install seal head assembly:

For Type 21:

a. Lubricate shaft and elastomer with vegetable oil or equivalent.

b. Install first rotary seal head onto pump shaft and slide toward seat using a twisting motion until carbon face touches seal seat.

c. Install second rotary seal head onto shaft sleeve with carbon facing towards pump end.

8. Install seal plate onto pump end of bracket with new gasket and tighten cap screws evenly (note: use pipe sealant on bolts).

9. Install impeller:

a. Install key in pump shaft.

b. Slide impeller onto shaft.

c. Install impeller washer and lockdown. Tighten to 10 ft-lbs.

10. Loosen pump shaft set screw.

11. Install new volute gasket or o-ring and mount volute. Secure with bolts and tighten evenly.

12. Move shaft back with a screwdriver **.010”-.015”**. Tighten pump shaft set screws. Turn shaft by hand to ensure impeller does not rub against volute.

13. Return pump to installation, reconnect electric connections.

14. Start pump momentarily to observe shaft rotation. If rotation corresponds to the rotation arrow on the pump, it may be put into service. If rotation is incorrect, switch any two leads on 3-phase motors to change rotation. Check wiring diagram of motor for single phase rotation correction.

15. Remove top pipe plug (if applicable) from the front of volute and prime pump thoroughly, making sure all air is purged. Turn shaft one revolution and then refill. Replace the pipe plug.

16. Start pump allowing adequate time to purge all air from system. Observe any gauges, flow meters, etc., to see if pump performs properly.

Double Seal Flush Piping Installation

1. Piping of the double seal arrangement should be done in accordance with all governmental regulations and safety codes.

2. All double seals require a barrier flush between the seals for proper lubrication and cooling. The barrier liquid must be maintained at 10-15 PSIG above the discharge pressure of the pump and it must be chemically compatible with the pumped liquid, material construction of the pump, and seals (5/8" double seals have 18-8 parts).

3. The barrier flush shall have a minimum flow rate in accordance with the graph below. If water is used as a fluid, the inlet temperature should not exceed 140°F.

4. A positive pressure must be maintained to the barrier flush between the seal faces even when the pump is not running. To conserve the barrier liquid a solenoid valve (Item 1) may be installed and connected electrically in parallel with the motor so the barrier fluid flows only when the pump is running. Note: The maximum pressure of the barrier fluid at the inlet is 150 PSIG.

5. The inlet should be connected to the bottom and the outlet to the top of the seal cavity.

Procedures for Checking Double Seals for Internal Leakage

Option 1 - for use with 2 flow meters.

Install flow meters on the inlet and outlet lines. Normal operating conditions will be indicated by equal or near equal flow on both flow meters. If the inlet flow meter shows more flow than the outlet, this could indicate excessive leakage.

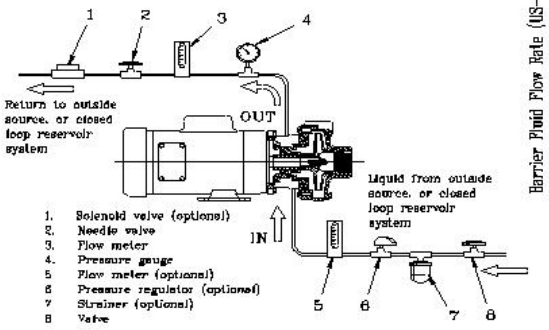
Option 2 - for use with 1 flow meter.

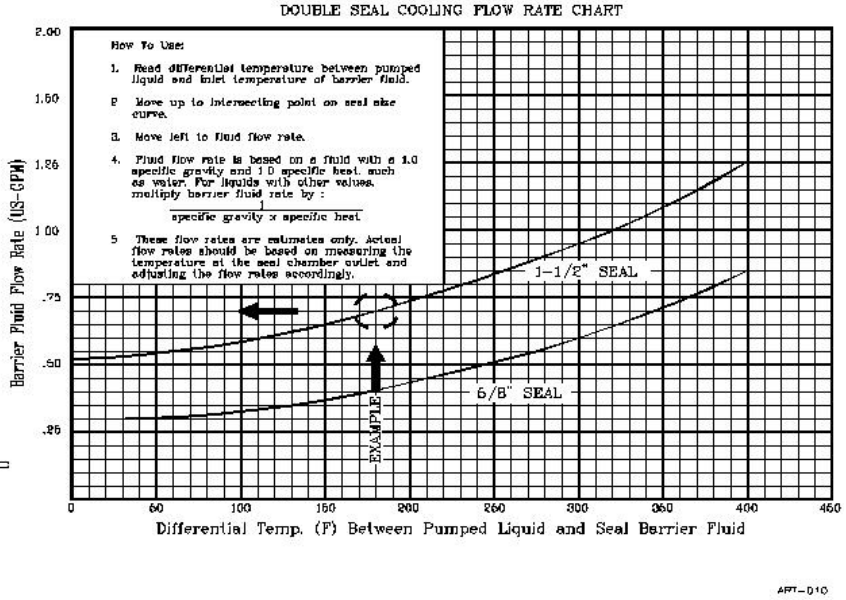
1. Shut off flow at outlet needle valve (Item 2).

2. Shut off inlet gate valve (Item 8) - for 15 seconds maximum.

3. If pressure in seal cavity drops rapidly rather than gradually while the gate valve is shut, the seal is leaking excessively.

4. To restart open gate valve first then reset valve on outlet.





THIS PAGE INTENTIONALLY LEFT BLANK

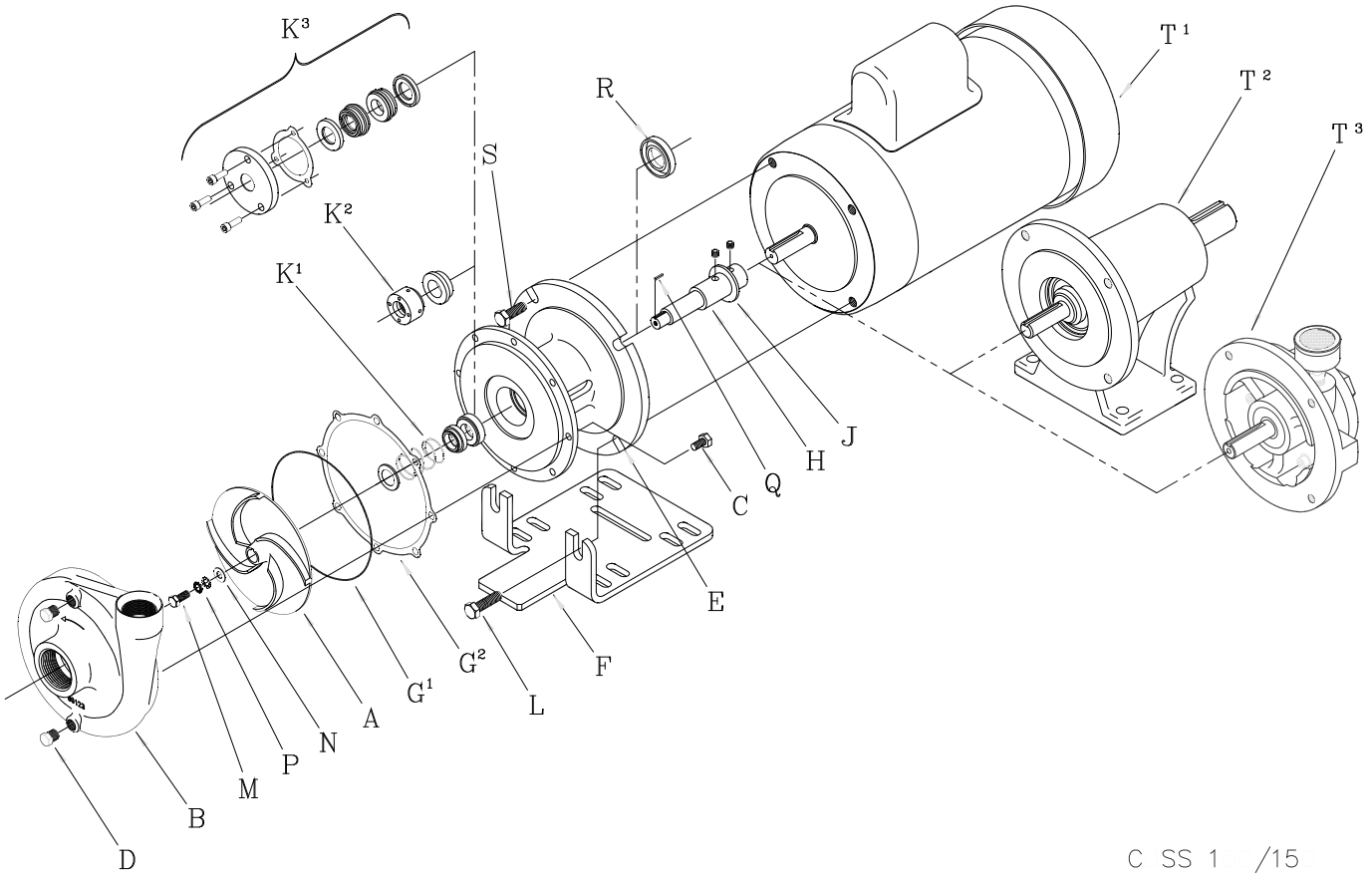
CD 100/150 SS Parts List

Key #	Description	Quantity	CD100 Part #	CD150 Part #
A.	Impeller **	1	2448- (specify dia.)	2412- (specify dia.)
B.	Volute	1	0247	2411-0
C.	Volute Bolts	8	0917	0917
D.	1/8" Pipe Plugs	2	0559	0559
E.	Bracket	1	0972	0972
F.	Base Plate	1	0197	0197
G[1].	O-ring	1		
	Fluorocarbon (std.)		-------	3070
	Buna		------	3074
	PTFE		-------	3071
	Neoprene		-------	3072
	EPR		-------	3073
G[2].	Gasket, PTFE (for CD100SS Only)	1	0507	-------
H.	Shaft w/ setscrews w/ 5/8" ID	1	2421-1	2421-1
	Shaft w/ setscrews w/ 7/8" ID	1	2422-1	2422-1
J.	Slinger (5/8" shaft only)	1	0522	0522
	Seal with Seat			
K[1]	T.21 Fluorocarbon (std.)	1	0553	0553
K[2]	T.9 Single PTFE (optional)	1	1150	1150
K[3]	Double Seal/Seat (optional, kit contains 2 seals)			
	T.21 Fluorocarbon	1	5002	5002
	T.21 Neoprene	1	5004	5004
	T.21 EPR	1	5005	5005
	Double Seal Plate	1	0973	0973
	Plate Gasket, PTFE	1	0974	0974
	Plate Cover Bolts	3	0256	0256
L.	Motor bolts	2	0673	0673
M.	Impeller Lockdown Bolt	1	0575	0575
N.	Impeller Lockdown Washer	1	2423	2423
P.	Impeller Lock Washer	2	2344	2344
Q.	Impeller Lockdown Key	1	2424	2424
R.	T.21 Quench Opt (For 5/8" shaft pumps only)	1	0891	0891
S.	Motor bolts	2	0673	0673
T[1]	Motor – Specify P/N	1	Specify P/N	Specify P/N
T[2]	Power Frames			
	For use with 5/8" ID Shaft	1	5478	5478
	For use with 7/8" ID Shaft	1	5501	5501
T[3]	Air Motor - Specify P/N	1	Specify P/N	Specify P/N
CD - Repair Parts Kits				
	For **5/8"** shaft	1	2205	2205
	For **7/8"** shaft	1	2205-1	2205-1

(Includes: Shaft w/ SS Slinger (5/8" shaft only), Impeller Lockdown Bolt and Key, 2ea. Impeller Lock washers)
Must select Gasket or O-ring separately, see part numbers listed above.

PRICE PUMP CO.

CDSS_P.dwg rev. 2



C SS 1 /15

Price Pump C..
21775 Eighth Street East * Sonoma, CA 95476-0329 * (707) 938-8441 * Fax (707) 938-0764

Key #	Description	Quantity	CD100 Part #	CD150 Part #
A.	Impeller **	1		
	Cast Iron		2402- (specify dia.)	2408- (specify dia.)
	Stainless Steel		2406- (specify dia.)	2412- (specify dia.)
	Bronze		2404- (specify dia.)	2410- (specify dia.)
B.	Volute	1		
	Cast Iron		2401	2407-0
	Bronze		2403-0	2409-0
C.	Volute Bolts (CD100)			
	Cast Iron	4	0573	-------
	Bronze	4	0376	-------
C.	Volute Bolts (CD150)			
	Cast Iron	8	-------	0573
	Bronze	4	-------	0376
D.	1/8” Pipe Plugs	2	0557	0557

Common Parts CD100/150

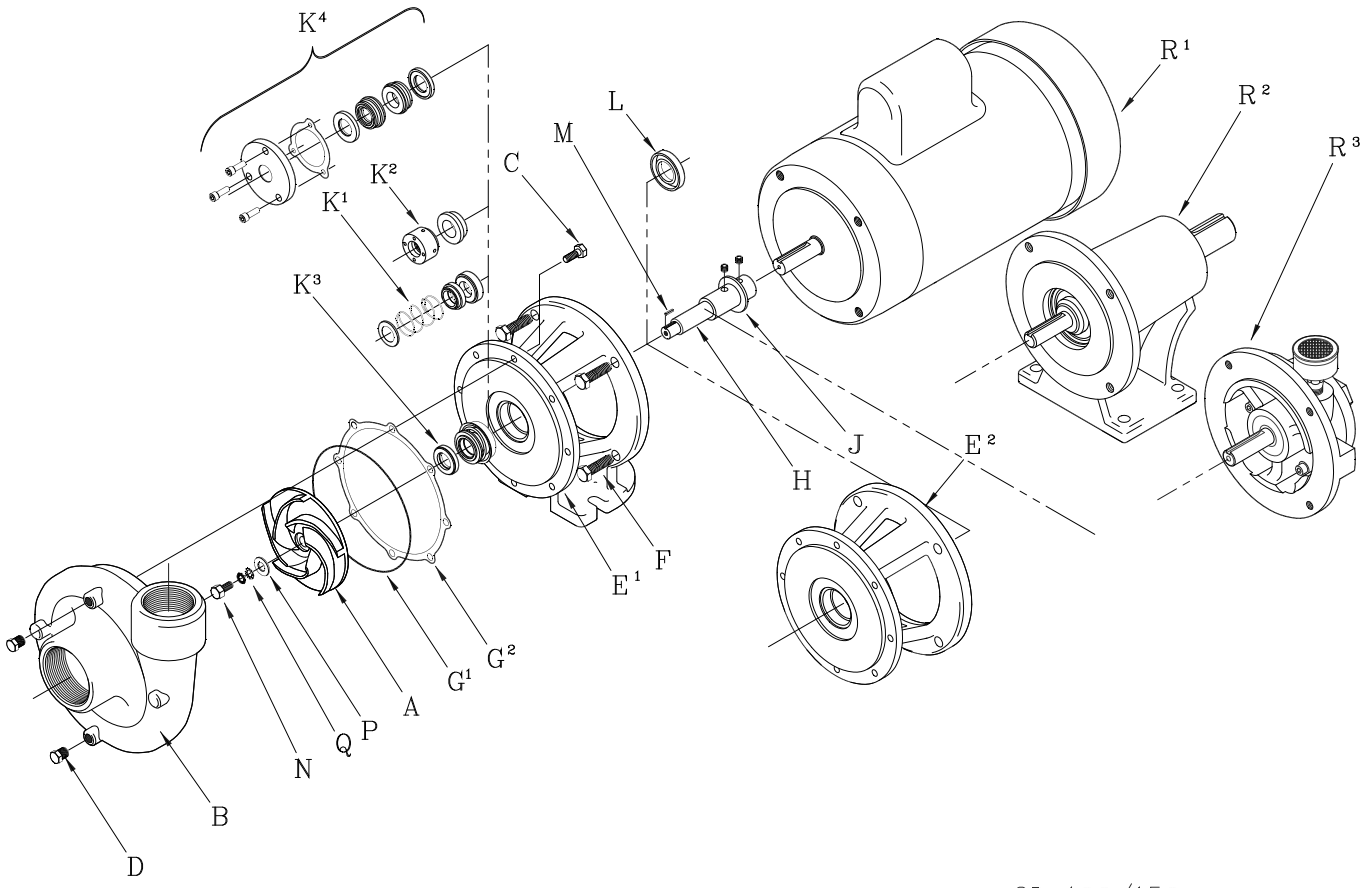
Key #	Description	Qty	Part #
E[1]	Bracket – with Foot		
	Cast Iron	1	2426
	Bronze	1	3701
E[2]	Bracket – without Foot		
	Cast Iron	1	2428
	Bronze	1	3702
F.	Motor Bolts		
	Cast Iron	4	0588
	Bronze	4	0592
G[1].	O-ring	1	
	Fluorocarbon (std.)		3070
	Buna		3074
	PTFE		3071
	Neoprene		3072
	EPR		3073
G[2].	Gasket, Syn Fiber (CD100 AI, SF&BF)	1	0506
H.	Shaft 5/8” ID	1	2421-1
	Shaft 7/8” ID	1	2422-1
J.	Slinger (5/8” shaft only)	1	0522
K[1]	T.21 Fluorocarbon (std.)	1	0553
K[2]	T.9 Single PTFE (opt)	1	1150
	CD repair kit for **5/8”** shaft	1	2222

Key #	Description	Qty	Part #
K[3]	T.6A Buna (std.)	1	0538
	T.6A Fluorocarbon	1	0539
	T.6A Neoprene / Ni-resist Seat	1	0675
K[4]	Double Seal/Seat (optional, kit contains 2 seals)		
	T.21 Fluorocarbon	1	5002
	T.21 Neoprene	1	5004
	T.21 EPR	1	5005
	Double Seal Plate	1	0973
	Plate Gasket, PTFE	1	0974
	Plate Cover Bolts	3	0256
L.	T.6A Quench (N/A on **AB Pumps)**	1	0899
M.	Impeller Lockdown Key	1	2424
N.	Impeller Lockdown Bolt	1	0575
P.	Impeller Flat Washer	1	2423
Q.	Impeller Lock Washer	2	2344
R[1]	Motor – Electric	1	Specify P/N
R[2]	Power Frames		
	For use with 5/8” ID Shaft	1	5478
	For use with 7/8” ID Shaft	1	5501
R[3]	Air Motor - Specify P/N	1	Specify P/N
	CD repair kit for **7/8”** shaft	1	2222-1

(5/8” shaft only), Impeller Lockdown Bolt, Flat washer and Key, 2ea. Impeller Lock washers)
-ring separately.

** Double seal pumps use double seal impellers, for example; P/N 2402DS - specify dia.

PRICE® PUMP CO.



C- 1../15.

Price® Pump C..
21775 Eighth Street East * Sonoma, CA 95476-0329 * (707) 938-8441 * Fax (707) 938-0764

PRICE CENTRIFUGAL PUMP CAUTIONS & WARNINGS

- **CAUTION:** Price Pump centrifugal pumps must be operated above minimum flow rate to avoid damage.
- **CAUTION:** All Price Pump centrifugal pumps require the suction to be flooded.
- **CAUTION:** It is recommended that all piping connections to the pump be flexible.
- **WARNNING:** Verify chemical compatibility of the pump materials of construction with the fluid being pumped.
- **WARNNING:** Price Pump centrifugal pumps are not designed for use in sanitary or food applications.
- **CAUTION:** Use only Price Pump original equipment factory replacement parts.
- **WARNNING:** Price Pump fluid temperature limits must be observed. Maximum operating temperature is 300°F.
- **CAUTION:** The pump should be thoroughly flushed and drained before disassembly.
- **CAUTION:** For larger pump motor units, weight may exceed 65 1bs. (30 kg).
- **CAUTION:** Price Pump Magnet Driven pumps above 3Hp require a VFD or soft starter.

CAUTION: Maximum solid size by pump

Shaft Seal pumps

- HP75 / MS50 **0.030”** (0.76mm)
- SP150 **0.060”** (1.50mm)
- LT25 **0.120”** (3.05mm)
- F50/75/95 **0.150”** (3.81mm)
- OH75 **0.150”** (3.81mm)
- CD100/150 **0.150”** (3.81mm)
- CL150 **0.150”** (3.81mm)
- RC200/300 **0.380”** (9.60mm)
- XJ-JB100 **0.120”** (3.05mm)
- XJ-JB150 **0.250”** (6.40mm)
- XJ-JB200 **0.440”** (11.2mm)
- XJ400 **0.440”** (11.2mm)
- XL-XT100 **0.120”** (3.05mm)
- XL-XT150 **0.250”** (6.40mm)
- XL-XT200 **0.440”** (11.2mm)

Magnet Driven pumps

- HP75MD **0.030”** (0.76mm)
- MS50MD **0.030”** (0.76mm)
- CD100MD **0.060”** (1.50mm)
- CD150MD **0.060”** (1.50mm)
- CL150MD **0.060”** (1.50mm)
- XL-XT100MD **0.060”** (1.50mm)
- XL-XT150MD **0.060”** (1.50mm)
- XL-XT200MD **0.060”** (1.50mm)

CAUTION: Minimum flow rate by pump

- HP75 / MS50 **0.5 GPM** (1.9 LPM)
- SP150 **10 GPM** (38 LPM)
- LT25 **0.5 GPM** (1.9 LPM)
- F50/75/95 **5.0 GPM** (19 LPM)
- OH75 **7.0 GPM** (26 LPM)
- CD100 **12 GPM** (45 LPM)
- CD150 **25 GPM** (94 LPM)
- CL150 **40 GPM** (150 LPM)
- RC200 **10 GPM** (38 LPM)
- RC300 **50 GPM** (189 LPM)
- XJ-JB150 **20 GPM** (75 LPM)
- XJ-JB150 **40 GPM** (150 LPM)
- XJ-JB200 **90 GPM** (340 LPM)
- XJ400 **100 GPM** (378 LPM)
- XL-XT100 **10 GPM** (38 LPM)
- XL-XT150 **35 GPM** (132 LPM)
- XL-XT200 **50 GPM** (189 LPM)

CAUTION: Maximum working pressure for seals:

- Type 02 Seal **350 PSI** (24.1 bar)
- Type 6 Seal **75 PSI** (5.2 bar)
- Type 6A Seal **75 PSI** (5.2 bar)
- Type 8 Seal **325 PSI** (22.4 bar)
- Type 8B Seal **350 PSI** (24.1 bar)
- Type 9 Seal **350 PSI** (24.1 bar)
- Type 21 Seal **150 PSI** (10.3 bar)
- Type 2106 Seal **150 PSI** (10.3 bar)
- Type 36 Seal **75 PSI** (5.2 bar)

GENERAL TERMS OF SALE FOR PRODUCTS

1. GENERAL

A. Seller's price is based on these sales terms and conditions. The agreement and inclusion of other or amended terms in this contract will result in a change (including increase) in Seller's price (as may be contained in any price books or quotations) to reflect such other or amended terms. This contract shall represent the final, complete and exclusive statement of the agreement between the parties and may not be modified, supplemented, explained or waived by parole evidence, any Terms and Conditions contained in Buyer's purchase order or request for quotation, any course of dealings between the parties, Seller's performance or delivery, or in any other way. The Terms and Conditions of this contract may only be modified or waived in a written document signed by an Officer of Seller. These terms are intended to cover all activity of Seller and Buyer hereunder, including sales and use of products, parts and work and all related matters (references to products include parts and references to work include construction, installation and start-up). Any reference by Seller to Buyer's specifications and similar requirements are only to describe the products and work covered hereby and no warranties or other terms therein shall have any force of effect. Any information provided by Seller including, but not limited to, suggestions as to specific equipment does not imply any guarantee of specific suitability and/or material compatibility in a particular application, since many factors outside the control of Seller may affect the suitability of products in a particular application. Catalogs, circulars, similar pamphlets and information contained on websites of the Seller are issued for general information purposes only and shall not be deemed to modify the provisions hereof.

B. The agreement formed hereby and the language herein shall be construed and enforced under the Uniform Commercial Code as in effect in the State of California on the date hereof.

2. TAXES

Any sales, use or other similar type taxes imposed on this sale or on this transaction and/or any import or export duties or fees as may be assessed or imposed on or as a result of deliveries under this transaction are not included in the price. Such taxes shall be billed separately to the Buyer. Seller will accept a valid exemption certificate from the Buyer if applicable; however, if an exemption certificate previously accepted is not recognized by the governmental taxing authority involved and the Seller is required to pay the tax covered by such exemption certificate. Buyer agrees to promptly reimburse Seller for the taxes paid.

3. PERFORMANCE, INSPECTION AND ACCEPTANCE

A. Unless Seller specifically assumes installation, construction or start-up responsibility, all products shall be finally inspected and accepted within thirty (30) days after arrival at point of delivery. Where seller has responsibility for installation, construction or start-up all work shall be finally inspected and accepted with thirty (30) days after completion of the applicable work by Seller. All claims whatsoever by Buyer, (including claims for shortages) except only those provided for under the WARRANTY AND LIMITATION OF LIABILITY and PATENTS Clauses, hereof, must be asserted in writing by Buyer within said thirty (30) day period or they are waived. If this contract involves partial performance, all such claims must be asserted within said thirty- (30) day period for each partial performance. There shall be no revocation of acceptance. Rejection may be only for defects substantially impairing the value of products or work and Buyer's remedy for lesser defects shall be those provided for under the WARRANTY AND LIMITATION OF LIABILITY Clause.

B. Seller shall not be responsible for non-performance or for delays in performance occasioned by any causes beyond Seller's reasonable control, including, by way of example and not limitation, to labor difficulties, delays of vendors or carriers, fires, governmental actions, or shortages of material, components, labor, or manufacturing facilities. Any delays so occasioned shall affect a corresponding extension of Seller's performance dates, which are, in any event, understood to be approximate. IN NO EVENT SHALL BUYER BE ENTITLED TO INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LATE PERFORMANCE OR FOR A FAILURE TO PERFORM. Seller reserves the right to make partial shipments and to ship products, parts or work which may be completed prior to the scheduled performance date.

C. In the event that Seller has agreed to mount motors, turbines, gears, or other products which are not manufactured by Seller and which are not an integral part of Seller's manufactured product, and a delay in the delivery of such products to Seller occurs that will cause a delay in Seller's performance date, Seller reserves the right to ship its product upon completion of manufacture and to refund an equitable portion of the amount originally included in the purchase price for mounting without incurring liability for non-performance.

D. Seller reserves to itself the right to change its specifications, drawings and standards if such changes will not impair the performance of its products, and parts, and further those products, and parts, will meet any of Buyer's specifications and other specific product requirements which are a part of this agreement. Seller is a global supplier of products and utilizes parts and products obtained worldwide, and Seller's products supplied under this contract shall be subject to Seller's sole determination as to all manufacturing, sourcing, assembly and supply unless otherwise specifically agreed in writing.

E. The manufacture and inspection of products and parts shall be to Seller's Engineering and Quality Assurance standards, plus such other inspections or tests of documentation as are specifically agreed to by Seller. Requirements for any additional inspection, tests, documentation, or Buyer witness of manufacture, test, and/or inspection shall be subject to additional charges.

4. TITLE AND RISK OF LOSS

Title and risk of loss shall pass to buyer upon delivery of products at the designated "Ex Works" as defined by Incoterms, unless other wise agreed by the parties.

5. EROSION AND CORROSION

It is specifically understood that products and parts sold hereunder are not warranted for operation with erosive or corrosive fluids or for operation with any fluid or under any operating condition in variance with the specifications of this contract. No product or part shall be deemed to be defective by reason of failure to resist erosive or corrosive action of any fluid and Buyer shall have no claim whatsoever against Seller therefore. No product shall be deemed defective by reason of any effect on Seller's products of the action or results (such as vibration) of any goods or system (such as piping) not supplied by Seller.

6. BUYER'S RESPONSIBILITY

The design specifications of the equipment require the operation of the equipment within certain parameters and may call for the use of speed controls, safety devices, set points or other control devices to insure that the operation remains within design parameters. Buyer agrees and understands that the equipment must be operated and maintained within design specifications and operated within the specifications of the contract, irrespective of whether controls or devices are otherwise required.

7. WARRANTY AND LIMITATION OF LIABILITY.

A. Seller warrants only that its product and parts, when shipped, will be free from defects in materials and workmanship. All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and, in any event, within two (2) years of shipment by seller and all claims for defective work must be made in writing immediately upon discovery. Defective items must be held for Seller's inspection and returned to the sellers' point of original shipment upon request.

ANY UNAUTHORIZED DISSASSEMBLY, ALTERATION OF OR TAMPERING WITH ANY PRODUCT OR COMPONENT MAY "VOID" THE WARRANTY, IN THAT SUCH ACTION WILL RESULT IN SELLER BEING RELEASED AND RELIEVED FROM ITS OBLIGATIONS UNDER THIS WARRANTY AND FOR ANY FURTHER COSTS OR ACTIONS UNDER CLAUSE 7.C, FOLLOWING, AND THE BUYER ASSUMING SOLE RESPONSIBILITY FOR THE COSTS AND RESULTS OF SUCH ACTION.

THE FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING WITHOUT LIMITATION, THE IMPLIED, WARRANTIES OF MERCHANTABILITY AND FITNESS.

B. ANY PRODUCT (S) SOLD HEREUNDER WHICH ARE NOT MANUFACTURED BY SELLER ARE NOT WARRANTED BY SELLER and shall be covered only by the express warranty, if any, of the manufacturer thereof. With respect to products and parts not manufactured by Seller, Seller's only obligation shall be to assign to Buyer, to the extent possible, whatever warranty Seller obtains from the manufacturer.

C. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at the original place of shipment, or (ii) refund an equitable portion of the purchase price.

D. THE FOREGOING IS SELLER'S ONLY OBLIGATION AND BUYER'S EXCLUSIVE REMEDY FOR BREACH OF WARRANTY AND, EXCEPT FOR THE REMEDIES PERMITTED UNDER THE PERFORMANCE, INSPECTION AND ACCEPTANCE AND THE PATENTS CLAUSES HEREOF, THE FOREGOING IS BUYER EXCLUSIVE REMEDY AGAINST SELLER FOR ALL CLAIMS ARISING HEREUNDER OR RELATING HERETO WHETHER SUCH CLAIMS ARE BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), INDEMNITY OR OTHER THEORIES. BUYER'S FAILURE TO SUBMIT A CLAIM AS PROVIDED ABOVE SHALL SPECIFICALLY WAIVE ALL CLAIMS FOR DAMAGES OR OTHER RELIEF, INCLUDING BUT NOT LIMITED TO CLAIMS BASED ON LATENT DEFECTS. IN NO EVENT SHALL BUYER BE ENTITLED TO INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, NOR FOR DAMAGES FOR LOSS OF USE, LOST PROFITS OR REVENUE, INTEREST, LOST GOODWILL, WORK OR PRODUCTION STOPPAGE, IMPAIRMENT OF OTHER GOODS, INCREASED EXPENSES OF OPERATION, OR THE COST OF PURCHASING REPLACEMENT POWER OR OTHER SERVICES BECAUSE OF SERVICE INTERRUPTIONS. FURTHERMORE, IN NO EVENT SHALL SELLER'S TOTAL LIABILITY FOR DAMAGES OF BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS OR PARTS MANUFACTURED BY SELLER AND UPON WHICH SUCH LIABILITY IS BASED. ANY ACTION ARISING HEREUNDER RELATED HERETO, WHETHER BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHER THEORIES, MUST BE COMMENCED WITHIN ONE (1) YEAR AFTER THE CAUSE OF ACTION ACCRUES OR IT SHALL BE BARRED.

8. PURCHASER'S REPRESENTATIONS & WARRANTIES

Purchaser represents and warranties that the products(s) covered by this contract shall not be used in or in connection with a nuclear facility or application. The parties agree that this representation and warranty is material and is being relied on by seller. This provision may be modified in a separate writing signed by an officer of Price Pump Co.

9. PATENTS

Seller agrees to assume the defense of any suit for infringement of any patents brought against Buyer to the extent of such suit charges infringement of an apparatus or product claim by Seller's product in and of itself, provided (i) said product is built entirely to Seller's design, (ii) Buyer notifies Seller in writing of the filing of such suit within ten (10) days after the service of process thereof, and (iii) Seller is given complete control of the defense of such suit, including the right to defend, settle and make changes in the product for the purpose of avoiding infringement of any process or method claims. Provided however, Seller will not defend any suit for infringement of a claimed patent where such alleged infringement is the result of following specific instruction furnished by Seller.

10. EXTENT OF SUPPLY

Only products as listed in Seller's proposal are included in this agreement. It must not be assumed that Seller has included anything beyond same.

11. MANUFACTURING SOURCES

To maintain delivery schedules, Seller reserves the right to have all or any part of the Buyer's order manufactured at any of Sellers', sellers' licensees or sub contractors' plants, globally.

12. TERMS OF PAYMENT

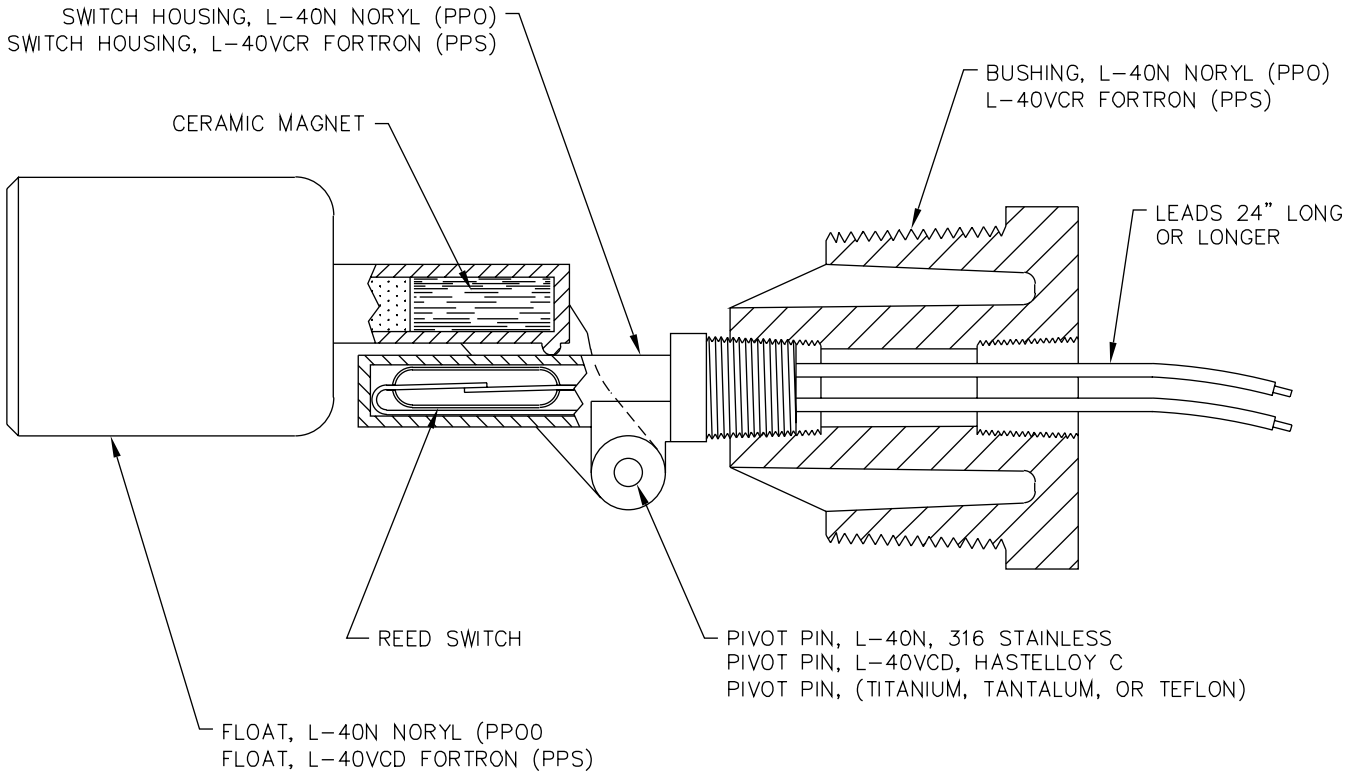
Net 30 days from date of invoice.

13. ARBITRATION

In the event a dispute arises between the parties relating to or arising out of this agreement, the parties agree to attempt to have their senior management amicably settle the matter. In the event that the matter cannot be settled, the parties shall submit all disputes relating to this Agreement (whether contract, tort, products liability or otherwise) to binding Arbitration before a panel of arbitrators under the Commercial Dispute Resolution Procedures of the American Arbitration Association. Each party shall appoint an arbitrator and the third shall be selected in accordance with the rules of the American Arbitration Association. Judgment upon the award may be entered in any court having jurisdiction. The parties shall cooperate in providing reasonable disclosure of relevant documents. Each party shall bear its own expenses, and the costs and fees of the arbitration shall be borne as allocated by the Arbitrator.

INSTALLATION INSTRUCTIONS

Liquid Level Switch - Model L-40N (Noryl®), L-40R (Ryton®) and L-40VCR

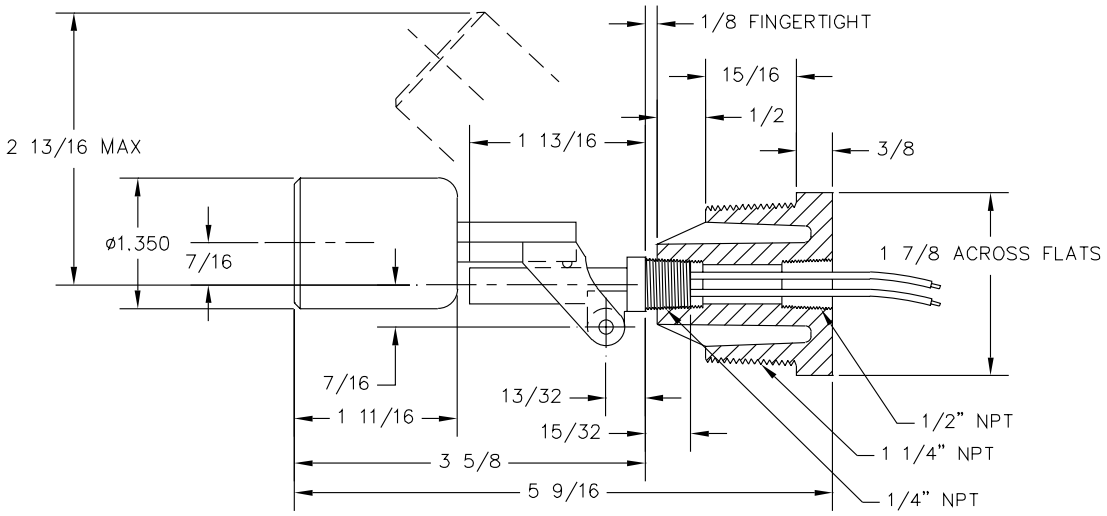


SWITCH HOUSING SUPPLIED ONLY AS AN ASSEMBLY OF ENCAPSULATED SWITCH & LEADS. FLOAT SUPPLIED ONLY WITH ENCAPSULATED MAGNET.

INSTALLATION INSTRUCTIONS

Liquid Level Switch - Model L-40N (Noryl®), L-40R (Ryton®) and L-40VCR

Installation Dimensions - Same for L-40N & L-40VCR



L-40N

Wetted Surfaces

10% Glass re-inforced Noryl® (PPO) and 316 stainless steel pivot pin

Nominal Working Pressure/Temp

Tested to Failure at 800 PSI at room temperature

Temp. °F (°C)	0 (-18)	50 (10)	100 (38)	200 (93)
Pressure psig	200	200	175	140

Working Fluid Specific Gravity

Top Mount 0.8
Side Mount 0.7

L-40VCR

Wetted Surfaces

40% Glass reinforced Fortron® (PPS) and Hastelloy® C pivot pin

Nominal Working Pressure / Temp

Tested to failure at 800 psi at room temperature

Temp. °F (°C)	0 (-18)	50 (10)	100 (38)	200 (93)
Pressure psig	250	250	180	150

Working Fluid Specific Gravity

Top Mount 0.9
Side Mount 0.7

COMMON PARAMETERS FOR BOTH L-40N & L-40VCR

Liquid Level Switch

Nominal ON/OFF Differential
~3/8" (0.375")

Electrical Switch Characteristics

STANDARD SPNO or SPNC operation available
AC voltage (max. switching) 300 VAC
DC voltage (max. switching) 350 VDC
Current (max. switching) 0.5 amp
Current (max. carrying) 2.5 amp
Contact Rating (VA,W) 50
Capacitance (typical) 0.3 pf
Insulation resistance 1010 ohms
Operation temperature -40°F to 240°F
(-40°C to 115°C)

Float Pivot Pin available in:

316 Stainless, Hast®. C as standard, Titanium, Tantalum, Teflon® as special order.

Corrosion Resistance

See compatibility table in back of catalog

Dry Circuit Operating

Switch can interface with microprocessor based controllers and related dry circuits.

Inductive Loads

Switch contacts have been tested with inductive relay and 30 amp motor contactor drive coils at 120 VAC and 240 VAC to 500,000 operations without failure. Maximum allowable volt amp (VA) rating of relay operating coil - 8.0 VA or less.

PART DESCRIPTION

MODEL	SWITCH OPERATION DRY TANK	MOUNTING POSITION	PIVOT PIN MATERIAL
L-40N L-40VCR	NO-Normally Open NC-Normally Closed	HOR.-Horizontal VER.-Vertical	316SS Tantalum Hast.® C Teflon® Titanium

SAMPLE PART NUMBER

L-40N / NO / HOR / 316
L-40VCR / NC / HOR / HAST.® C
L-40N / NC / VER / 316
L-40VCR / NO / VER / Titanium

Note: Model L-40 deploys magnetic coupling between float arm and switch body. Magnetic particles can accumulate on and around magnet housing which may affect proper operation. Please conduct appropriate fluid magnetic particle evaluation and operational tests prior to and during installation and use.

CORPORATION

INSTALLATION INSTRUCTIONS

Liquid Level Switch - Model L-40N (Noryl®), L-40R (Ryton®) and L-40VCR

INSTALLATION & OPERATING INSTRUCTIONS

NOTE: Models L-40N and L-40VCR are dimensionally equal and employ the same electrical switch. The only difference is in the material used which affects their chemical resistance. Installation procedures and electrical check out are equivalent so the term "Model L-40" will be used to mean both individual models L-40N and L-40VCR.

Installation:
Model L-40 liquid level switch is supplied with a 1-1/4" x 1/4" NPT TT bushing which allows the unit to pass through a 1-1/4" NPT female thread located in the side or top of the tank. Teflon tape is factory applied to the 1/4" NPT end of the switch housing which is threaded into the 1-1/4" x 1/4" bushing and tightened to provide a sealed connection. An arrow on the top of the 1- 1/4" x 1/4" bushing indicates the plane of motion of the float.

1). Horizontal mounting through side wall of tank.

A). The male 1-1/4" NPT thread of the 1-1/4" x 1/4" bushing is teflon taped at the factory. Inspect taped threads for uniform tape covering. If teflon tape has been damaged remove and replace with new tape.

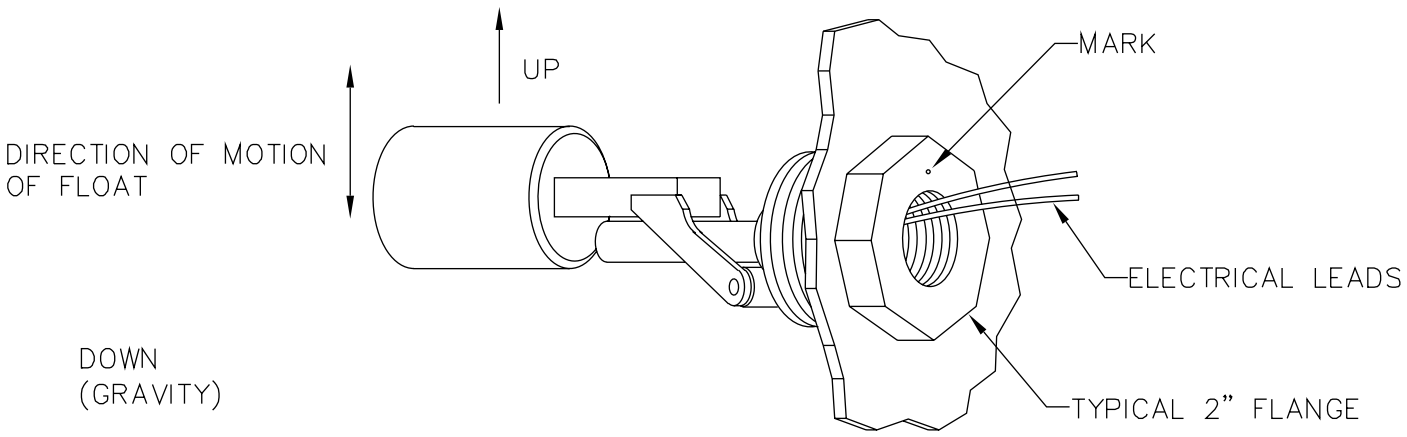
B). Insert model L-40 through 1-1/4" NPT opening in wall of tank, thread 1-1/4" x 1/4" bushing into place and tighten until seal is obtained, as per standard PVC pipe fittings. Tighten additional amount until arrow points vertically upward.

C). Model L-40 is designed to be field replaceable for "donut" sliding float types with 1/4" NPT on end of switch housing tube. Installation is accomplished thus:

1). Disconnect old sliding float switch wires and unthread unit from support, e.g. 2" flange, bushing, etc.

2). Clean female threads, apply teflon tape to L40 threads as required, and tighten in place as required to ensure no leaks.

3). Move L40 float through full travel to ensure float motion is not restricted by adjacent structure. Mark outside surface of flange, bushing etc. to indicate plane of motion and up position of float. See Fig. 1.



2). Vertical mounting through top of tank.

A). Same as A) above.

B). Insert model L40 through 1-1/4" NPT opening in top of tank, thread 1-1/4" x 1/4" bushing into place and tighten until seal is obtained as per standard PVC pipe fittings. Arrow indicates plane of motion of float which may be in any position or a particular position should internal structure interfere with motion of the float.

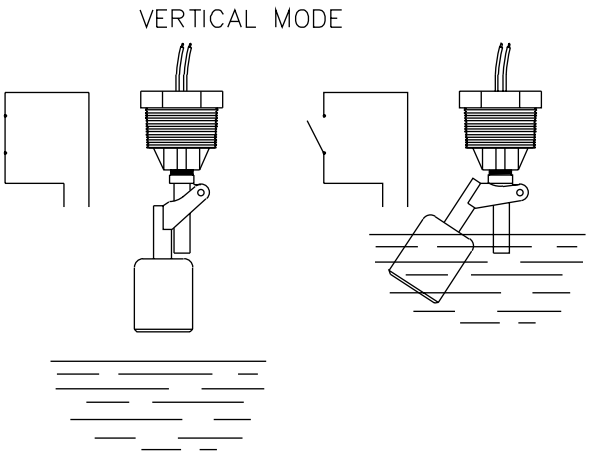
C). Field replacement of top mounted "donut" type sliding float level switches is the same as C) above except that indexing the plane of motion of the float is not required except when tank internal structure interferes with float motion.

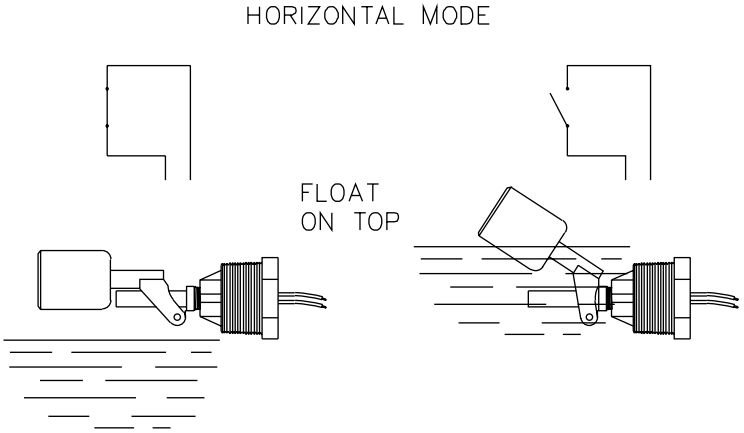
CORPORATION

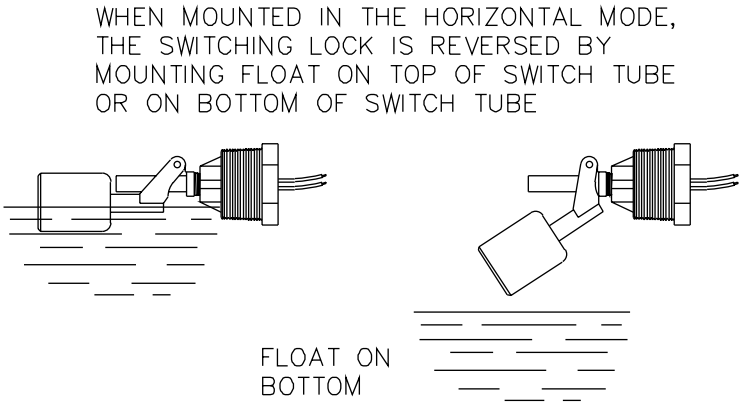
INSTALLATION INSTRUCTIONS

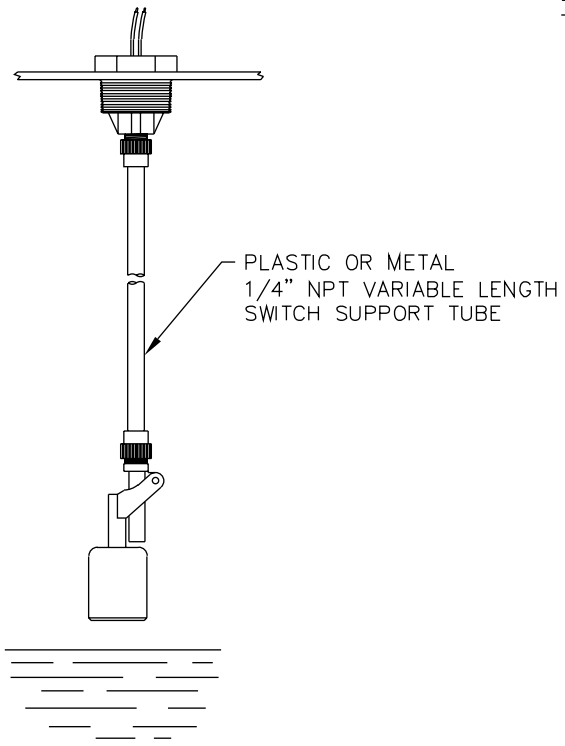
Liquid Level Switch - Model L-40N (Noryl®), L-40R (Ryton®) and L-40VCR

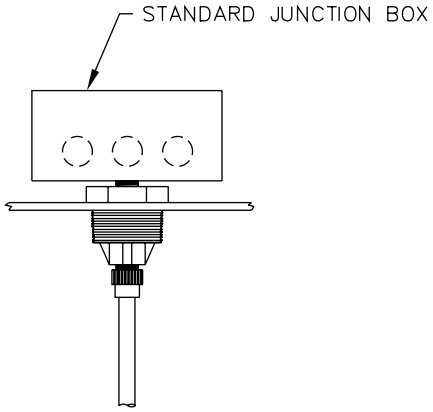
Electrical Wiring:
1). Check switch operation with an OHM meter prior to installing to ensure switch is activated when float is moved between stops. NOTE: Switch must be activated and deactivated when float is in a position near but not at stop.









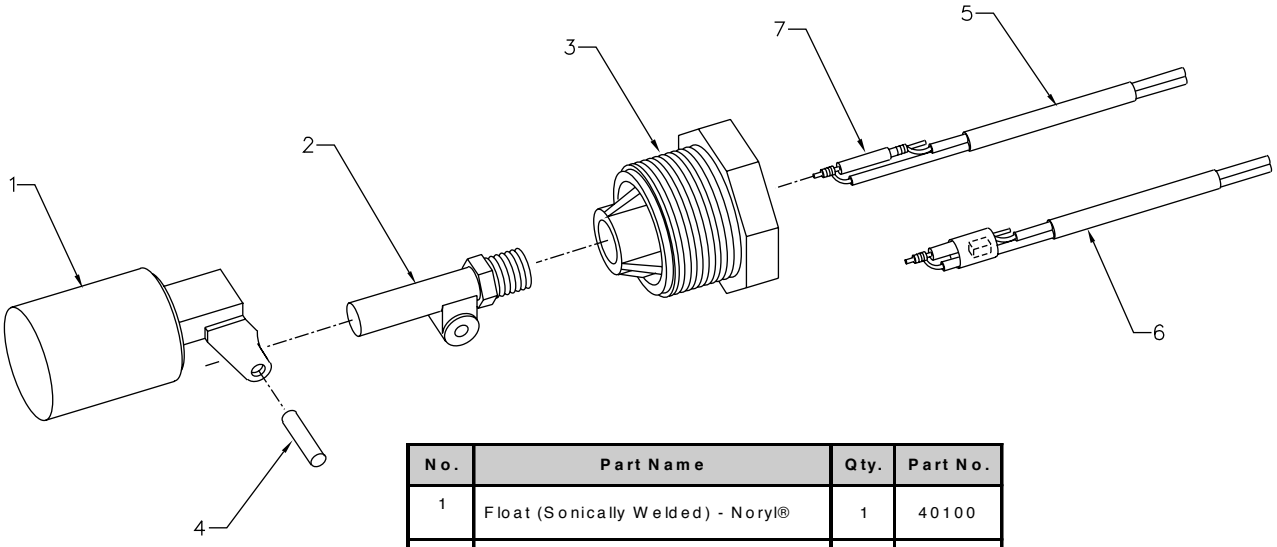


CORPORATION

INSTALLATION INSTRUCTIONS

Liquid Level Switch - Model L-40N (Noryl®), L-40R (Ryton®) and L-40VCR

L-40VCR
(Series 40300)



No.	Part Name	Qty.	Part No.
1	Float (Sonically Welded) - Noryl®	1	40100
	# A Magnet Inside	1	40112
2	Switch Housing - Noryl® Assembly Only	1	40102
3	Bushing - Noryl®	1	40103
4	Pivot Pins - 316 Stainless Steel	1	40104
5	Lead Wire - Optional	1	
	Open Switch - Assembly Only	1	40105
	#A Blue Wire - Short	1	40106
	# B Blue Wire - Long	1	40107
	#C Black Shrink Tubing	1	901-F
	#D Reed Switch	1	40108
6	Lead Wire - Optional	1	
	Open Switch - Assembly Only	1	40109
	#A Blue Wire - Short	1	40106
	# B Blue Wire - Long	1	40107
	#C Black Shrink Tubing	1	901-F
	#D Reed Switch	1	40108
	#E Square Magnet	1	40110
	#F Clear Shrink Tubing	1	40111

CORPORATION

Installation & Maintenance Instructions

2—WAY INTERNAL PILOT—OPERATED SOLENOID VALVES

NORMALLY CLOSED OPERATION — 3/4″, 1″, 1—1/4″, 1—1/2″ OR 2″ NPT

SERIES

8215

Form No.V5996R5

IMPORTANT: See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Causes of Improper Operation, and Coil Replacement.

DESCRIPTION

Series 8215 valves are 2—way normally closed internal pilot—operated solenoid valves. Valve bodies are made of rugged aluminum with trim and internal parts made of steel and stainless steel. Series 8215 valves may be provided with a general purpose or explosionproof solenoid enclosure.

OPERATION

Normally Closed: Valve is closed when solenoid is de—energized; open when energized.

Note: No minimum operating pressure differential required.

INSTALLATION

⚠ **CAUTION: Not all valves are approved for fuel gas service. Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.**

Future Service Considerations

Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid after disassembly and reassembly.

Temperature Limitations

For maximum valve ambient and fluid temperatures, refer to chart below. Check catalog number prefix on nameplate to determine maximum temperatures.

Construction	Coil Class	Catalog Number Prefix	Max. Ambient Temp°F	Max. Fluid Temp°F
AC Construction	F	FT	125	125
	H	HT	140	140
DC Construction	B or H	None or HT	77	77

Positioning

Valve must be mounted with solenoid vertical and upright.

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

⚠ **CAUTION: To avoid damage to the valve body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If Teflon* tape, paste, spray or similar lubricant is used, use extra care when tightening due to reduced friction.**

IMPORTANT: To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601 and 8602 for strainers.

MAINTENANCE

⚠ **WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area before servicing the valve.**

NOTE: It is not necessary to remove the valve from the pipeline for repairs.

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean valve strainer or filter when cleaning the valve.

*Dupont Co. Registered Trademark

ASCO® MMIII All Rights Reserved. Printed in U.S.A.

50 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

Preventive Maintenance

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the best indication of a proper interval between exercise cycles.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete rebuild kit.

Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Valve Disassembly

⚠ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area before servicing the valve.

NOTE: Determine valve construction AC (Figure 1 on page 3) or DC (Figure 2 on page 4) then proceed as follows:

1. Remove solenoid enclosure, see separate installation and maintenance instructions.
2. For AC Construction, unscrew solenoid base sub−assembly. For DC Construction, unscrew solenoid base sub−assembly with special wrench adapter provided in ASCO Rebuild Kit. For wrench adapter only, order kit No.K218−949. NOTE: For alternate type open end wrench, order kit No.K168−146−1 which is available for solenoid base sub−assembly removal or replacement.
3. Remove bonnet screws, valve bonnet, bonnet gasket, core/diaphragm sub−assembly and body gasket.
4. All parts are now accessible to clean or replace. If parts are worn or damaged, install a complete ASCO Rebuild kit.

Valve Reassembly

1. Lubricate bonnet gasket and body gasket with a light coat of DOW CORNING® 200 Fluid lubricant or an equivalent high−grade silicone fluid.
2. Apply a light coat of RemGrit TFL 50® Dry Lubricant to:
    - Valve seat
    - Valve body flange where diaphragm assembly contacts the valve body and body gasket.
    - Internal surface of valve bonnet where diaphragm assembly contacts bonnet when valve is in the energized (open position).

IMPORTANT: If valve has been disassembled for inspection and cleaning only and a Rebuild Kit is not being installed, lubricate the following with RemGrit TFL 50® Dry Lubricant:

- Diaphragm assembly on both sides.
- Main disc base of core/diaphragm sub−assembly.
- Pilot disc at base of core assembly.

⚠ CAUTION: Do not distort hanger spring between core assembly and diaphragm assembly when lubricating pilot disc.

3. Replace body gasket and core/diaphragm sub−assembly with closing spring attached. Locate bleed hole in core/diaphragm sub−assembly approximately 30° from the valve inlet.
4. Replace valve bonnet and bonnet screws (6). Torque screws in a crisscross manner to 100 ±10 in−lbs [11,3 ± 1,1 Nm].
5. For AC construction, replace bonnet gasket and solenoid base sub−assembly. Torque solenoid base sub−assembly to 45 ± 5 ft−lbs [61,1 ± 6,8 Nm] For DC construction refer to separate "Solenoid Installation and Maintenance Instructions" for lubrication instructions; then install bonnet gasket, housing and solenoid base sub−assembly. Torque solenoid base sub−assembly to 30 ± 5 ft−lbs [40,7 ± 6,8 Nm].
6. Replace solenoid (see separate instructions) and make electrical hookup.

⚠ WARNING: To prevent the possibility of death, serious injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.

7. Restore line pressure and electrical power supply to valve.
8. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic *click* signifies the solenoid is operating.

ORDERING INFORMATION FOR ASCO REBUILD KITS

Parts marked with an asterisk (*) in the exploded views are supplied in Rebuild Kits.

● When Ordering Rebuild Kits for ASCO Valves, order the Rebuild Kit number stamped on the valve nameplate.

+ If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.

ASCO® 50 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

Torque Chart

Part Name	Torque Value	Torque Value in Newton–Meters
Solenoid Base Sub–Assembly	45 ± 5 ft.–lbs	61,1 ± 6,8
Bonnet Screws	100 ± 10 in–lbs	11,3 ±1,1

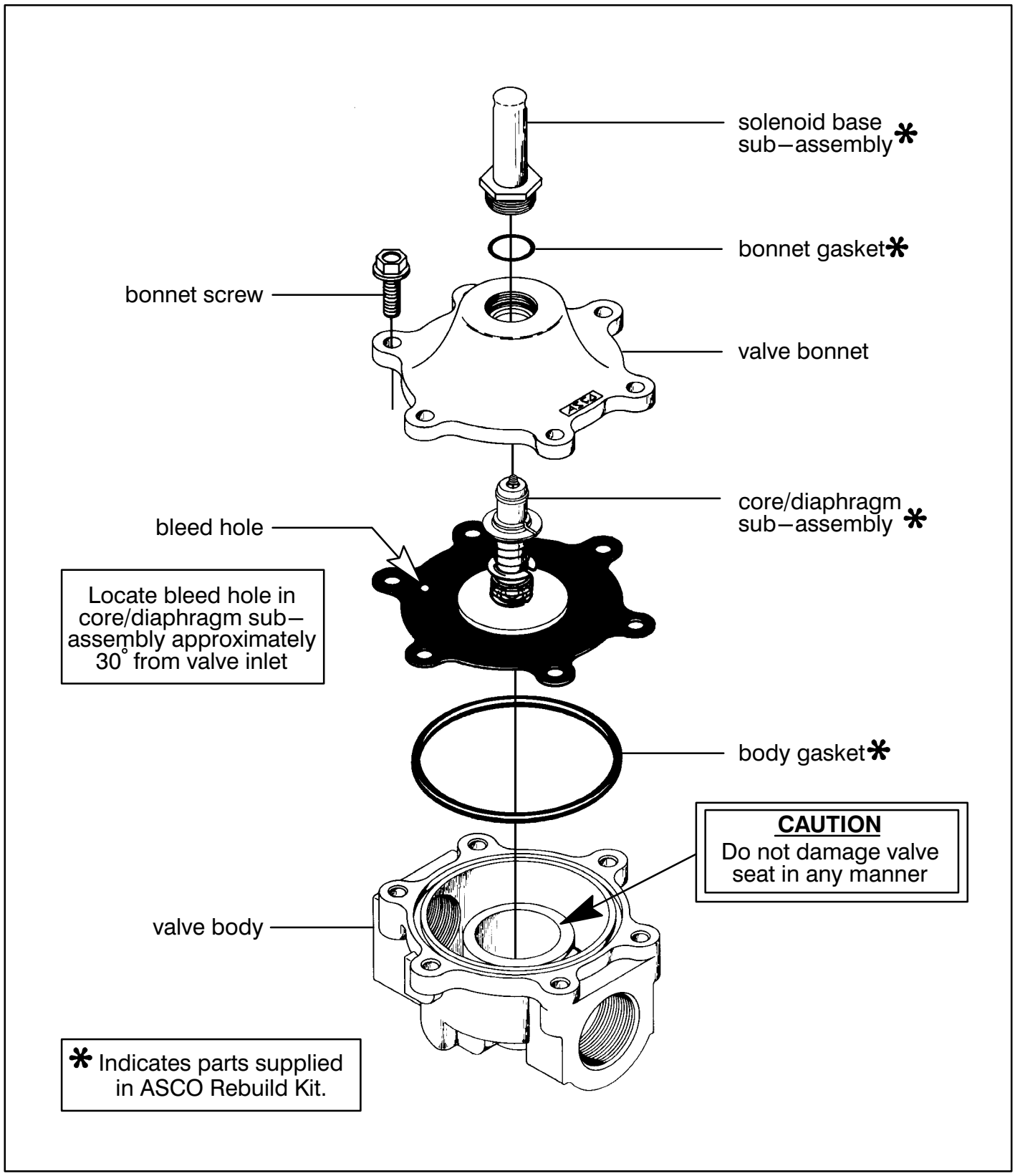


Figure 1. Series 8215 valves without solenoid, AC Construction.

ASCO® 50 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

Torque Chart

Part Name	Torque Value	Torque Value in Newton–Meters
Solenoid Base Sub–Assembly	30 ± 5 ft–lbs	40,7 ± 6,8
Bonnet Screws	100 ± 10 in–lbs	11,3 ±1,1

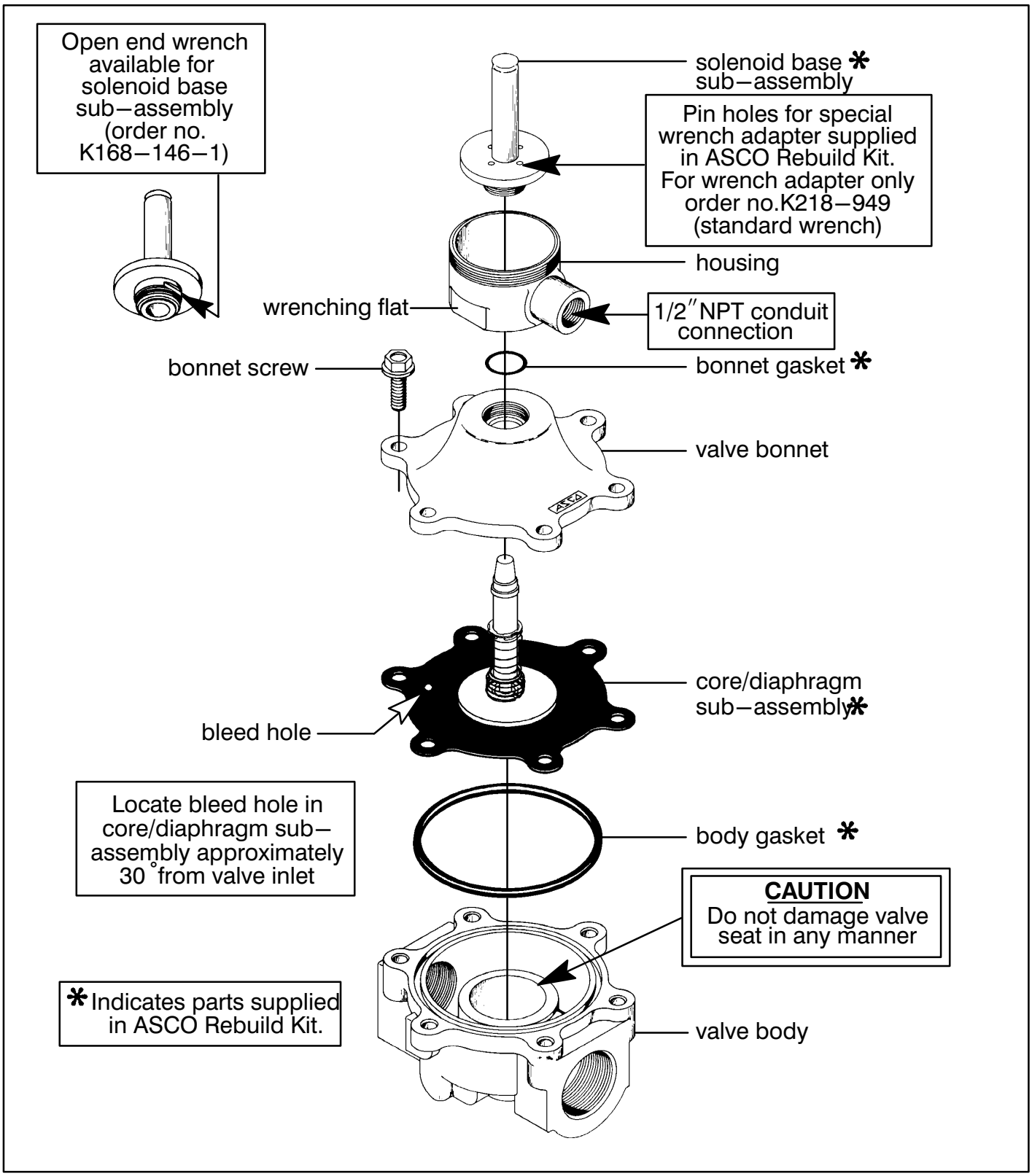


Figure 2. Series 8215 valves without solenoid, DC Construction.

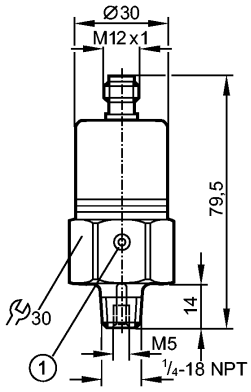
ASCO® 50 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

efectorsoo

PX3229

PA-0-1PRBN14-A-ZVG/US/ /V

Pressure sensors



1: ventilation

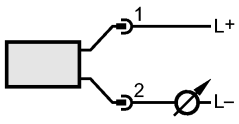
Made in Germany

Product characteristics		
Electronic pressure sensor		
Quick disconnect		
e1 compliant		
Process connection: ¼"NPT A / M5 I		
Analog output		
Measuring range: -14.5...0 psi		
Application		
Application		Type of pressure: relative pressure Liquids and gases
Pressure rating	[psi]	145
Bursting pressure min.	[psi]	450
Medium temperature	[°C]	-25...90
Electrical data		
Electrical design		DC
Operating voltage	[V]	9.6...32 DC
Insulation resistance	[MΩ]	> 100 (500 V DC)
Protection class		III
Reverse polarity protection		yes
Outputs		
Output		Analog output
Output function		20...4 mA
Overload protection		yes
Max. load	[Ω]	(Ub - 9.6 V) x 50; 720 at Ub = 24 V
Measuring / setting range		
Measuring range	[psi]	-14.5...0
Accuracy / deviations		
Accuracy / deviations (in % of the span)		
Characteristics deviation *)		< ± 0.25 (BFSL) / < ± 0.5 (LS)
Repeatability **)		< 0.1
Long-term stability ***)		< ± 0.05

Temperature coefficients (TEMPCO) in the temperature range 0...80° C (in % of the span per 10 K)

Greatest TEMPCO of the zero point		0.15
Greatest TEMPCO of the span		0.2
Reaction times		
Step response time analogue output	[ms]	3
Environment		
Ambient temperature	[°C]	-25...80
Storage temperature	[°C]	-40...100
Protection		IP 65
Tests / approvals		
EMC	EN 61000-4-2 ESD: EN 61000-4-3 HF radiated: EN 61000-4-4 Burst: EN 61000-4-6 HF conducted: radiation of interference noise immunity HF radiated pulse resistance	4 kV CD / 8 kV AD 30 V/m 2 kV 10 V according to the automotive directive 2004/104/EC / CISPR25 according to the automotive directive 2004/104/EC / ISO 11452-2 100 V/m according to ISO7637-2 / severity level 3
Shock resistance	DIN IEC 68-2-27:	50 g (11 ms)
Vibration resistance	DIN IEC 68-2-6:	20 g (10...2000 Hz)
Mechanical data		
Process connection		¼"NPT A / M5 I
Materials (wetted parts)		stainless steel (303S22); ceramics; FPM (Viton)
Housing materials		stainless steel 316L / 1.4404; FPM (Viton); PA; EPDM/X (Santoprene)
Min. pressure cycles		100 million
Weight	[kg]	0.214
Electrical connection		
Connection		M12 connector; gold-plated contacts

Wiring



Remarks		
Remarks		*) BFSL = Best Fit Straight Line / LS = Limit Value Setting **) with temperature fluctuations < 10 K ***) in % of value of measuring range / 6 months
Pack quantity	[piece]	1

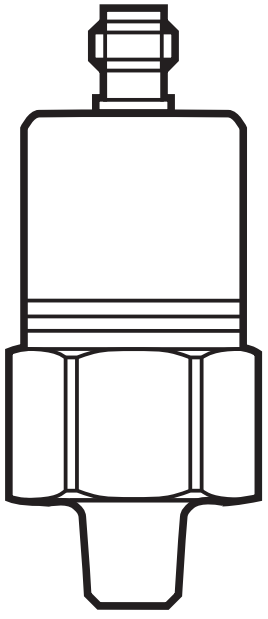
ifm electronic

CE

Installation Instructions
Electronic pressure sensor

efectorsoo®

PX3111
PX322x
PX323x
PX3244
PX3422
PX911x
PX913x



704571/06 02/2011

Contents

1 Safety instructions 2
2 Function and features 4
3 Installation 5
4 Electrical connection 5
5 Scale drawing 6
6 Technical data 8

1 Safety instructions

Please read the product description prior to installing the unit. Please check that the product is suitable for your application without any restrictions.
If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
Please check in all applications that the product materials (see Technical data) are compatible with the media to be measured.
For gaseous media the application is limited to max. 363 PSI.

High-pressure units (5000 PSI) are supplied with a pressure relief mechanism and an integrated damping device to comply with the regulations for UL approval and to avoid any risk of injury in case of bursting when bursting pressure is exceeded.

Any manipulation of the damping device is not permissible.
When the damping device is removed, there is no damping function any more. ATTENTION: risk of injury!
For units with cULus approval this approval becomes invalid when the damping device is removed.

For units with cULus approval and the scope of validity cULus:
The device shall be supplied from an isolating transformer having a secondary Listed fuse rated as noted in the following table.

Overcurrent protection		
Control-circuit wire size		Maximum protective device rating Ampere
AWG	(mm^2)	
26	(0.13)	1
24	(0.20)	2
22	(0.32)	3
20	(0.52)	5
18	(0.82)	7
16	(1.3)	10

The Sensor shall be connected only by using any R/C (CYJV2) cord, having suitable ratings.

2 Function and features

The pressure sensor detects the system pressure and converts it into an analog output signal.

- 0 to 10 V (PX9xxx)
- 10 to 0 V (PX9119)
- 4 to 20 mA (PX3xxx)
- 20 to 4 mA (PX3229)

Applications (type of pressure: relative pressure)

Order no.	Measuring range	Permissible overload pressure	Bursting pressure
	PSI	PSI	PSI
PX3220 PX9110	0 to 5000	11600	17400
PX3111 PX9111	0 to 3000	5800	12300
PX3222 PX9112	0 to 1000	4350	9400
PX3223	0 to 500	2175	5075
PX3224 PX9114	0 to 100	1087	2175
PX3244	0 to 150	1087	2175
PX9134	0 to 200	1087	2175
PX3226 PX9116	0 to 30	290	725
PX3237	0 to 20	145	450
PX3227 PX9117	0 to 15	145	450
PX3238	0 to 5	145	450
PX3229 PX9119	-14.5 to 0 (vacuum)	145	450
PX3422	-14.5 to 735.5	4350	9400
	inH2O	inH2O	inH2O
PX3228 PX9118	0 to 100	4015	12043

Avoid static and dynamic overpressure exceeding the given over-load pressure.
Even if the bursting pressure is exceeded only for a short time the unit can be destroyed (danger of injuries)!

3 Installation

Before mounting and removing the sensor, make sure that no pressure is applied to the system.

Mount the pressure sensor on a suitable process connection (see type label “Port Size”).

4 Electrical connection

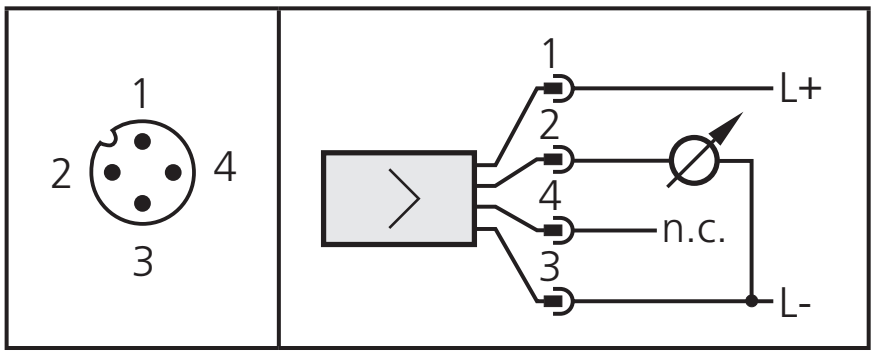
The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

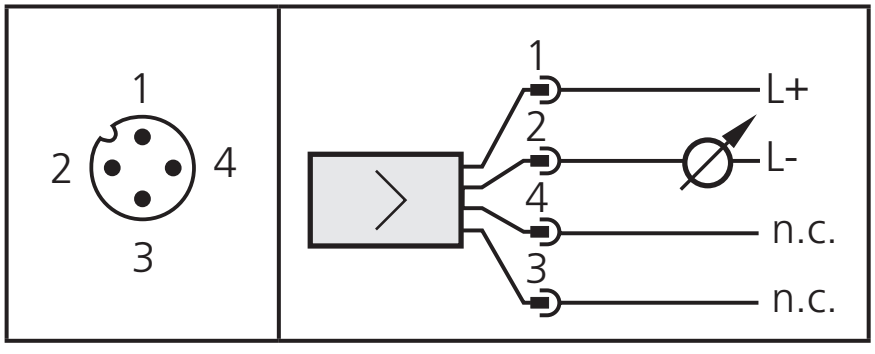
Voltage supply to EN50178, SELV, PELV.

► Disconnect power before connecting the unit as follows:

Voltage output (PX9xxx)

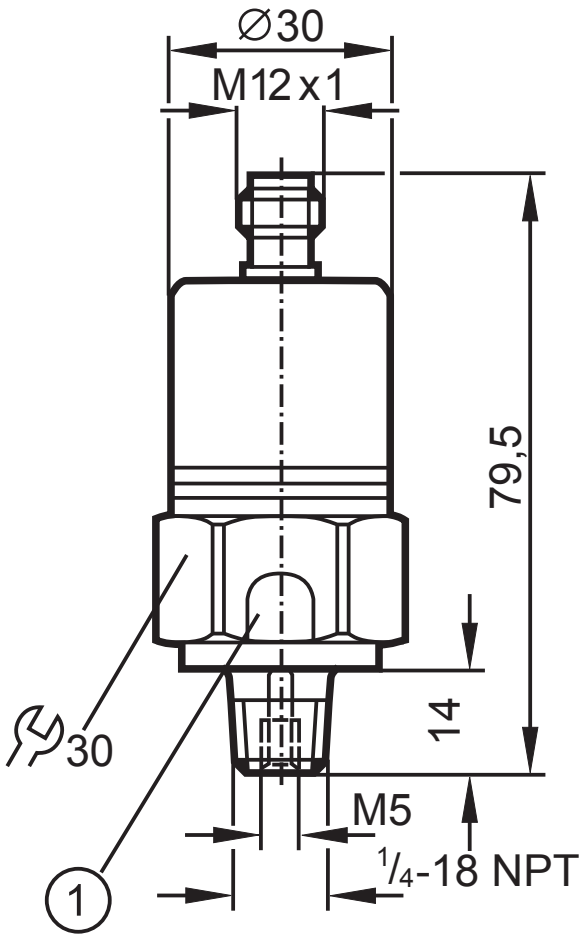
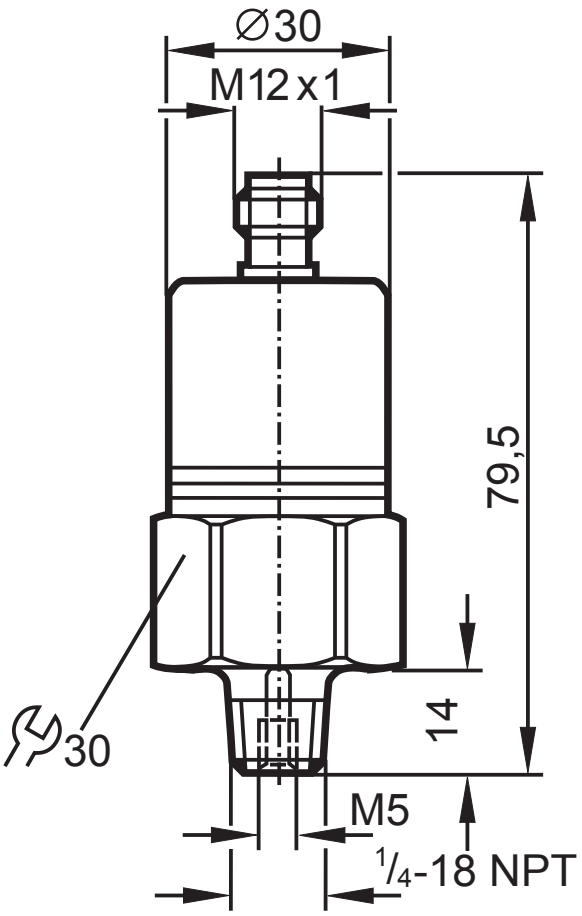


Current output (PX3xxx)

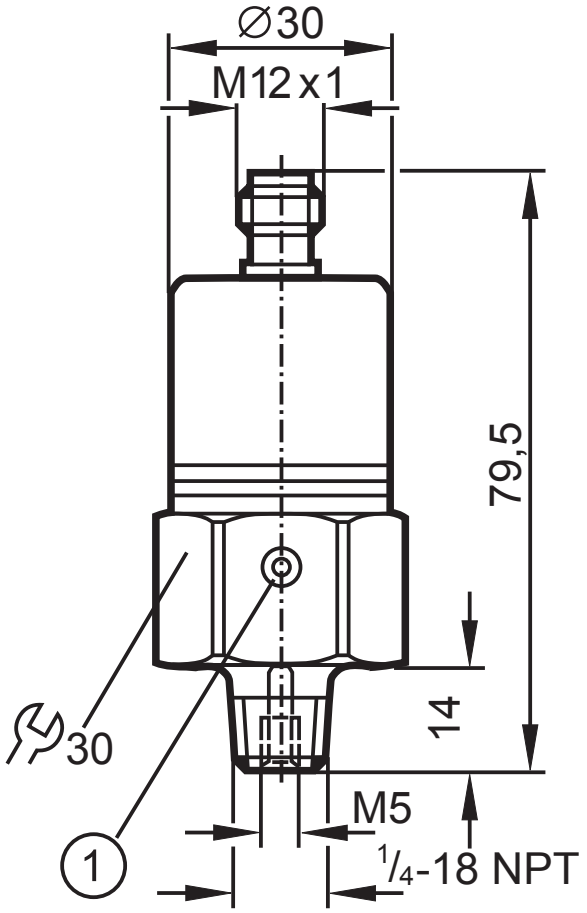
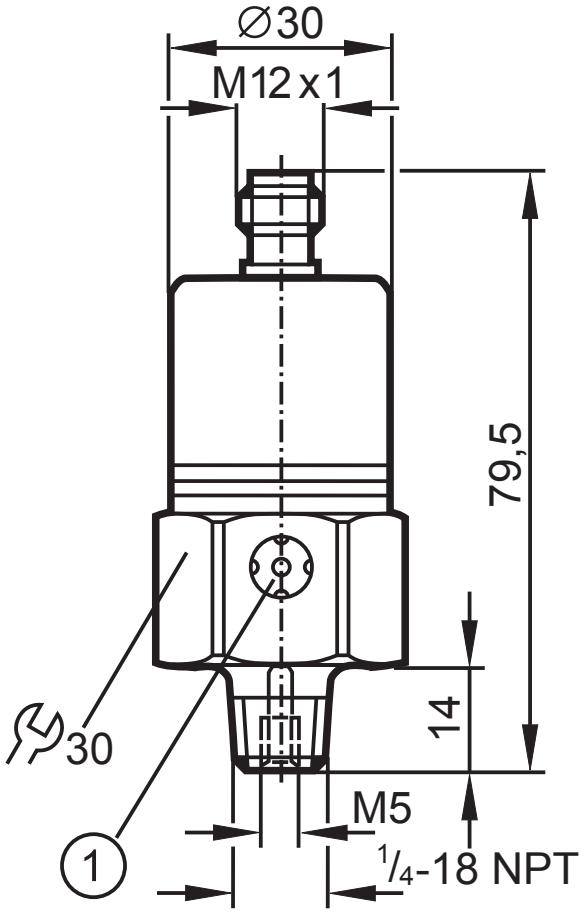


For information about available sockets/connectors see:
www.ifm.com → Products → Accessories

5 Scale drawing

PX3220 PX9110	PX3111 PX3222 PX3422 PX9111 PX9112
	
1: Pressure relief mechanism No mechanical force must be exerted on the pressure relief mechanism.	

dimensions are in millimeters (25.4 mm = 1 inch)
process connection 1/4 NPT, tigtening torque 25 Nm

PX3223 PX3224 PX3244 PX3226 PX3227 PX3228 PX3229 PX9114 PX9116 PX9117 PX9118 PX9119 PX9134	PX3237 PX3238
	
1: Ventilation	1: Ventilation

dimensions are in millimeters (25.4 mm = 1 inch)
process connection 1/4 NPT, tigtening torque 25 Nm

6 Technical data

PX3xxx	
Operating voltage [V]	9.6 to 32 DC[1)]
Analog output	4 to 20 mA
Load [Ω]	max. (U_B - 9,6) x 50; 720 at U_B = 24 V DC
Step response time analog output [ms]	3
PX9xxx	
Operating voltage [V]	16 to 32 DC[1)]
Current consumption [mA]	< 18
Analog output	0 to 10 V DC
Load [Ω]	min. 2000
Step response time analog output [ms]	3
Characteristics deviation (in % of full range)	
PX3111, PX9111	< ± 0.35 (BFSL) / < ± 0.75 (FR)
PX3220, PX3222, PX3223, PX3422, PX9112	< ± 0.35 (BFSL) / < ± 0.75 (FR)
PX3224, PX3244, PX9114	< ± 0.35 (BFSL) / < ± 0.75 (FR)
PX3226, PX9116	< ± 0.35 (BFSL) / < ± 0.75 (FR)
PX3227, PX3237, PX3238, PX9117	< ± 0.25 (BFSL) / < ± 0.5 (FR)
PX3228, PX9118	< ± 0.35 (BFSL) / < ± 0.75 (FR)
PX3229, PX9119	< ± 0.25 (BFSL) / < ± 0.5 (FR)
PX9110	< ± 0.35 (BFSL) / < ± 0.75 (FR)
PX9134	< ± 0.35 (BFSL) / < ± 0.75 (FR)
Repeatability (in % of full range)	
PX3111, PX9111	< 0.15
PX3220, PX3222, PX3422, PX9112	< 0.15
PX3224, PX3244, PX9114	< 0.15
PX3226, PX9116	< 0.15
PX3223, PX3227, PX9117	< 0.1
PX3228, PX9118	< 0.15
PX3229, PX9119	< 0.1
PX3237, PX3238	< 0.15
PX9110	< 0.15
PX9134	< 0.1

[1)] to EN50178, SELV, PELV

BFSL = Best Fit Straight Line / FR = full range

Temperature coefficients (TEMPCO) in the compensated temperature range 0 to 80°C (in% of full range/10 °C); greatest TEMPCO of the zero point / of full range

PX3111, PX9111	0.2 / 0.3
PX3220, PX3422, PX9110	0.3 / 0.4
PX3222, PX9112	0.2 / 0.3
PX3223	0.2 / 0.3
PX3224, PX3244, PX9114	0.2 / 0.3
PX3226, PX9116	0.2 / 0.3
PX3227, PX9117	0.15 / 0.2
PX3228, PX9118	0.2 / 0.3
PX3229, PX9119	0.15 / 0.2
PX3237	0.2 / 0.4
PX3238	0.3/ 0.5
PX9134	0.15 / 0.2

Housing material	stainless steel (316S12); FPM (Viton); PA; EPDM/X (Santoprene)
Materials (wetted parts)	stainless steel (303S22); ceramics; FPM (Viton)
Operating temperature [°C]	-25 to +80
Medium temperature [°C]	-25 to +90
Storage temperature [°C]	-40 to +100
Protection	IP 68 / IP 69K[2)]
Protection	IP 67[3)]
Protection	IP 65[4)]
Protection class	III
Insulation resistance [MΩ]	> 100 (500 V DC)
Shock resistance [g]	50 (DIN / IEC 68-2-27, 11ms)
Vibration resistance [g]	20 (DIN / IEC 68-2-6, 10 - 2000 Hz)

EMC

EN 61000-4-2 ESD:	4 kV / 8 KV AD
EN 61000-4-3 HF radiated:	30 V/m
EN 61000-4-4 Burst:	2 KV
EN 61000-4-6 HF conducted:	10 V
Radiation of interference:	according to the road vehicle guideline 2004/104/EC / CISPR25
Noise immunity:	according to the road vehicle guideline 2004/104/EC / ISO 11452-2
HF conducted:	100 V/m
Pulse resistance:	according to ISO7637-2 / severity level 3

[2)] for PX3111, PX3220, PX3222, PX3422, PX9110, PX9111, PX9112,

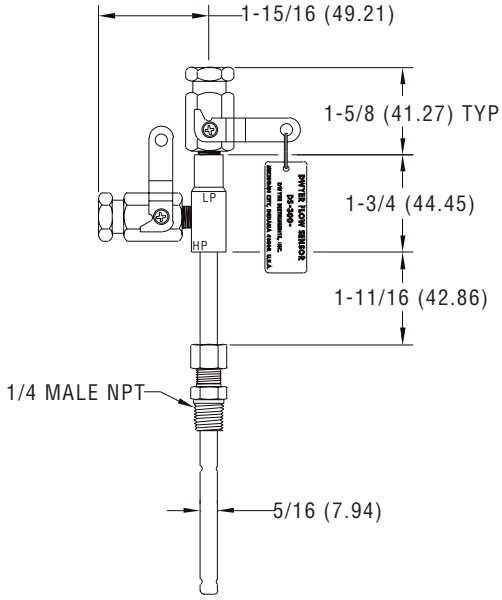
[3)] for PX3237, PX3238

[4)] for PX3223, PX3224, PX3226, PX3227, PX3228, PX3229, PX3244 PX9114, PX9116, PX9117, PX9118, PX9119, PX9134

More information at www.ifm.com

Series DS-300 Flow Sensors

Installation and Operating Instructions Flow Calculations



Series DS-300 Flow Sensors are averaging pitot tubes that provide accurate, convenient flow rate sensing. When purchased with a Dwyer Capsuhelic® for liquid flow or Magnehelic® for air flow, differential pressure gage of appropriate range, the result is a flow-indicating system delivered off the shelf at an economical price. Series DS-300 Flow Sensors are designed to be inserted in the pipeline through a compression fitting and are furnished with instrument shut-off valves on both pressure connections. Valves are fitted with 1/8″ female NPT connections. Accessories include adapters with 1/4″ SAE 45° flared ends compatible with hoses supplied with the Model A-471 Portable Capsuhelic® kit. Standard valves are rated at 200°F (93.3°C). Where valves are not required, they can be omitted at reduced cost. Series DS-300 Flow Sensors are available for pipe sizes from 1″ to 10″.

INSPECTION

Inspect sensor upon receipt of shipment to be certain it is as ordered and not damaged. If damaged, contact carrier.

INSTALLATION

General - The sensing ports of the flow sensor must be correctly positioned for measurement accuracy. The instrument connections on the sensor indicate correct positioning. The side connection is for total or high pressure and should be pointed upstream. The top connection is for static or low pressure.

Location - The sensor should be installed in the flowing line with as much straight run of pipe upstream as possible. A rule of thumb is to allow 10 - 15 pipe diameters upstream and 5 downstream. The table below lists recommended up and down piping.

PRESSURE AND TEMPERATURE

Maximum: 200 psig (13.78 bar) at 200°F (93.3°C).

Upstream and Downstream Dimensions in Terms of Internal Diameter of Pipe*

Upstream Condition	Minimum Diameter of Straight Pipe		
	Upstream		Downstream
	In-Plane	Out of Plane	
One Elbow or Tee	7	9	5
Two 90° Bends in Same Plane	8	12	5
Two 90° Bends in Different Plane	18	24	5
Reducers or Expanders	8	8	5
All Valves**	24	24	5

* Values shown are recommended spacing, in terms of internal diameter for normal industrial metering requirements. For laboratory or high accuracy work, add 25% to values.

** Includes gate, globe, plug and other throttling valves that are only partially opened. If valve is to be fully open, use values for pipe size change. **CONTROL VALVES SHOULD BE LOCATED AFTER THE FLOW SENSOR.**

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361, U.S.A.
Phone: 219/879-8000 **www.dwyer-inst.com**
Fax: 219/872-9057 **e-mail: info@dwyer-inst.com**

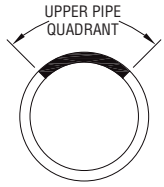
POSITION

Be certain there is sufficient clearance between the mounting position and other pipes, walls, structures, etc, so that the sensor can be inserted through the mounting unit once the mounting unit has been installed onto the pipe.

Flow sensors should be positioned to keep air out of the instrument connecting lines on liquid flows and condensate out of the lines on gas flows. The easiest way to assure this is to install the sensor into the pipe so that air will bleed into, or condensate will drain back to, the pipe.

For Air or Gas Flow

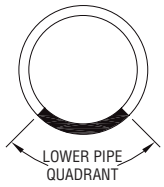
Install in upper quadrant of pipe



Condensate drains back to pipe

For Liquid or Steam Flow

Install in lower quadrant of pipe



Air bleeds back to pipe

INSTALLATION

1. When using an A-160 thred-o-let, weld it to the pipe wall. If replacing a DS-200 unit, an A-161 bushing (1/4˝ x 3/8˝) will be needed.

2. Drill through center of the thred-o-let into the pipe with a drill that is slightly larger than the flow sensor diameter.

3. Install the packing gland using proper pipe sealant. If the packing gland is disassembled, note that the tapered end of the ferrule goes into the fitting body.

4. Insert sensor until it bottoms against opposite wall of the pipe, then withdraw 1/16˝ to allow for thermal expansion.

5. Tighten packing gland nut finger tight. Then tighten nut with a wrench an additional 1-1/4 turns. Be sure to hold the sensor body with a second wrench to prevent the sensor from turning.

INSTRUMENT CONNECTION

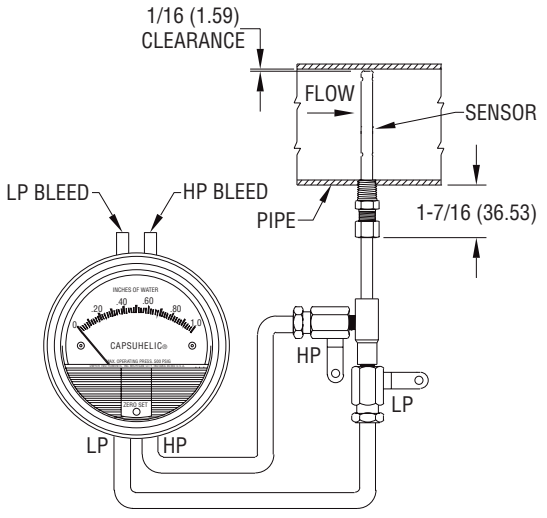
Connect the slide pressure tap to the high pressure port of the Magnehelic® (air only) or Capsuhelic® gage or transmitting instrument and the top connection to the low pressure port.

See the connection schematics below.

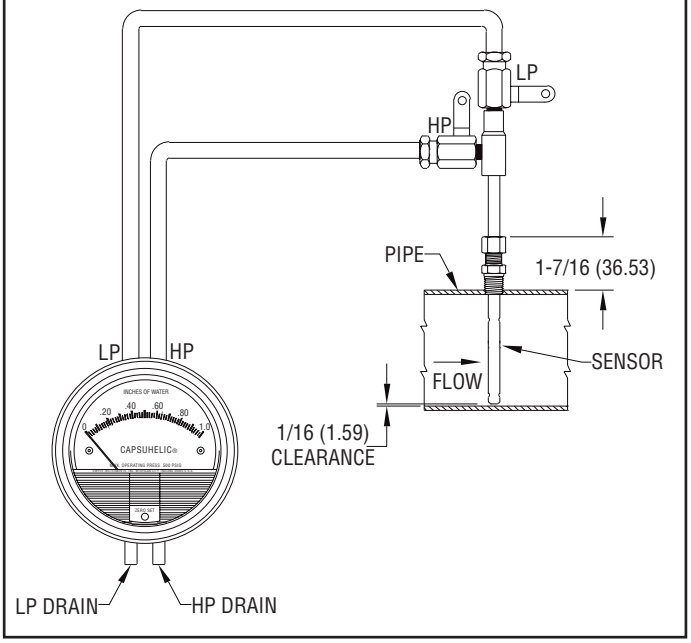
Bleed air from instrument piping on liquid flows. Drain any condensate from the instrument piping on air and gas flows.

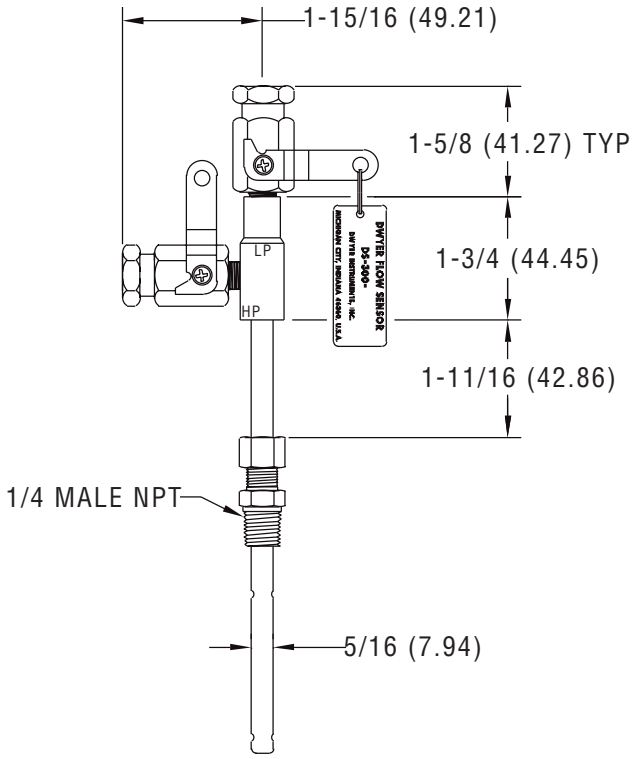
Open valves to instrument to place flow meter into service. For permanent installations, a 3-valve manifold is recommended to allow the gage to be zero checked without interrupting the flow. The Dwyer A-471 Portable Test Kit includes such a device.

Water Flow



Air or Gas Flow





Flow Calculations and Charts

The following information contains tables and equations for determining the differential pressure developed by the DS-300 Flow Sensor for various flow rates of water, steam, air or other gases in different pipe sizes.

This information can be used to prepare conversion charts to translate the differential pressure readings being sensed into the equivalent flow rate. When direct readout of flow is required, use this information to calculate the full flow differential pressure in order to specify the exact range of Dwyer Magnehelic® or Capsuhelic® gage required. Special ranges and calculations are available for these gages at minimal extra cost. See bulletins A-30 and F-41 for additional information on Magnehelic® and Capsuhelic® gages and DS-300 flow sensors.

For additional useful information on making flow calculations, the following service is recommended: Crane Valve Co. Technical Paper No. 410 “Flow of Fluids Through Valves, Fittings and Pipe.” It is available from Crane Valve Company, www.cranevalve.com.

Using the appropriate differential pressure equation from Page 4 of this bulletin,calculate the differential pressure generated by the sensor under normal operating conditions of the system. Check the chart below to determine if this value is within the recommended operating range for the sensor. Note that the data in this chart is limited to standard conditions of air at 60°F (15.6°C) and 14.7 psia static line pressure or water at 70°F (21.1°C). To determine recommended operating ranges of other gases, liquids an/or operating conditions, consult factory.

Note: the column on the right side of the chart which defines velocity ranges to avoid. Continuous operation within these ranges can result in damage to the flow sensor caused by excess vibration.

Pipe Size (Schedule 40)	Flow Coefficient “K”	Operating Ranges Air @ 60°F & 14.7 psia (D/P in. W.C.)	Operating Ranges Water @ 70°F (D/P in. W.C.)	Velocity Ranges Not Recommended (Feet per Second)
1	0.52	1.10 to 186	4.00 to 675	146 to 220
1-1/4	0.58	1.15 to 157	4.18 to 568	113 to 170
1-1/2	0.58	0.38 to 115	1.36 to 417	96 to 144
2	0.64	0.75 to 75	2.72 to 271	71 to 108
2-1/2	0.62	1.72 to 53	6.22 to 193	56 to 85
3	0.67	0.39 to 35	1.43 to 127	42 to 64
4	0.67	0.28 to 34	1.02 to 123	28 to 43
6	0.71	0.64 to 11	2.31 to 40	15 to 23
8	0.67	0.10 to 10	0.37 to 37	9.5 to 15
10	0.70	0.17 to 22	0.60 to 79	6.4 to 10

FLOW EQUATIONS

1. Any Liquid

$$Q\ (GPM) = 5.668 \times K \times D^2 \times \sqrt{\Delta P / S_f}$$

2. Steam or Any Gas

$$Q\ (lb/Hr) = 359.1 \times K \times D^2 \times \sqrt{p \times \Delta P}$$

3. Any Gas

$$Q\ (SCFM) = 128.8 \times K \times D^2 \times \sqrt{\frac{P \times \Delta P}{(T + 460) \times S_s}}$$

DIFFERENTIAL PRESSURE EQUATIONS

1. Any Liquid

$$\Delta P\ (in.\ WC) = \frac{Q^2 \times S_f}{K^2 \times D^4 \times 32.14}$$

2. Steam or Any Gas

$$\Delta P\ (in.\ WC) = \frac{Q^2}{K^2 \times D^4 \times p \times 128{,}900}$$

3. Any Gas

$$\Delta P\ (in.\ WC) = \frac{Q^2 \times S_s \times (T + 460)}{K^2 \times D^4 \times P \times 16{,}590}$$

Technical Notations

The following notations apply:

ΔP = Differential pressure expressed in inches of water column
Q = Flow expressed in GPM, SCFM, or PPH as shown in equation
K = Flow coefficient— See values tabulated on Pg. 3.
D = Inside diameter of line size expressed in inches.

For square or rectangular ducts, use: $D = \sqrt{\frac{4 \times \text{Height} \times \text{Width}}{\pi}}$

P = Static Line pressure (psia)
T = Temperature in degrees Fahrenheit (plus 460 = °Rankine)
p = Density of medium in pounds per square foot
S_f = Sp Gr at flowing conditions
S_s = Sp Gr at 60°F (15.6°C)

SCFM TO ACFM EQUATION

$$SCFM = ACFM \times \left(\frac{14.7 + PSIG}{14.7}\right) \left(\frac{520^*}{460 + °F}\right)$$

$$ACFM = SCFM \times \left(\frac{14.7}{14.7 + PSIG}\right) \left(\frac{460 + °F}{520}\right)$$

$$\text{POUNDS PER CUBIC FOOT STD.} = \text{POUNDS PER CUBIC FOOT ACT.} \times \left(\frac{14.7}{14.7 + PSIG}\right) \left(\frac{460 + °F}{520^*}\right)$$

$$\text{POUNDS PER CUBIC FOOT ACT.} = \text{POUNDS PER CUBIC FOOT STD.} \times \left(\frac{14.7 + PSIG}{14.7}\right) \left(\frac{520^*}{460 + °F}\right)$$

1 Cubic foot of air = 0.076 pounds per cubic foot at 60° F (15.6°C) and 14.7 psia.
* (520°= 460 + 60°) Std. Temp. Rankine

©Copyright 2004 Dwyer Instruments, Inc.
Printed in U.S.A. 7/04 FR# 72-440451-01 Rev. 2

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361, U.S.A.
Phone: 219/879-8000 www.dwyer-inst.com
Fax: 219/872-9057 e-mail: info@dwyer-inst.com

Magnehelic® Differential Pressure Gage

OPERATING INSTRUCTIONS

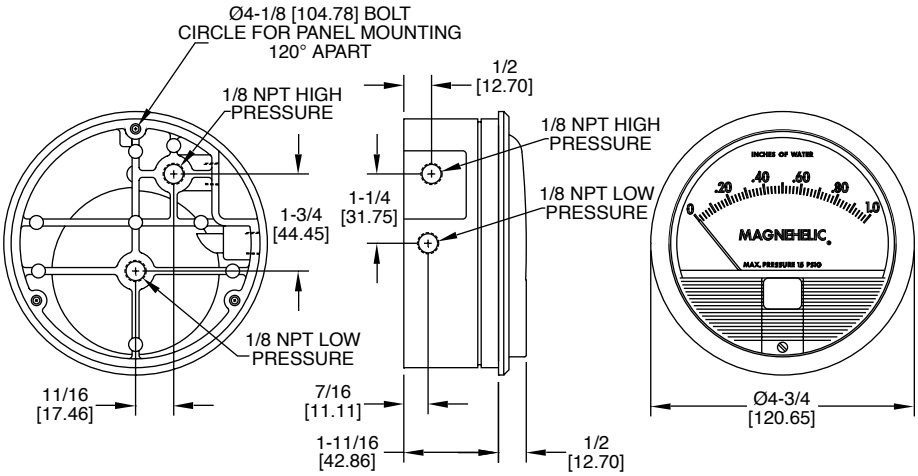
SPECIFICATIONS

Dimensions: 4-3/4″ dia. x 2-3/16″ deep.
Weight: 1 lb. 2 oz.
Finished: Baked dark gray enamel.
Connections: 1/8″ NPT high and low pressure taps, duplicated, one pair side and one pair back.
Accuracy: Plus or minus 2% of full scale, at 70°F. (Model 2000-0, 3%; 2000-00, 4%).
Pressure Rating: 15 PSI (0,35 bar)
Ambient Temperature Range: 20° to 140°F (-7 to 60°C).
Standard gage accessories include two 1/8″ NPT plugs for duplicate pressure taps, two 1/8″ NPT pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.

Caution: For use with air or compatible gases only.

For repeated over-ranging or high cycle rates, contact factory.

Not for use with Hydrogen gas. Dangerous reactions will occur.



DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361 U.S.A.

Phone: 219/879-8000
Fax: 219/872-9057
Lit-by-Fax: 888/891-4963

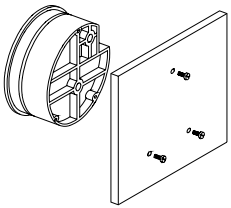
www.dwyer-inst.com
e-mail: info@dwyer-inst.com

MAGNEHELIC® INSTALLATION

1.Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F. Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines my be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.

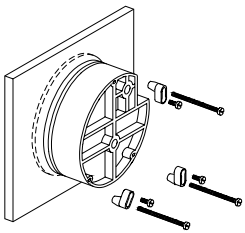
2. All standard Magnehelic gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range Model 2000-00 and metric equivalents must be used in the vertical position only.

3. Surface Mounting



Locate mounting holes, 120° apart on a 4-1/8″ dia. circle. Use No. 6-32 machine screws of appropriate length.

4. Flush Mounting



Provide a 4-9/16″ dia. opening in panel. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place. To mount gage on 1-1/4″-2″ pipe, order optional A-610 pipe mounting kit.

5. To zero the gage after installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

Operation

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8″ pipe thread to rubber tubing adapter and connect to source of pressure with rubber or Tygon tubing.

B. For permanent installation, 1/4″ O.D., or larger, copper or aluminum tubing is recommended. See accessory bulletin S-101 for fittings.

Ordering Instructions:

When corresponding with the factory regarding Magnehelic® gage problems, be sure to include model number, pressure range, and any special options. Field repair is not recommended; contact the factory for repair service.

MAINTENANCE

Maintenance: No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves, (bulletin S-101), should be used in permanent installations.

Calibration Check: Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the Magnehelic gage and the test gage to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid to drain, etc., and compare readings. If accuracy unacceptable, gage may be returned to factory for recalibration. To calibrate in the field, use the following procedure.

Calibration:

1. With gage case, held firmly, loosen bezel, by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.
2. Lift out plastic cover and "O" ring.
3. Remove scale screws and scale assembly. Be careful not to damage pointer.
4. The calibration is changed by moving the clamp. Loosen the clamp screw(s) and move slightly toward the helix if gage is reading high, and away if reading low. Tighten clamp screw and install scale assembly.
5. Place cover and O-ring in position. Make sure the hex shaft on inside of cover is properly engaged in zero adjust screw.
6. Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore gage will leak if not properly tightened.
7. Zero gage and compare to test instrument. Make further adjustments as necessary.

Caution: If bezel binds when installing, lubricate threads sparingly with light oil or molybdenum disulphide compound.

Warning: Attempted field repair may void your warrenty. Recalibration or repair by the user is not recommended. For best results, return gage to the factory. Ship prepaid to:

Dwyer Instruments, Inc.

Attn: Repair Dept.

102 Indiana Highway 212

Michigan City, IN 46360

Trouble Shooting Tips:

•G*age won't indicate or is sluggish.*

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O"ring damaged, missing.
5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F, order gage with low temperature, (LT) option.

•Pointer stuck-gage can't be zeroed.

1. Scale touching pointer.
2. Spring/magnet assembly shifted and touching helix.
3. **Metallic particles clinging to magnet and interfering with helix movement.**
4. Cover zero adjust shaft broken or not properly engaged in adjusting screw.

We generally recommend that gages needing repair be returned to the factory. Parts used in various sub-assemblies vary from one range of gage to another, and use of incorrect components may cause improper operation. After receipt and inspection, we will be happy to quote repair costs before proceeding.

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only.

©Copyright 2001 Dwyer Instruments, Inc.
Printed in U.S.A. 4/01 FR# 12-440212-00 Rev. 3

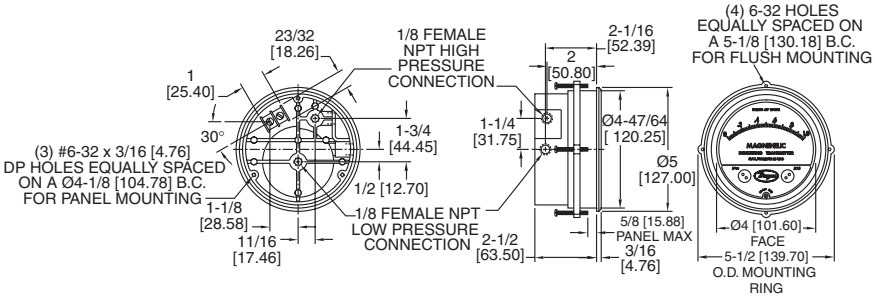
DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361 U.S.A.

Phone: 219/879-8000 www.dwyer-inst.com
Fax: 219/872-9057 e-mail: info@dwyer-inst.com
Lit-by-Fax: 888/891-4963

Series 605 Magnehelic® Differential Pressure Indicating Transmitter

Specifications - Installation and Operating Instructions

Patent No. 4,890,497



The Dwyer Series 605 Magnehelic® Indicating Transmitter simultaneously provides local indication on a large, easily read analog scale while also converting that pressure into a standard two-wire, 4-20 mA signal for ranges from 0-0.5 to 0-50˝ w.c. Positive, negative or differential air and compatible gas pressure can be measured with an accuracy of ±2% of full scale. The basic mechanical components of the Series 605 Magnehelic® indicating transmitter are similar to those used in the popular, time-proven Magnehelic® differential pressure gage. However, the Series 605 models add electrical conditioning and amplification of a resistance change produced by a silicon strain gage which is cemented to the range spring. This resistance change is the result of the slight flexing which results from spring deflection as pressure is applied to the diaphragm which is directly linked to the spring.

STANDARD ACCESSORIES

Mounting ring
Snap ring
(4) 6-32 x 1-1/4 screws (panel mtg.)
(3) 6-32 x 5/16 screws (surface mtg.)
(2) Tubing to 1/8˝ NPT adapters
(2) 1/8˝ NPT plugs
Adjustment key

SPECIFICATIONS

GAGE SPECIFICATIONS

Service: Air and non-combustible, compatible gases.
Wetted Materials: Consult factory.
Accuracy: See chart.
Stability: ±1% F.S./yr.
Pressure Limits: See chart.
Temperature Limits: 20 to 120°F (-6.67 to 48.9°C).
Process Connections: 1/8˝ female NPT.
Size: 4˝ (101.6 mm) dial face, 5˝ (127 mm) O.D. x 2-11/16˝ (68.3 mm).
Weight: 1 lb, 12.6 oz (811 g).
Agency Approvals: CE.

TRANSMITTER SPECIFICATIONS

Accuracy: See chart (includes linearity, hysteresis, repeatability).
Temperature Limits: 20 to 120°F (-6.67 to 48.9°C).
Compensated Temperature Range: 32 to 120°F (0 to 48.9°C).
Thermal Effect: ±0.025% F.S./°F (0.045% F.S./°C).
Power Requirements: 10-35 VDC (2-wire).
Output Signal: 4 to 20 mA.
Zero and Span Adjustments: Protected potentiometers.
Loop Resistance: DC; 0-1250 ohms maximum.
Current Consumption: DC; 38 mA maximum.
Electrical Connections: Screw terminal block.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.

Model Number	Range in w.c.	Maximum Pressure	Electrical Accuracy +/-%	Electrical Accuracy +/-%
605-00N	.05-0-.20	25 psi (1.7 bar)	2	4
605-11	.25-0-.25	25 psi (1.7 bar)	2	3
605-0	0-.50	25 psi (1.7 bar)	2	2
605-1	0-1.0	25 psi (1.7 bar)	2	2
605-2	0-2.0	10 in. w.c. (2.5 kPa)	0.5	2
605-3	0-3.0	5 psi (34.5 kPa)	0.5	2
605-6	0-6.0	5 psi (34.5 kPa)	0.5	2
605-10	0-10	5 psi (34.5 kPa)	0.5	2

Model Number	Range in w.c.	Maximum Pressure	Electrical Accuracy +/-%	Mechanical Accuracy +/-%
605-20	0-20.0	20 psi (1.4 bar)	0.5	2
605-30	0-30	20 psi (1.4 bar)	0.5	2
605-50	0-50	20 psi (1.4 bar)	0.5	2
	Range in Pa			
605-60Pa	0-60	25 psi (1.7 bar)	2	4
605-125Pa	0-125	25 psi (1.7 bar)	2	2
605-250Pa	0-250	25 psi (1.7 bar)	2	2
605-500Pa	0-500	10 in. w.c. (2.5 kPa)	0.5	2

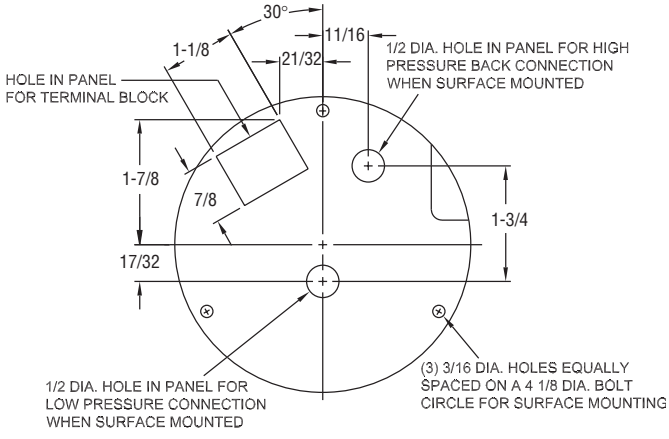
DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, IN 46361, U.S.A.
Phone: 219/879-8000 **www.dwyer-inst.com**
Fax: 219/872-9057 **e-mail: info@dwyer-inst.com**

INSTALLATION

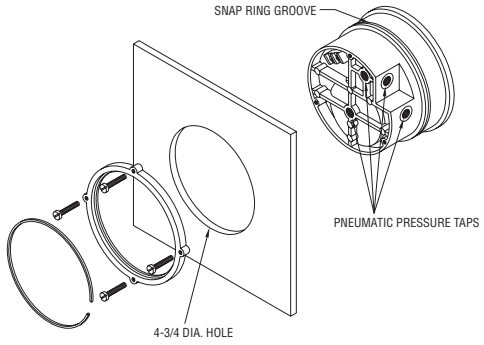
1. **LOCATION**: Select a location where the temperature of the unit will be between 20°F and 120°F. Distance from the receiver is limited only by total loop resistance. See "Electrical Connections". The tubing feeding pressure to the instrument can be run practically any length required but long lengths will increase response time slightly. Avoid surfaces with excessive vibration.

2. **POSITION:** All standard models are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If your application requires mounting in other than a vertical position, be sure to specify this when ordering.

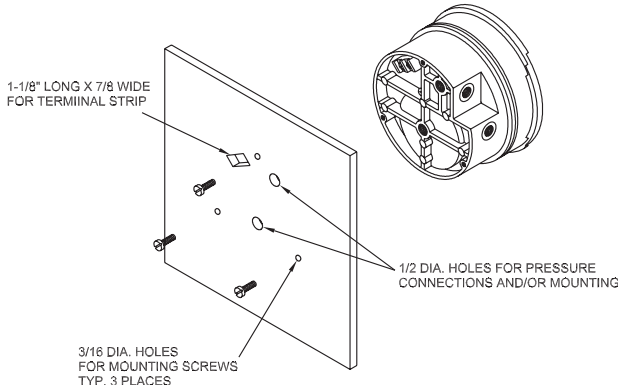
3. **PRESSURE CONNECTIONS:** For convenience, two sets of 1/8″ female NPT ports are available. Plug the unused set with pipe plugs provided. Attach tubing from positive pressure source to port marked "HI" or from negative (Vacuum) source to port marked "LOW". In either case, opposite port must be vented to atmosphere. In dusty environments, we recommend use of an A-331 Filter Vent Plug to keep interior of instrument clean. For differential pressures the higher source is connected to the "HI" port and lower to the "LOW" port.



4. **MOUNTING:** The Series 605 Transmitter may be either panel mounted or surface mounted.



A. PANEL MOUNTING: Cut a 4-3/4″ or 120 mm dia. hole in panel and insert the complete unit from the front. Slip on the mounting ring and install the split snap ring in the groove on the bezel. Seat the mounting ring against the snap ring and thread the four screws through the tapped holes. Tighten screws against rear of panel.



B. SURFACE MOUNTING: Drill (3) 3/16″ dia. holes for mounting screws and cut (1) 7/8″ x 1-1/8″ hole for access to terminal strip as shown in hole location drawing. Insert screws from rear of panel and thread into tapped holes on back of transmitter case. If rear pressure connections are to be used, make 1/2″ dia. holes located as shown in hole location drawing in left column.

5. **ZEROING:** Once gage/transmitter is mounted in its final position, check to be sure pointer aligns with zero on scale, when no pressure is applied and both low and high pressure ports are vented to atmosphere. To adjust, turn small slotted screw at center-bottom of gage face. **Do not** move the larger black knobs labeled SPAN and ZERO. These are for use only if a calibration check shows the 4-20 mA output signal to need adjustment. See page 3 under heading OUTPUT RANGING.

ELECTRICAL CONNECTIONS

CAUTION: DO NOT EXCEED SPECIFIED SUPPLY VOLTAGE RATINGS. PERMANENT DAMAGE NOT COVERED BY WARRANTY WILL RESULT. THIS UNIT IS NOT DESIGNED FOR AC VOLTAGE OPERATION.

Electrical connections to the Series 605 Transmitter are made to the two-screw terminal strip on the rear of the case. Polarity is indicated by + and – signs stamped on side. The schematic diagram of the Series 605 transmitter is illustrated in Figure B.

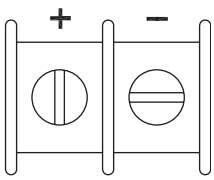


Figure A

An external power supply delivering 10.0 to 35 VDC with a minimum current capability of 40 milliamps must be used to power the control loop in which the Series 605 transmitter is connected. Refer to Fig. B for connection of the power supply, transmitter and receiver. The range of appropriate receiver load resistances (R_L) for the power supply voltage available is given by the formula and graph in Fig. C. Shielded two wire cable is recommended for control loop wiring and the negative side of the loop may be grounded if desired. Note also that the receiver may be connected in either the negative or positive side of the loop, whichever is most convenient. Should polarity of the transmitter or receiver be inadvertently reversed, the loop will not function properly but no damage will be done to the transmitter.

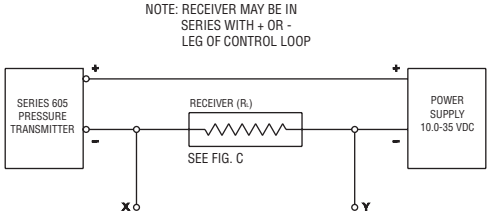


Figure B

The maximum length of connecting wire between the transmitter and the receiver is a function of wire size and receiver resistance. That portion of the total current loop resistance represented by the resistance of the connecting wires themselves should not exceed 10% of the receiver resistance. For extremely long runs (over 1,000 feet), it is desirable to select receivers with higher resistances in order to keep the size and cost of the connecting leads as low as possible. In installations where the connecting run is no more than 100 feet, connecting lead wire as small as No. 22 Ga. can be used.

The Series 605 transmitters can be used with receivers requiring 1-5 volt input rather than 4-20 mA. If the receiver requires a 1-5 volt input, insert a 250 ohm, 1/2 watt resistor in series with the current loop but in parallel with the receiver input. Referring to Figure B, R_L becomes the 250 ohm resistor and point X and Y are connected to the receiver input, point X being positive (+) and point Y negative (–) or ground. The resistor should be connected at the panel end of the transmitter current loop close to the receiver input to take advantage of the immunity of the current loop to electrical noise pickup. Most electronic component distributors stock a 249 r, 1/2 watt, ±1% tolerance metal film resistor which is adequate for this application.

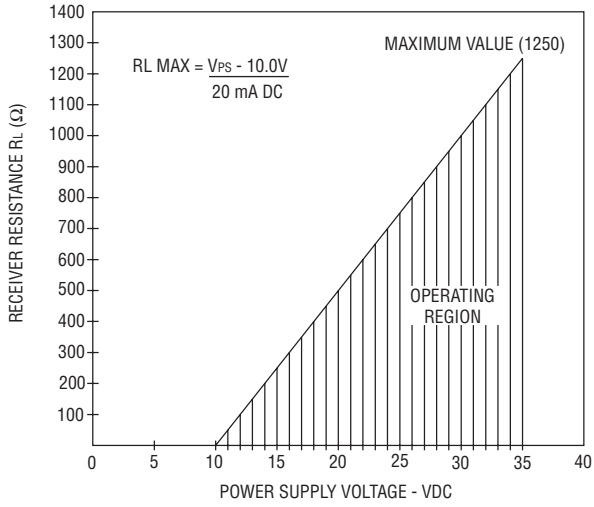


Figure C

OUTPUT RANGING

Each Series 605 Magnehelic® indicating transmitter is factory calibrated to produce 4 mA at zero scale reading and 20 mA at full scale reading. The following procedure should be used if the pressure versus output signal relationship needs to be checked.

1. With unit connected to the companion receiver per preceding instructions, insert an accurate milliammeter with a full scale reading of approximately 30 mA in series with the current loop.

2. Vent both pressure ports to atmosphere and, if necessary, adjust pointer zero screw to align pointer with zero on scale. A controllable pressure source capable of reaching the full scale range should be connected to either high pressure port. Plug the other high pressure port and vent one or both low pressure ports to atmosphere. The instrument must be ranged in the same position in which it will be used. Standard factory calibration and ranging is done with unit vertical.

3. Apply electrical power to the system and check for proper operation by slowly increasing pressure and observing whether the loop current increases above the 4 mA zero pressure reading.

4. A spanner type key is supplied to adjust span and zero. This helps to reduce unauthorized tampering. Apply pressure until pointer aligns with full scale reading and adjust the SPAN knob for a 20 mA reading.

5. Relieve all pressure, allow a few seconds for setting and adjust the ZERO knob for a 4 mA current loop reading.

6. The SPAN and ZERO controls are slightly interactive so steps 4 & 5 should be repeated a few times until readings of 4 and 20 mA are obtained consistently.

7. Remove the milliammeter from the current loop and proceed with final installation of the transmitter and receiver.

MULTIPLE UNITS WITH COMMON POWER SUPPLY

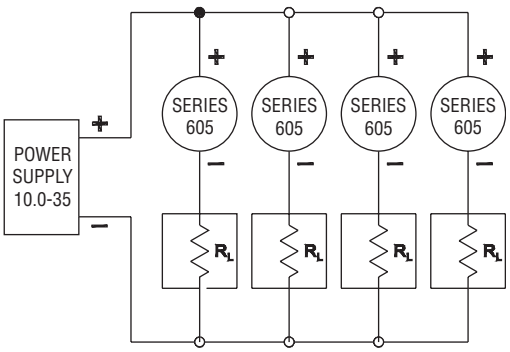


Figure D

Several Series 605 transmitters can be operated with a single power supply as depicted above in Figure D. Be careful to specify a supply with sufficient capacity. The minimum current requirement at a given voltage can be calculated by multiplying the number of units x 20 mA. In the example shown this would be 4 x 20 or 80 mA minimum.

MAINTENANCE

Upon final installation of the Series 605 Transmitter and the companion receiver, including the A-701 Digital Readout, no routine maintenance is required. A periodic check of system calibration is recommended. The Series 605 Differential Pressure Transmitter is is not field repairable and should be returned, freight prepaid, to the factory if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization (RGA) number before shipping.

©Copyright 2004 Dwyer Instruments, Inc.
Printed in U.S.A. 12/04 FR# 01-440559-00 Rev. 1

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, IN 46361, U.S.A.
Phone: 219/879-8000 www.dwyer-inst.com
Fax: 219/872-9057 e-mail: info@dwyer-inst.com

System O&M Data Sheet
2424 Hamburg Turnpike LLC

Date	Time	Initials	Blower Vacuum Before Knockout (in. Hg)	Air Velocity at DPE Main Intake (ft/s)	DPE Influent PID Reading (PPM)	Volume of Water in Condensate Holding Tank (gal)	Blower Discharge PID Reading (PPM)	DPE-1 Vacuum (in. H20)	DPE-2 Vacuum (in. H20)	DPE-3 Vacuum (in. H20)	DPE-4 Vacuum (in. H20)	DPE-5 Vacuum (in. H20)	DPE-6 Vacuum (in. H20)	DPE-7 Vacuum (in. H20)	DPE-8 Vacuum (in. H20)	DPE-9 Vacuum (in. H20)	DPE-10 Vacuum (in. H20)	DPE-11 Vacuum (in. H20)	DPE-12 Vacuum (in. H20)	DPE-13 Vacuum (in. H20)	DPE-14 Vacuum (in. H20)

Notes:

APPENDIX F

QUALITY ASSURANCE PROJECT PLAN (QAPP)

QUALITY ASSURANCE PROJECT PLAN

2424 HAMBURG TURNPIKE SITE
BCP SITE NUMBER: C915296
LACKAWANNA, NEW YORK

October 2019 B0345-015-001

Prepared for:

2424 Hamburg Turnpike, LLC

Prepared By:

Benchmark Environmental Engineering & Science, PLLC
2558 Hamburg Turnpike, Suite 300
Buffalo, NY 14218
(716)856-0599

QUALITY ASSURANCE PROJECT PLAN (QAPP)

2424 Hamburg Turnpike Site

Table of Contents

1.0 INTRODUCTION 1
1.1 Site Location and Description 1
1.2 Scope of the QAPP 1

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY 3
2.1 NYSDEC and NYSDOH 3
2.2 Property Owner 3
2.3 Project Manager 3
2.4 Field Team Leader: 4
2.5 Quality Assurance (QA) Officer 5
2.6 Laboratory Responsibilities 5

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA 7
3.1 Level of QC Effort for Sample Parameters 7

4.0 SAMPLE CUSTODY PROCEDURES 9
4.1 Field Custody Procedures 9
4.1.1 Sample Storage 9
4.1.2 Sample Custody 9
4.1.3 Sample Tracking 11

5.0 CALIBRATION PROCEDURES AND FREQUENCY 12
5.1 Field Instrument Calibration 12
5.2 Preventative Maintenance 12

6.0 DATA VALIDATION AND REPORTING 13
6.1 Data Usability Evaluation 13
6.1.1 Procedures Used to Evaluate Field Data Usability 13
6.1.2 Procedures Used to Evaluate Laboratory Data Usability 13
6.2 Data Reporting 14
6.2.1 Field Data Reporting 14
6.2.2 Laboratory Data Reporting 14

7.0 CORRECTIVE ACTION 15
7.1 Field Corrective Action 15
7.2 Laboratory Corrective Action 16
7.3 Data Validation & Assessment Corrective Action 16

QUALITY ASSURANCE PROJECT PLAN (QAPP)
2424 Hamburg Turnpike Site

Table of Contents

LIST OF TABLES

Table 1 Sample Container, Volume, Preservative, and Holding Time Requirements

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is an appendix to the Site Management Plan (SMP), which is required as an element of the remedial program at the 2424 Hamburg Turnpike Site (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP), administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreement (BCA) Index #C915296-10-15, which was executed on November 2, 2015.

1.1 Site Location and Description

The Site is located in the County of Erie, New York and is identified as S.B.L No. 141.59-5-2 on the Erie County Tax Map. The 1.04-acre BCP property is bound by an active gasoline station to the north, a retail store to the south, vacant land to the east and Hamburg Turnpike (aka Route 5) with vacant industrial land to the west.

1.2 Scope of the QAPP

This QAPP was prepared to provide quality assurance (QA) guidelines to be implemented post-remedial activities. The QAPP will assure the accuracy and precision of data collection during post-remedial Site redevelopment and data interpretation. The QAPP identifies procedures for sample collection to mitigate the potential for cross-contamination, as well as analytical requirements necessary to allow for independent data validation. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the EPA Region II CERCLA Quality Assurance Manual, and NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).This document may be modified for subsequent phases of investigative work, as necessary.

The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when;

- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations);

- A document that can be used by the Project Manager's and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data;

- A plan to document and track project data and results; and,

- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports.

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples; field testing; record keeping; data management; chain-of-custody procedures; laboratory analyses; and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be defended.

QA refers to the conduct of all planned and systematic actions necessary to perform satisfactorily all task-specific activities and to provide information and data confidence as a result of such activities. The QA for task-specific activities includes the development of procedures, auditing, monitoring and surveillance of the performance.

QC refers to the activity performed to determine if the work activities conform to the requirements. This includes activities such as inspections of the work activities in the field (e.g., verification that the items and materials installed conform to applicable codes and design specifications). QA is an overview monitoring of the performance of QC activities through audits rather than first time inspections.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The following section provides a generic organization for sampling activities, including roles, responsibilities, and required qualifications of these organizations.

2.1 NYSDEC and NYSDOH

It is the responsibility of the New York State Department of Environmental Conservation (NYSDEC), in conjunction with the New York State Department of Health, to review the project documents for completeness and conformance with the site-specific cleanup objectives and to make a decision to accept or reject these documents based on this review. The NYSDEC also has the responsibility and authority to review and approve all QA documentation collected during brownfield cleanup construction and to confirm that the QA Plan was followed.

2.2 Property Owner

The property owner (Owner), or holder of the certificate of completion (COC) will be responsible for complying with the QA requirements as specified herein and for monitoring and controlling the quality of the Brownfield cleanup activities either directly or through their designated environmental consultant and/or legal counsel. The Owner will also have the authority to select Contractor(s) to assist them in fulfilling these responsibilities. The Owner is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements.

2.3 Project Manager

The Project Manager has the responsibility for ensuring that the project meets the overall project objectives, reports directly to the Owner, coordinates with the NYSDEC/NYSDOH Project Coordinators, and is responsible for technical and project oversight. The PM will:

- Define project objectives and develop a detailed work plan schedule.
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.

- Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Review the work performed on each task to assure its quality, responsiveness, and timeliness.
- Review and analyze overall task performance with respect to planned requirements and authorizations.
- Review and approve all deliverables before their submission to NYSDEC.
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Ultimately be responsible for the preparation and quality of interim and final reports.
- Represent the project team at meetings.

2.4 Field Team Leader:

The Field Team Leader (FTL) has the responsibility for implementation of specific project tasks identified at the Site, and is responsible for the supervision of project field personnel, subconsultants, and subcontractors. The FTL reports directly to the Project Manager. The FTL will:

- Define daily develop work activities.
- Orient field staff concerning the project's special considerations.
- Monitor and direct subcontractor personnel.
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness.
- Assure that field activities, including sample collection and handling, are carried out in accordance with this QAPP.

2.5 Quality Assurance (QA) Officer

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute, and is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations and policies, and NYSDEC requirements. Specific function and duties include:

- Performing QA audits on various phases of the field operations.
- Reviewing and approving QA plans and procedures.
- Providing QA technical assistance to project staff.
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager for technical operations.
- Responsible for assuring third party data review of all sample results from the analytical laboratory.

2.6 Laboratory Responsibilities

Any environmental laboratory utilized for sample analysis for this Site must be an independent, NY State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified facility approved to perform the analyses prescribed herein.

- *Laboratory Director:*

  The Laboratory Director is a technical advisor and is responsible for summarizing and reporting overall unit performance. Responsibilities of the TestAmerica Laboratory Director include:

  - Provide technical, operational, and administrative leadership.
  - Allocation and management of personnel and equipment resources.
  - Quality performance of the facility.
  - Certification and accreditation activities.
  - Blind and reference sample analysis.

- *Quality Assurance Manager (QA Manager):*

  The QA Manager has the overall responsibility for data after it leaves the laboratory. The QA Manager will be independent of the laboratory but will communicate data issues through the Laboratory Director. In addition, the QA Manager will:

  - Oversee laboratory QA.
  - Oversee QA/QC documentation.
  - Conduct detailed data review.
  - Determine whether to implement laboratory corrective actions, if required.
  - Define appropriate laboratory QA procedures.
  - Prepare laboratory SOPs.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall objectives and criteria for assuring quality for this effort are discussed below. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented. The objectives of this QAPP are to address the following:

- The procedures to be used to collect, preserve, package, and transport soil, groundwater and air samples.
- Field data collection.
- Record keeping.
- Data management.
- Chain-of-custody procedures.
- Precision, accuracy, completeness, representativeness, for sample analysis and data management under EPA analytical methods.

3.1 Level of QC Effort for Sample Parameters

Field blank, method blank, trip blank, field duplicate, laboratory duplicate, laboratory control, standard reference materials (SRM) and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. QC samples are discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents at the facility that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.
- Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures.

- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD and MS/Duplicate samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Depending on site-specific circumstances, one MS/MSD or MS/Duplicate should be collected for every 20 or fewer investigative samples to be analyzed for organic and inorganic chemicals of a given matrix.

The general level of QC effort will be one field (blind) duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD or MS/Duplicate for every 20 or fewer investigative samples of a given matrix. One trip blank consisting of distilled, deionized water will be included along with each sample delivery group of aqueous VOC samples.

4.0 SAMPLE CUSTODY PROCEDURES

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person's custody if it is in the person's possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site.

4.1 Field Custody Procedures

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to their final disposition, the laboratory. A sample is considered to be in a person's custody if it is in the person's possession or it is in the person's view after being in his or her possession or it was in that person's possession and that person has locked it in a vehicle or room. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site.

4.1.1 Sample Storage

Samples are stored in secure limited-access areas. Walk-in coolers or refrigerators are maintained at 4°C, ± 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location if necessary. Sample parameter lists, holding times and sample container requirements are summarized on Table 1.

4.1.2 Sample Custody

Sample custody is defined by this document as when any of the following occur:

- It is in someone's actual possession.
- It is in someone's view after being in his or her physical possession.

- It was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering.

- It is placed in a designated and secured area.

Samples are removed from storage areas by the sample custodian or analysts and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure. If required by the applicable regulatory program, internal chain-of-custody is documented in a log by the person moving the samples between laboratory and storage areas.

Laboratory documentation used to establish COC and sample identification may include the following:

- Field COC forms or other paperwork that arrives with the sample.

- The laboratory COC.

- Sample labels or tags are attached to each sample container.

- Sample custody seals.

- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.

- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist.

- Sample storage log (same as the laboratory COC).

- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

4.1.3 Sample Tracking

All samples are maintained in the appropriate coolers prior to and after analysis. The analysts remove and return their samples as needed. Samples that require internal COC are relinquished to the analysts by the sample custodians. The analyst and sample custodian must sign the original COC relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original COC returning sample custody to the sample custodian. Sample extracts are relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department tracks internal COC through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the COC (e.g., sample breakage or depletion).

5.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

5.1 Field Instrument Calibration

Quantitative field data to be obtained during groundwater sampling include pH, turbidity, specific conductance, temperature, dissolved oxygen and depth to groundwater. Quantitative water level measurements will be obtained with an electronic sounder or steel tape, which require no calibration. Quantitative field data to be obtained during soil sampling include screening for the presence of volatile organic constituents using a photoionization detector (PID).

5.2 Preventative Maintenance

Each piece of field equipment is checked according to its routine maintenance schedule and before field activities begin. Field equipment that may be used at the Site includes:

- Photoionization detector (PID)
- Water quality meters (includes pH, turbidity, temperature, Eh, and specific conductance)
- Electric water level indicator

Field personnel will report all equipment maintenance and/or replacement needs to the Project QA Officer and will record the information on the daily field record.

6.0 DATA VALIDATION AND REPORTING

All data generated through field activities, or by the laboratory operation shall be reduced and validated (as required in the SMP) before reported.

6.1 Data Usability Evaluation

If requested by the NYSDEC, data evaluation will be performed by a third party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program*, National Functional Guidelines for Inorganic Data Review.*

6.1.1 Procedures Used to Evaluate Field Data Usability

The performance of all field activities, calibration checks on all field instruments at the beginning of each day of use, manual checks of field calculations, checking for transcription errors and review of field log books is the responsibility of the Field Team Leader.

6.1.2 Procedures Used to Evaluate Laboratory Data Usability

Data evaluation will be performed by the third party data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review*, and Contract Laboratory Program*, National Functional Guidelines for Inorganic Data Review.* The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. Also, results of blanks, surrogate spikes, MS/MSDs, and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix shall be evaluated. The third party data validation expert will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in this QAPP are present. The reviewer will determine whether all required items are present and request copies of missing deliverables.

6.2 Data Reporting

6.2.1 Field Data Reporting

All field documents will be accounted for when they are completed. Accountable documents include items such as field notebooks, sample logs, field data records, photographs, data packages, computer disks, and reports.

6.2.2 Laboratory Data Reporting

Analytical data will be summarized in tabular format with such information as sample identification, sample matrix description, parameters analyzed and their corresponding detected concentrations, and the detection limit. Analytical results will be incorporated into reports as data tables, maps showing sampling locations and analytical results, and supporting text.

7.0 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out of quality control performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. All corrective action proposed and implemented should be documented in the regular quality assurance reports to management. Corrective action should be implemented only after approval by the Project Manager, or his/her designee. If immediate corrective action is required, approvals secured by telephone from the Project Manager should be documented in an additional memorandum.

7.1 Field Corrective Action

If errors in field procedures are discovered during the observation or review of field activities by the Project QA Officer or his/her designee, corrective action will be initiated. Nonconformance to the QA/QC requirements of the field operating procedures will be identified by field audits or immediately by project staff who know or suspect that a procedure is not being performed in accordance with the requirements. The Project QA Officer or his designee will be informed immediately upon discovery of all deficiencies. Timely action will be taken if corrective action is necessary.

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Work Plan, etc.) or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. In general, the Project Manager and QA Officer may identify the need for corrective action. The Project Manager will approve the corrective measure that will be implemented by the field team. It will be the responsibility of the Project Manager to ensure that corrective action has been implemented.

If the corrective action will supplement the existing sampling using existing and approved procedures in the QAPP, corrective action approved by the Project Manager will be documented. If the corrective actions result in less samples (or analytical fractions), alternate locations, etc., which may result in non-achievement of project QA objectives, it will be necessary that all levels of project management, including the NYSDEC Project Coordinator, concur with the proposed action.

Corrective actions will be implemented and documented in the project field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by the NYSDEC Project Coordinator.

If at any time a corrective action issue is identified which directly impacts project data quality objectives, the NYSDEC Project Coordinator will be notified immediately.

7.2 Laboratory Corrective Action

Corrective actions may be initiated if the quality assurance goals are not achieved. The initial step in a corrective action is to instruct the analytical laboratory to examine its procedures to assess whether analytical or computational errors caused the anomalous result. If no error in laboratory procedures or sample collection and handling procedures can be identified, then the Project Manager will assess whether reanalysis or resampling is required or whether any protocol should be modified for future sampling events.

7.3 Data Validation & Assessment Corrective Action

The need for corrective action may be identified during the data validation or assessment processes. Potential types of corrective action may include resampling by the field team, or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the QA objectives (e.g., the holding time for samples is not exceeded, etc.). If the data validator identifies a corrective action situation, the Project Manager will be responsible for approving the corrective action implementation. All required corrective actions will be documented by the laboratory Quality Assurance Coordinator.

TABLE

TABLE 1

SAMPLE CONTAINER, VOLUME, PRESERVATION & HOLDING TIME REQUIREMENTS

SITE MANAGEMENT PLAN

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

Matrix	Parameter [1]	Method [1]	Container Type	Minimum Volume	Preservation (Cool to 2-4 °C for all samples)	Holding Time from Sample Date
Soil	TCL + CP-51 VOCs	8260B	EnCore/amber glass	5 gm / 4 oz.	Cool to 2-4 °C, Zero Headspace	48 - hours / 14 days
	TCL SVOCs	8270C	amber glass	8 oz.	Cool to 2-4 °C	14 days extrac./40 days
	TAL Metals [2]	6010	amber glass	4 oz.	Cool to 2-4 °C	6 months/Hg 28 days
	Pesticides	8081	amber glass	8oz	Cool to 2-4 °C	14 days extrac./40 days
	Herbicides	8151	amber glass	8oz	Cool to 2-4 °C	14 days extrac./40 days
	PCBs	8082	amber glass	4 oz.	Cool to 2-4 °C	14 days extrac./40 days
	PFAS	modified 537	HDPE/Polypropylene	4-8 oz.	Cool to 2-4 °C	14 days extrac./40 days
	1,4-dioxane	8270 SIM mode	amber glass	8 oz.	Cool to 2-4 °C	14 days extrac./40 days
Groundwater	TCL + CP-51 VOCs	8260B	glass vial	3 - 4 oz.	HCl to pH<2, Zero Headspace, Cool to 2-4 °C	14 days
	TCL SVOCs	8270C	amber glass	1000 ml	Cool to 2-4 °C	7 days extrac/40 days
	TAL Metals [2]	6010	plastic	600 ml	HNO_3 to pH<2, Cool to 2-4 °C	6 months/Hg 28 days
	Pesticides	8081B	amber glass	1000 ml	Cool to 2-4 °C	14 days extrac./40 days
	Herbicides	8151A	amber glass	1000 ml	Cool to 2-4 °C	14 days extrac./40 days
	PCBs	8082	amber glass	1000 ml	Cool to 2-4 °C	7 days extrac/40 days
	PFAS	modified 537	HDPE/Polypropylene	2 - 500 mL	Trizma, Cool to 2-4 °C	14 days
	1,4-dioxane	8270 SIM mode	amber glass	2 - 500 mL	Cool to 2-4 °C	7 days extrac./40 days
Air/Soil Vapor	TCL VOCs	TO-15	Summa Cannister	6 liters	None	Analyze within 14 days of sample date of collection

References:

1. Test Methods for Evaluating Solid Wastes, USEPA SW-846, Update III, 1991.

Notes:

1. EPA-approved methods published in Reference 1 above may be used. The list of analytes, laboratory method and the method detection limit for each parameter are included in Tables 1 and 2 of the QAPP.
2. Mercury sampling in soil/groundwater via EPA methods 7471/7470 respectively.

Acronyms:

VOCs = Volatile Organic Compounds
PFAS = Per- and Polyfluoroalkyl Substances
SVOCs = Semi-Volatile Organic Compounds
TCL = Target Compound List
TAL = Target Analyte List

APPENDIX G

SITE MANAGEMENT FORMS

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, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
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		
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:
Other:

CERTIFICATION BY CONTRACTOR

I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application.

_____

Date **Contractor**

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

DAILY LOG	DATE			
	NO.			
	SHEET		OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
PROJECT LOCATION:	CLIENT:
FIELD ACTIVITY:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	DESCRIPTION

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS:

WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
A.M.:	
P.M.:	

PERSONNEL ON SITE:	
SIGNATURE	DATE:

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

DAILY LOG				
	DATE			
	NO.			
	SHEET		OF	

FIELD ACTIVITY DAILY LOG
(CONTINUED)

PROJECT NAME:	PROJECT NO.

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	DESCRIPTION

SIGNATURE DATE:

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

DAILY LOG	DATE			
	NO.			
	SHEET		OF	

FIELD ACTIVITY DAILY LOG
(CONTINUED)

PROJECT NAME:	PROJECT NO.

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TIME	DESCRIPTION

REFERENCED PROJECT FIELD FORMS:

☐ Aquifer Test Data Sheet	☐ Impacted Soil Excavation Log	☐ Soil Gas Survey Log
☐ Chain-of-Custody Form	☐ Impacted Soil Transportation Log	☐ Step-Drawdown Test Data Sheet
☐ Construction Sample Summary Log	☐ Monitoring Well Inspection Form	☐ Survey Elevation Log
☐ Corrective Measures Report	☐ Nuclear Densitometer Field Log	☐ Tailgate Safety Meeting Form
☐ Daily Drilling Report	☐ Photographic Log	☐ Test Pit Excavation Log
☐ Drilling Safety Checklist	☐ Pipe Leakage Testing Log	☐ Underground/Overhead Utility Checklist
☐ Equipment Calibration Log	☐ Post-Closure Field Inspection Report	☐ Variance Log
☐ Field Borehole Log	☐ Pressure Packer Testing Log	☐ Water Level Monitoring Record
☐ Field Borehole/Monitoring Well Installation Log	☐ Problem Identification Report	☐ Water Quality Field Collection Log
☐ Field Investigation Report	☐ Real-Time Air Monitoring Log	☐ Water Sample Collection Log
☐ Field Slug Test Log	☐ Record of Telecom Meeting	☐ Well Abandonment/Decomm. Log
☐ Groundwater Elevation Log	☐ Sample Summary Collection Log	☐ Well Completion Detail
☐ GW Well Development and Purge Log	☐ Sediment Sample Collection Log	☐
☐ Hot Work Permit	☐ Seep Sample Collection Log	☐
☐ IDW Container Log	☐ Seepage Meter Sample Collection Log	☐

SIGNATURE DATE:

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

GROUNDWATER FIELD FORM

Project Name: Date:

Location: Project No.: Field Team:

Well No.			Diameter (inches):			Sample Date / Time:			
Product Depth (fbTOR):			Water Column (ft):			DTW when sampled:			
DTW (static) (fbTOR):			One Well Volume (gal):			Purpose: ☐ Development ☐ Sample ☐ Purge & Sample			
Total Depth (fbTOR):			Total Volume Purged (gal):			Purge Method:			
Time	Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (uS)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	0 Initial								
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
Sample Information:									
	S1								
	S2								

Well No.			Diameter (inches):			Sample Date / Time:			
Product Depth (fbTOR):			Water Column (ft):			DTW when sampled:			
DTW (static) (fbTOR):			One Well Volume (gal):			Purpose: ☐ Development ☐ Sample ☐ Purge & Sample			
Total Depth (fbTOR):			Total Volume Purged (gal):			Purge Method:			
Time	Water Level (fbTOR)	Acc. Volume (gallons)	pH (units)	Temp. (deg. C)	SC (uS)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Appearance & Odor
	0 Initial								
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
Sample Information:									
	S1								
	S2								

REMARKS:

Note: All water level measurements are in feet, distance from top of riser.

Volume Calculation

Diam.	Vol. (g/ft)
1"	0.041
2"	0.163
4"	0.653
6"	1.469

Stabilization Criteria

Parameter	Criteria
pH	± 0.1 unit
SC	± 3%
Turbidity	± 10%
DO	± 0.3 mg/L
ORP	± 10 mV

PREPARED BY:

New York State Department of Environmental Conservation
Division of Environmental Remediation, 11th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9553 **Fax:** (518) 402-9577
Website: www.dec.ny.gov

45-Day Reminder Notice: Site Management Periodic Review

,

September 29, 2009
Site Name:
Site No.:
Site Address:
, NY

Dear :

This is a reminder that as part of the last phase of a site's remedial program (i.e., "Site Management" (SM)), a progress report for your site is to be submitted by you, the site owner or Remedial Party, to the New York State Department of Environmental Conservation (Department) by . This report, now referred to as the Periodic Review Report (PRR) documents the implementation of and compliance with the Site Management requirements for this site. SM is a concept defined in regulation (6 NYCRR 375-1.2(at)). A suggested outline for the PRR is enclosed. If the site is comprised of multiple properties or parcels, then you as the owner or Remedial Party must arrange to submit one PRR for all parcels that comprise the site.

Depending on the age of the remedial program for your site, the document(s) governing SM for your site will be different. Previously, SM requirements were contained in separate documents with specific titles (e.g., Operation, Maintenance, and Monitoring Plan or Soil Management Plan) and are now being incorporated into one comprehensive "Site Management Plan" (SMP). A SMP may contain one or all of the following elements as applicable to the site; a plan to maintain institutional and/or engineering controls ("IC/EC Plan"), a plan for monitoring the performance and effectiveness of the selected remedy ("Monitoring Plan"), and/or a plan for the operation and maintenance of the selected remedy ("O&M Plan"). Additionally, the requirements for SM are normally stated in the decision document (e.g., Record of Decision) and/or the legal agreement directing the remediation of the site (e.g., order on consent, voluntary agreement, etc.).

When you submit the PRR (by the due date above), please sign and include the enclosed forms documenting that all SM requirements are being met. If there is some reason you cannot certify that all SM requirements are being met, you should indicate this and include a statement of explanation in the PRR with a schedule for addressing the problem(s). The Periodic Review process will not be considered complete until all necessary corrective measures are completed and any required controls are certified. Instructions for completing the certifications are enclosed.

Enclosures

ec: , Project Manager
, Bureau Director
Hazardous Waste Remediation Engineer, Region
Gary Litwin, DOH

cc:

Enclosure
Periodic Review Report (PRR) General Guidance

I. Introduction: (½-page or less)

A. Provide a brief summary of site, nature and extent of contamination, and remedial history.

B. Effectiveness of the Remedial Program - Provide overall conclusions regarding;
   1. progress made during the reporting period toward meeting the remedial objectives for the site
   2. the ultimate ability of the remedial program to achieve the remedial objectives for the site.

C. Compliance
   1. Identify any areas of non-compliance regarding the major elements of the Site Management Plan (SMP, i.e., the Institutional/Engineering Control (IC/EC) Plan, the Monitoring Plan, and the Operation & Maintenance (O&M) Plan).
   2. Propose steps to be taken and a schedule to correct any areas of non-compliance.

D. Recommendations
   1. recommend whether any changes to the SMP are needed
   2. recommend any changes to the frequency for submittal of PRRs (increase, decrease)
   3. recommend whether the requirements for discontinuing site management have been met.

II. Site Overview (one page or less)

A. Describe the site location, boundaries (figure), significant features, surrounding area, and the nature and extent of contamination prior to site remediation.

B. Describe the chronology of the main features of the remedial program for the site, the components of the selected remedy, cleanup goals, site closure criteria, and any significant changes to the selected remedy and site that have been made since remedy selection.

III. Evaluate Remedy Performance, Effectiveness, and Protectiveness

A. Using tables, graphs, charts and bulleted text to the extent practicable, describe the effectiveness of the remedy in achieving the remedial goals for the site. Base findings, recommendations, and conclusions on objective data. Evaluations should be presented simply and concisely.

IV. IC/EC Plan Compliance Report (if applicable)

A. IC/EC Requirements and Compliance
   1. Describe each control, its objective, and how performance of the control is evaluated.
   2. Summarize the status of each goal (whether it is fully in place and its effectiveness).
   3. Corrective Measures: describe steps proposed to address any deficiencies in ICECs.
   4. Conclusions and recommendations for changes.

B. IC/EC Certification
   1. The certification must be complete (even if there are IC/EC deficiencies), and certified by the appropriate party as set forth in a Department-approved certification form(s).

V. **Monitoring Plan Compliance Report (if applicable)**

A. Components of the Monitoring Plan (tabular presentations preferred) - Describe the requirements of the monitoring plan by media (i.e., soil, groundwater, sediment, etc.) and by any remedial technologies being used at the site.

B. Summary of Monitoring Completed During Reporting Period - Describe the monitoring tasks actually completed during this PRR reporting period. Tables and/or figures should be used to show all data.

C. Comparisons with Remedial Objectives - Compare the results of all monitoring with the remedial objectives for the site. Include trend analyses where possible.

D. Monitoring Deficiencies - Describe any ways in which monitoring did not fully comply with the monitoring plan.

E. Conclusions and Recommendations for Changes - Provide overall conclusions regarding the monitoring completed and the resulting evaluations regarding remedial effectiveness.

VI. **Operation & Maintenance (O&M) Plan Compliance Report (if applicable)**

A. Components of O&M Plan - Describe the requirements of the O&M plan including required activities, frequencies, recordkeeping, etc.

B. Summary of O&M Completed During Reporting Period - Describe the O&M tasks actually completed during this PRR reporting period.

C. Evaluation of Remedial Systems - Based upon the results of the O&M activities completed, evaluated the ability of each component of the remedy subject to O&M requirements to perform as designed/expected.

D. O&M Deficiencies - Identify any deficiencies in complying with the O&M plan during this PRR reporting period.

E. Conclusions and Recommendations for Improvements - Provide an overall conclusion regarding O&M for the site and identify problems, their severity, and any suggested improvements requiring changes in the O&M Plan.

VII. **Overall PRR Conclusions and Recommendations**

A. Compliance with SMP - For each component of the SMP (i.e., IC/EC, monitoring, O&M), summarize;

1. whether all requirements of each plan were met during the reporting period
2. any requirements not met such as new completed exposure pathways resulting in unacceptable risk
3. proposed plans and a schedule for coming into full compliance.

B. Performance and Effectiveness of the Remedy - Based upon your evaluation of the components of the SMP, form conclusions about the performance of each component and the ability of the remedy to achieve the remedial objectives for the site.

C. Future PRR Submittals

1. Recommend, with supporting justification, whether the frequency of the submittal of PRRs should be changed (either increased or decreased).
2. If the requirements for site closure have been achieved, contact the Department's Project Manager for the site to determine what, if any, additional documentation is needed to support a decision to discontinue site management.

VIII. **Additional Guidance**

A. Additional guidance regarding the preparation and submittal of an acceptable PRR can be obtained from the Department's Project Manager for the site.

WHERE to mail the signed Certification Form by :

New York State Department of Environmental Conservation

Attn: , Project Manager

Please note that extra postage may be required.

Enclosure 1

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No.

Site Name

Site Address: Zip Code:
City/Town:
County:
Allowable Use(s) (if applicable, does not address local zoning):
Site Acreage:
Owner:
, , NY

Reporting Period: to

Verification of Site Details **Box 2**

	YES	NO
1. Is the information in Box 1 correct?	☐	☐
If NO, are changes handwritten above or included on a separate sheet?	☐	
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	☐
If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
3. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	☐
If YES, is documentation (or evidence that documentation has been previously submitted) included with this certification?	☐	
4. If use of the site is restricted, is the current use of the site consistent with those restrictions?	☐	☐
If NO, is an explanation included with this certification?	☐	
5. For non-significant-threat Brownfield Cleanup Program Sites subject to ECL 27-1415.7(c), has any new information revealed that assumptions made in the Qualitative Exposure Assessment regarding offsite contamination are no longer valid?	☐	☐
If YES, is the new information or evidence that new information has been previously submitted included with this Certification?	☐	
6. For non-significant-threat Brownfield Cleanup Program Sites subject to ECL 27-1415.7(c), are the assumptions in the Qualitative Exposure Assessment still valid (must be certified every five years)?	☐	☐
If NO, are changes in the assessment included with this certification?	☐	

SITE NO. Box 3

Description of Institutional Controls

Box 4

Description of Engineering Controls

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) 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 is accurate and compete.

YES	NO
☐	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) 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;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
☐	☐

3. If this site has an Operation and Maintenance (O&M) Plan (or equivalent as required in the Decision Document);

   I certify by checking "YES" below that the O&M Plan Requirements (or equivalent as required in the Decision Document) are being met.

YES	NO
☐	☐

4. If this site has a Monitoring Plan (or equivalent as required in the remedy selection document);

   I certify by checking "YES" below that the requirements of the Monitoring Plan (or equivalent as required in the Decision Document) is being met.

YES	NO
☐	☐

IC CERTIFICATIONS
SITE NO.

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 2 and/or 3 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 _____ at _____,
print name print business address

am certifying as _____(Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

_____ _____
Signature of Owner or Remedial Party Rendering Certification Date

IC/EC CERTIFICATIONS

Box 7

QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) SIGNATURE

I certify that all information in Boxes 4 and 5 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 _____ at _____,
print name print business address

am certifying as a Qualified Environmental Professional for the _____

(Owner or Remedial Party) for the Site named in the Site Details Section of this form.

_____ _____ _____
Signature of Qualified Environmental Professional, for the Owner or Remedial Party, Rendering Certification Stamp (if Required) Date

Enclosure 2

Certification Instructions

I. Verification of Site Details (Box 1 and Box 2):

Answer the six questions in the Verification of Site Details Section. Questions 5 and 6 only refer to sites in the Brownfield Cleanup Program. The Owner and/or Qualified Environmental Professional (QEP) may include handwritten changes and/or other supporting documentation, as necessary.

II. Certification of Institutional / Engineering Controls (Boxes 3, 4, and 5)

1. Review the listed IC/ECs, confirming that all existing controls are listed, and that all existing controls are still applicable. If there is a control that is no longer applicable the Owner / Remedial Party is to petition the Department requesting approval to remove the control.

2. In Box 5, complete certifications for all Plan components, as applicable, by checking the corresponding checkbox.

3. If you cannot certify "YES" for each Control and/or certify the other SM Plan components that are applicable, continue to complete the remainder of this **Certification** form. Attach supporting documentation that explains why the **Certification** cannot be rendered, as well as a statement of proposed corrective measures, and an associated schedule for completing the corrective measures. Note that this **Certification** form must be submitted even if an IC or EC cannot be certified; however, the certification process will not be considered complete until corrective action is completed.

   If the Department concurs with the explanation, the proposed corrective measures, and the proposed schedule, a letter authorizing the implementation of those corrective measures will be issued by the Department's Project Manager. Once the corrective measures are complete, a new Periodic Review Report (with IC/EC Certification) is to be submitted within 45 days to the Department. If the Department has any questions or concerns regarding the PRR and/or completion of the IC/EC Certification, the Project Manager will contact you.

III. IC/EC Certification by Signature (Box 6 and Box 7):

If you certified "YES" for each Control, please complete and sign the IC/EC Certifications page. Where the only control is an Institutional Control on the use of the property the certification statement in Box 6 shall be completed and may be made by the property owner. Where the site has Institutional and Engineering Controls, the certification statement in Box 7 must be completed by a Professional Engineer or Qualified Environmental Professional (see table below).

Table 1. Signature Requirements for Control Certification Page

Type of Control	Example of IC/EC	Required Signatures
EC which does not include a treatment system or engineered caps.	Fence, Clean Soil Cover, Individual House Water Treatment System, Vapor Mitigation System	A site or property owner or remedial party, and a QEP. (P.E. license not required)
EC that includes treatment system or an engineered cap.	Pump & Treat System providing hydraulic control of a plume, Part 360 Cap.	A site or property owner or remedial party, and a QEP with a P.E. license.

APPENDIX H

REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION FOR 2424 HAMBURG TURNPIKE SITE

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 Operation and Maintenance Program

3.0 FINDINGS AND OBSERVATIONS
- 3.1 SUBSURFACE PERFORMANCE
- 3.2 TREATMENT SYSTEM PERFORMANCE
- 3.3 REGULATORY COMPLIANCE 3-3
- 3.4 MAJOR COST COMPONENTS OR PROCESSES
- 3.5 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

APPENDIX I

ELECTRONIC COPY