HAMILTON GREEN WESTCHESTER COUNTY WHITE PLAINS, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C360177

Prepared for:

S-WD/WP LLC

c/o Law Offices of Denise J. D'Ambrosio 2 Westchester Park Drive, Suite 418 White Plains, New York 10604

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision Date No. Submitted		Summary of Revision	NYSDEC Approval Date	

DECEMBER 2024

CERTIFICATION STATEMENT

ι Fuad Dahan	certify that I am	currently a NYS	registered professional
engineer as in	defined in 6 NYCRR Part	375 and that this	Site Management Plan
was prepared	in accordance with all ap	oplicable statutes	and regulations and in
substantial con	formance with the DER	Technical Guidan	ce for Site Investigation
and Remediation	on (DER-10) and Green F	Remediation (DER	k - 31).

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12/30/2024		_DATE

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LIST OF ACRONYMS

Acronym	Definition		
ACM	Asbestos-Containing Material		
AWQS	Ambient Water Quality Standards		
BCA	Brownfield Cleanup Agreement		
ВСР	Brownfield Cleanup Program		
BMPs	Best Management Practices		
CAMP	Community Air Monitoring Plan		
CCR	Construction Completion Report		
COC	Certificate of Completion		
DER	Division of Environmental Remediation		
DER-10	NYSDEC Technical Guidance for Site Investigation		
	& Remediation		
EE	Environmental Easement		
ESA	Environmental Site Assessment		
FER	Final Engineering Report		
ft-bgs	feet below ground surface		
HASP	Health and Safety Plan		
IRM	Interim Remedial Measures		
MTBE	methyl-tertiary-butyl-ether		
MW	Monitoring Well		
NYSDEC	New York State Department of Environmental		
	Conservation		
NYSDOH	New York State Department of Health		
PCB	Polychlorinated Biphenyls		
PCE	Tetrachloroethene		
PE	Professional Engineer		
PFAS	Per and Polyfluoroalkyl Substances		
PFOA	Perfluorooctanoic Acid		
PFOS	Perfluorooctanesulfonic Acid		
PHC	Petroleum Hydrocarbon		
PRR	Periodic Review Report		
QAPP	Quality Assurance Project Plan		
QA/QC	Quality Assurance/Quality Control		
RAO	Remedial Action Objective		
RAWP	Remedial Action Work Plan		
RI	Remedial Investigation		

Acronym	Definition
RI/IRMWP	Remedial Investigation/Interim Remedial Measures
	Work Plan
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objectives
SGS	SGS North America
SESI	SESI Consulting Engineers, DPC
SMP	Site Management Plan
SOE	Support of Excavation
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TOGS	Technical and Operations Guidance Series
USCO	Unrestricted Use Soil Cleanup Objectives
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

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 (SMP):

Site Identification:	BCP NO. C360177 Hamilton Green, 200 Ham Avenue, White Plains				
Institutional Controls (ICs):	1. The Site is subject to an environmental easement (EE) which restricts the use of the Site to restricted residential, commercial, or industrial use. Should the Site meet the requirements for an unrestricted Track 1 remedy for all media within five years of the date of Certificate of Completion (COC), with the approval of NYSDEC, the EE and this SMP will be extinguished and the Site can then be used for unrestricted use.				
	 EE and SMP compliance until groundwater requirements have been met or until data demonstrates that the groundwater contamination has reached asymptotic levels or ambient water quality standards or are attributable to an off-site source, at which point the Volunteer will petition NYSDEC to terminate the SMP and EE. When the EE is terminated the use of groundwater at the Site will continue to be prohibited per Chapter 873, Article VII of the Laws of Westchester County. Quarterly monitoring of the groundwater monitoring network. 				
Engineering Controls (ECs):	Groundwater Monitorng Well Network				
Inspections:		Frequency			
Site-Wide Inspection		Annually			
Evaluations					
Climate Change Vulnerability Assessment		Annually			
Soil Vapor Intrusion Evaluation		As needed, if proposed use or building design changes			

SILE INPUIIICATION:		Hamilton Green, 200 Hamilton Avenue, White Plains		
1. Groundwa MW-2, SMF SMP-MW-6, SMP-MW-9.	Quarterly groundwater monitoring until concentrations are found to be consistently below AWQS, concentrations have become asymptotic at an acceptable level over an extended period, or are indicative of a wholly off-site source.			
1. Soil Vapor Buildings	Intrusion Evaluation for New	As needed		
Maintenance:				
1. Groundwa	ater monitoring well network	As needed		
Reporting:				
1. Periodic F	Review Report	Annually		
2. Groundwa	ater Monitoring Report	Quarterly		

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 SMP is a required element of the remedial program for the Hamilton Green Site located in White Plains, Westchester County, New York (hereinafter referred to as the "Site"). A Site Location Map (topographic map) is provided as **Figure 1.1**. The Site is currently in the New York State BCP (Site No. C360177), which is administered by New York State Department of Environmental Conservation (NYSDEC).

S-WD/WP LLC entered into a Brownfield Cleanup Agreement (BCA) on April 5, 2022 with the NYSDEC to remediate the Site, with Hamilton Green II Partners LLC added as an Applicant January 29, 2024. A figure showing the Site location and boundaries of this Site is provided in **Figure 1.2**. The boundaries of the Environmental Easement 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 groundwater contamination remains on the Site, which is hereafter referred to as "remaining contamination". Institutional controls (ICs) and Engineering Controls (ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment on the Site. An Environmental Easement (EE) granted to the NYSDEC and recorded with the Westchester County Clerk (#641383422) requires compliance with this SMP and all ICs/ECs placed on the Site. In addition, when the EE has been terminated the use of groundwater at the Site is prohibited as per Chapter 873, Article VII of the Laws of Westchester County.

This SMP was prepared to manage remaining groundwater contamination on the Site until the Environmental Easement is extinguished in accordance with Environmental Conservation Law (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 project manager.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA Index # C360177-03-22; Site #C360177 for the Site, and thereby subject to applicable penalties.

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

This SMP was prepared by SESI Consulting Engineers, on behalf of S-WD/WP LLC and Hamilton Green II Partners LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 REVISIONS AND ALTERATIONS

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

1.3 NOTIFICATIONS

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

- 1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.
- 2. 7-day advance notice of any field activity associated with the remedial program.
- 3. 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.
- 4. Notice within 48 hours of any non-routine maintenance activities.
- 5. 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:

- 7. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.
- 8. 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 1.1 on the following page includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in **Appendix B**.

Table 1.1: Notifications*

<u>Name</u>	Contact Information	Required Notification**	
NYSDEC Project Manager	greta.kowalski@dec.ny.gov	All Notifications	
Greta Kowalski, P.G.	(518) 402-2029		
NYSDEC Project Manager's	kiera.thompson@dec.ny.gov All Notifications		
Supervisor Kiera Thompson, P.G.	(518) 402-9662		
NYSDEC Site Control	(518) 402-9553	Notifications 1 and 8	
Kelly Lewandowski. PE	kelly.lewandowski@dec.ny.gov		
NYSDOH Project Manager	(518) 402-7860	Notifications 4, 6, and 7	
Sara Bogardus	beei@health.ny.gov		

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

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

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 SITE LOCATION AND DESCRIPTON

The Site is located in White Plains, Westchester County, New York and is identified as Section 125.67/Block 5/Lot 1..2 on the Westchester County Tax Map (see **Figure 1.2**). The Site is an approximately 1.94-acre area and is bounded by Barker Avenue to the north, Hamilton Avenue to the south, the WP Mall Cleaners and Gas Station BCP Site (C360221) to the east, and Dr Martin Luther King Jr. Boulevard to the west (see **Figure 1.2**). The boundaries of the Site are more fully described in **Appendix A**—Environmental Easement. The owner of the Site at the time of issuance of this SMP is:

S-WD/WP LLC

2.2 PHYSICAL SETTING

2.2.1 **LAND USE**

The Site consists of the following: a vacant lot. The Site is zoned as Transit Development District (TD-1), which allows for residential use above the first floor of a building, and is currently under development that will include subterranean parking and loading docks, with retail, office space, and residential areas above. The Site was most recently improved with the White Plains Mall that was demolished in 2022. Historically as identified on the 1930 through 1950 Sanborn fire insurance maps, the Site was bisected by historical Williams Street and was improved with several private residential dwellings and residential apartments with automotive storage garages (address ranges 45 Williams to 70 Williams), stores at 50 and 62 Williams, and a gasoline station with three (3) gasoline tanks at a former address of 230 Hamilton Avenue which was located on the southern portion of the Site. An off-Site gas station with greasing operations and four (4) gasoline tanks was identified at a former address of 250 Hamilton Avenue which was located on the eastern adjacent parcel (BCP # C360221) on the 1950 Sanborn map. Numerous private dwellings were shown within the former mall building footprint on Sanborn maps from 1894 to 1950. These historical gasoline stations are depicted on **Figure 1.2**. In addition, there is a Gulf Gasoline Station located to the east across Cottage Place with an open NYSDEC Spill No. 9707887 that has impacted the Site. Based on these findings, the Phase I ESA identified the potential for abandoned underground storage tanks (USTs) and/or associated petroleum contamination in the Site subsurface associated with the gasoline stations and/or heating oil for the residential dwellings. The former on-Site structures were likely present until construction of the former two-story shopping mall and east-adjacent asphalt-paved parking lot. Based on historic records and interviews, the shopping mall was constructed in 1972 and operated as the White Plains Mall with a variety of tenants since its construction, including a potential dry cleaner listed in historic City Directories. The mall was razed in September and October 2022.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial properties. The Site is located in a commercial area of downtown White Plains and the setting is predominantly urban in character with high-rise commercial office buildings and other retail buildings. The surrounding land uses include a commercial office building to the north, the WP Mall Cleaners & Gas Station Site (BCP C360221) to the east, the Power Authority building to the south, and a three-story commercial building to the west.

2.2.2 GEOLOGY

Based on a database compiled by the U.S. Geological Survey and Westchester County Geographic Information System (GIS), the Site lies at elevations ranging from approximately 185 to 200 feet above the National Geodetic Vertical Datum of 1983 (an approximation of sea level), with ground sloping down to the west. Based on soil borings conducted during subsurface investigations conducted by SESI, AKRF, and a preliminary geotechnical investigation conducted by GZA, the subsurface soils are characterized as fill material consisting of loose to dense brown fine to coarse sand with varying gravel and silt content and occasional trace vegetation and construction debris (brick, crushed stone fragments) to depths to 8 feet below ground surface (ft-bgs). The fill material is underlain by clay and silt with varying sand content between 7 and 13 ft-bgs. The clay and silt layer is underlain by a layer of sand encountered at a depth of 13 to 25.5 ft-bgs. Bedrock was encountered at depths ranging from 19 to 42 ft-bgs. Site-specific boring logs are provided in **Appendix C**.

2.2.3 HYDROGEOLOGY

During the remedial investigation (RI) groundwater sampling was conducted from April to June 2023. The groundwater was determined to flow in a southwesterly direction across the Site. A groundwater contour map is shown in **Figure 2.1**. Groundwater elevation data

is provided in **Table 2.1** below. Groundwater monitoring well construction logs are provided in **Appendix C**.

Table 2.1: RI Groundwater Elevation Data

Well ID	Total Depth (ft)	Screen Diameter (in.)	Screen length (ft)	Depth to Water (ft)	Top of Casing Elevation (ft)	Groundwater Elevation (ft)	Sampling Date				
TW-1	29.6	2	10 (19.6-29.6)	21.1	195.59	174.49	4/24/2023				
1 44 -1	29.0	2	10 (19.0-29.0)	20.8	193.39	174.79	5/23/2023				
TV 2	5	2	2 (2.5)	2.2	100.02	187.72	5/2/2023				
TW-2	3	2	3 (2-5)	1.9	189.92	188.02	6/2/2023				
TW-3	27	2	10 (17-27)	22.3	195.61	173.31	5/1/2023				
144-3	21	2	10 (17-27)	21.6	193.01	174.01	5/22/2023				
MW-2 (GT-2)	28.4	2	10 (19 4 29 4)	21.98	193.06	171.08	4/28/2023				
MW-2 (G1-2)	20.4	2	10 (18.4-28.4)	18.7	193.00	174.36	5/30/2023				
MW-3 (GT-3)	28.7	2	10 (18.7-28.7)	17.42	192.44	175.02	4/28/2023				
MW-3 (G1-3)	20.7	2	10 (18.7-28.7)	16.25	192.44	176.19	5/30/2023				
MW-8	26.5	26.5	26.5	26.5	2	10 (16 5 26 5)	10 (16 5 26 5)	20.54	193.25	172.71	4/24/2023
IVI VV -0	26.5	∠	10 (16.5-26.5)	20	193.23	173.25	5/23/2023				
MW	27	2	10 (17 27)	20.3	194.68	174.38	4/21/2023				
MW-9	27	2	10 (17-27)	19.3		175.38	5/22/2023				

2.3 INVESTIGATION AND REMEDIAL HISTORY

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.

Remedial Investigation Summary

The RI and prior investigations identified petroleum hydrocarbons (PHCs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, metals, and per and polyfluoroalkyl substances (PFAS) in soil at concentrations exceeding the Track 1 Unrestricted Use Soil Cleanup Objectives (USCOs) to depths of 30 ft-bgs across the Site. Groundwater is similarly impacted by VOCs, SVOCs, PFAS, and metals at concentrations exceeding the Ambient Water Quality Standards (AWQS). Based on the Site history, which documents the on-Site gas stations were closed prior to the use of MTBE in gasoline, and prior Site investigations, methyl-tertiary-butyl-ether (MTBE) has emanated onto the Site in groundwater from the upgradient active Gulf Gas Station

NYSDEC Spill site (NYSDEC Spill #9707887). VOCs were detected in soil vapor samples collected across the Site.

Summary of Remedial Actions

Interim Remedial Action Performed

In an effort to expedite remediation of the property, several interim remedial measures (IRMs) were performed, including asphalt asbestos abatement and demolition of the former mall building, installation of support of excavation (SOE) system (consisting of steel pipe piles with wood lagging and tie backs, a composite wall with sheet piles integrally designed with a concrete wall and tie backs and a secant wall with tie backs) designed and installed for the purpose of restraining earth and groundwater pressures around the perimeter of the Site to allow for the excavation of all soil impacted above the USCOs to a variable and maximum depth of approximately 34 feet, horizonatal and vertical waterproofing, excavation of soil impacted above USCOs (171,616.8 tons), and dewatering of the remedial excavation and treating of contaminated groundwater (3,088,800 gallons) during the soil IRM. These IRMs were performed in accordance with the RI-IRM Work Plan that was approved in June 2022, and were completed in October 2024. Details of the IRM are documented in the December 2024 Interim Remedial Measures Construction Completion Report (IRM-CCR) and in the December 2024 Final Engineering Report (FER).

Selected Remedy

The selected remedy, as specified in the November 2024 Remedial Action Work Plan (RAWP) and December 2024 Decision Document (DD), included the following:

- Installation of a groundwater monitoring well network and post-IRM groundwater sampling for VOCs, SVOCs, metals, and PFAS.
- A SVI evaluation for any buildings proposed to be constructed on-site, to include a provision for implementing actions recommended to address exposures related to soil vapor intrusion, as needed.
- Execution and recording of an EE to restrict site use and prevent future exposure to any contamination remaining at the Site

 Development and implementation of a SMP for long term management of remaining contamination as required by the EE, which includes plans for: (1) institutional controls and engineering controls (IC/ECs), (2) monitoring, (3) operation and maintenance (O&M) and (4) reporting; as well as periodic certification requirements.

2.4 REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated December 2024 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 ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground 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

2.5.1 GROUNDWATER

Post-IRM groundwater samples were collected in October 2024 from six (6) temporary monitoring wells (SMP-MW-1 through SMP-MW-6), and two (2) permanent monitoring wells (SMP-MW-8 and SMP-MW-9) while the dewatering system was active. Monitoring well SMP-MW-7 could not be sampled due to low water levels. The groundwater samples were analyzed for TCL/TAL compounds which includes metals (USEPA Methods

6010/7471), SVOCs (USEPA Method 8270), VOCs (USEPA Method 8260), PCBs and pesticides (USEPA Methods 8081/8082), cyanide (USEPA Method 9012B), PFAS (USEPA Method 1633), and 1,4-dioxane (USEPA Method 8270).

As shown on **Figure 2.2**, the groundwater samples collected post-IRM demonstrate that the groundwater is impacted with the petroleum hydrocarbon VOC MTBE and SVOCs on the southern portion of the Site, and PFOA and PFOS Site-wide. Based on the Site history (the on-site gas station ceased operations prior to MTBE use) and prior site investigations, MTBE has likely emanated onto the Site in groundwater from the upgradient active Gulf Gas Station NYSDEC Spill site (NYSDEC Spill #9707887).

2.5.2 SOIL VAPOR

Site soil was remediated to Unrestricted Track 1 SCOs via completion of the IRM. A soil vapor intrusion (SVI) evaluation has been conducted to assess for potential SVI for the proposed building Ito be constructed on-site (as provided in **Appendix J**), as presented in the FER. In summary, vapor intrusion into the Site's building will not be a concern based on the following:

- All soil exceeding the Track1 USCOs have been removed from the Site and there are no sources of VOCs in soil or soil vapor.
- No VOCs of concern were detected above AWQS in post-IRM groundwater samples.
- The building foundation has been designed with a 36-inch thick slab underlain by a waterproofing barrier and a mud slab that will aid to prevent any potential vapors from impacting the building.
- The building design includes subterranean levels of mechanically ventilated car parking that contain only limited occupancy area (i.e. maintenance and meter rooms, and storage areas).
- The building subgrade foundation will be below the seasonal high groundwater table and there is no potential for vapor to collect under the building.

While SVI is not a concern for the above described proposed use and design, a change in occupancy (i.e. management office) of the sub-surface floors or change in building design would require further SVI evaluation and potential remediation.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 GENERAL

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

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC project manager.

3.2 INSTITUTIONAL CONTROLS

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to restricted residential, commercial, and 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 **Appendix A**. These ICs are:

- The property may be used for: restricted residential, commercial, and industrial use;
- 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 Westchester
 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 media 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; and
- The potential for vapor intrusion must be evaluated if the proposed building use
 within the IC boundaries noted on Appendix A changes, and any potential
 impacts that are identified must be monitored or mitigated.

3.3 ENGINEERING CONTROLS

3.3.1. GROUNDWATER MONITORING WELL NETWORK

Groundwater monitoring activities associated with source removal will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual VOC, SVOC, metals, and PFAS groundwater concentrations are found to be consistently below AWQS, concentrations have become asymptotic at an acceptable level over an extended period, or are indicative of a wholly off-site source. If monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels remain at a level that is not acceptable to the NYSDEC treatment and/or control measures will be evaluated.

3.3.2 CRITERIA FOR COMPLETION OF REMEDIATION

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

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

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

4.0 MONITORING AND SAMPLING PLAN

4.1 GENERAL

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

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

- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards; 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. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix 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;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- 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.

Reporting requirements are outlined in Section 7.0 of this plan.

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

4.3 POST-REMEDIATION GROUNDWATER MONITORING AND SAMPLING

Samples shall be collected from the groundwater monitoring well network on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in **Table 4.1** – Remedial System Sampling Requirements and Schedule, below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. The proposed well locations are depicted on **Figure 4.1**.

Table 4.1 – Post Remediation Sampling Requirements and Schedule

Monitoring Well I.D.	Location	Sample Analysis	Schedule		
SMP-MW-1	South central/ downgradient of Historical Gas Station	, ,			
SMP-MW-2	Southwestern/downgradient of Historical Gas Station	VOCs, SVOCs, TAL Metals, PFAS	· Quarterly		
SMP-MW-3	Mid-Central/downgradient	VOCs, SVOCs, TAL Metals, PFAS			
SMP-MW-4	Mid-western/Central	VOCs, SVOCs, TAL Metals, PFAS			
SMP-MW-5	Mid-Central	VOCs, SVOCs, TAL Metals, PFAS			
SMP-MW-6	Northwestern/upgradient	VOCs, SVOCs, TAL Metals, PFAS			
SMP-MW-7	Northeastern/upgradient	VOCs, SVOCs, TAL Metals, PFAS			
SMP-MW-8	Mid-Eastern Site	VOCs, SVOCs, TAL Metals, PFAS			
SMP-MW-9	South/Downgradient of WP Mall BCP Site and Gulf Gas Station	VOCs, SVOCs, TAL Metals, PFAS			

Detailed sample collection and analytical procedures and protocols are provided in **Appendix H** – Field Activities Plan and **Appendix D** – Quality Assurance Project Plan.

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

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

4.3.1 GROUNDWATER SAMPLING

Groundwater monitoring will be performed quarterly to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells will be been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The proposed monitoring well locations are depicted on **Figure 4.1**. The monitoring well network for this site includes the following sentinel wells: SMP-MW-1, SM2-MW-2, SMP-MW-3, SMP-MW-4. SMP-MW-5, SMP-MW-6, SMP-MW-7, SMP-MW-8, and SMP-MW-9. Monitoring wells SMP-MW-7, SMP-MW-8, and SMP-MW-9 were installed in September 2024. SMP-MW-1 through SMP-MW-6 will be installed for continued groundwater monitoring. A plan for monitoring well installations will be provided to NYSDEC prior to installations. **Table 4.2** summarizes the wells' identification numbers, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, two (2) upgradient wells, four (4) on-site wells and three(3) downgradient wells are to be sampled to evaluate the effectiveness of the remediation. The remedial party will measure depth to the water table for each monitoring well in the network before sampling to understand groundwater flow direction.

Table 4.2 – Monitoring Well Construction Detail

Monitoring Well I.D	Location	Coordinates (Lat/Long)	Well Diameter (inches)	Elevation (above mean sea level)			
				Casing	Surface	Screen Top	Gradient
SMP-MW-1	South central	TBD	2	TBD	TBD	TBD	Downgradient of Off-Site Historical Gas Station
SMP-MW-2	Southwestern	TBD	2	TBD	TBD	TBD	Downgradient of Historical Gas Station
SMP-MW-3	Mid-Central	TBD	2	TBD	TBD	TBD	Mid-Site
SMP-MW-4	Mid-western	TBD	2	TBD	TBD	TBD	Mid-Site
SMP-MW-5	Mid-Central	TBD	2	TBD	TBD	TBD	Mid-Site
SMP-MW-6	Nothwestern	TBD	2	TBD	TBD	TBD	Nothwestern/upgradient
SMP-MW-7	Northeastern	TBD	2	TBD	TBD	TBD	Northeastern/upgradient
SMP-MW-8	Mid-Eastern Site	TBD	2	TBD	TBD	TBD	Mid-Site
SMP-MW-9	Southeastern	TBD	2	TBD	TBD	TBD	Downgradient of Off-Site Historical Gas Station

Monitoring well construction logs are included in **Appendix F** of this document.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

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

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

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

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

5.0 OPERATION AND MAINTENANCE PLAN

5.1 GENERAL

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP. However, the groundwater monitoring well network may require occasional maintenance (i.e. well cover replacement, redevelopment, bolt and/or lock replacements, etc). The need for maintenance will be reported to NYSDEC within 24-hours of observation, and a work plan for the necessary repairs provided within 45-days. Any repairs made will be reported to NYSDEC in the next annual Periodic Review Report.

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.

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

- 1. The Site is not located in a floodplain.
- 2. During severe rain events low lying areas of the Site may experience brief flooding limiting access to monitoring wells.
- 3. High winds are not expected to damage the groundwater wells.
- 4. The groundwater wells are not vulnerable to loss of electric power.
- 5. No spill or containment areas exist on the Site that would cause a release during severe weather events.

6.2 SOIL VAPOR INTRUSION EVALUATION

Should the proposed building use or design change from the above description, a SVI evaluation will be performed to determine if an engineering control is needed to mitigate the SVI risk, if present. The SVI evaluation will be presented in a Periodic Review Report (PRR).

6.3 GREEN REMEDIATION EVALUATION

Environmental Footprint Analysis

As part of the site management program, to promote implementation of green and sustainable remediation principles, an environmental footprint analysis was completed and included in this SMP (**Appendix I**). The environmental footprint analysis was

completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWiseTM (developed by the US military) or a similar Department-accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use was estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, was established for the site management activities, as appropriate. Further, progress with respect to green and sustainable remediation metrics will be tracked and reported in periodic review reports and remedial system optimization reports as part of the site management program, and opportunities to further reduce the environmental footprint of the project will be identified as appropriate.

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

During the course of the SMP activities, SESI will consider NYSDEC DER-31 "Green Remediation" implementation objectives. The NYSDEC DER's approach to remediating sites in the context of the larger environment is a concept known as "Green Remediation". Green Remediation is defined in NYSDEC DER-31 as "the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions." The approach is intended to improve the overall sustainability of the remediation by promoting the use of more sustainable practices and technologies. Green Remediation practices and technologies are less disruptive to the environment, generate less waste, increase reuse and recycling, and emit fewer pollutants, including greenhouse gases, to the atmosphere. Green Remediation concepts and techniques considered during the remedial activities will include:

- Eliminated idling vehicles and equipment when possible; reducing emission of CO2, N2O, CH4, and other greenhouse gases contributing to climate change:
- Operation of particulate detectors during ground intrusive activities to monitor and minimize dust export of contaminants:
- Operation of volatile organic compound (VOC) detectors to monitor and minimize VOC exposures: and
- Conducting sampling events planned simultaneously to maximize level of efforts while traveling to/from the Site (economy of scale implementing multiple sampling events).

Best Management Practices (BMPs)

- Select service providers, product suppliers and analytical laboratories from the local area and consolidate the service and delivery schedules.
- Portable vapor/gas detection systems using photoionization or flame ionization for screening purposes.
- Use plastic sheeting or portable wash pads to contain and collect decontamination fluids and prevent their entrance into storm drains or groundwater.
- Choose groundwater monitoring equipment made of noncorrosive material.
- Design investigative wells in ways that allow for maximum reuse during remediation or to meet water demands of ongoing or future site activities.
- Use minimally invasive drilling techniques such as direct-push or sonic technology whenever feasible to reduce drilling duration, avoid or minimize use of water, and prevent or reduce generation of cuttings and associated disposal of investigation derived waste (IDW).
- Compress the number of days needed for a given round of sampling.

6.3.1 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 NYSDEC project manager feels appropriate, (e.g. during significant maintenance events or in conjunction with storm recovery activities).

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

6.3.2 FREQUENCY OF SYSTEM CHECKS, SAMPLING AND OTHER PERIODIC ACTIVITIES

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

6.3.3 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 and will be evaluated over time to ensure that green remediation actions are achieving the desired results.

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 site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375 or a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 7.1 and summarized in the Periodic Review Report.

Table 7.1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*		
Groundwater Monitoring Reports	Quarterly		
Periodic Review Report	Annually		

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

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

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

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

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 EQuISTM database in accordance with the requirements found at this link http://www.dec.ny.qov/chemical/62440.html.

7.2 PERIODIC REVIEW REPORT

A Periodic Review Report (PRR) will be submitted to the NYSDEC project manager beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the site is subdivided into separate parcels with different

ownership, a single Periodic Review Report will be prepared that addresses the site described in **Appendix 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, fire inspections and severe condition inspections, if applicable.
- Description of any change of use, import of materials, or excavation that occurred during the certifying period.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
 - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
 - O&M data summary tables;
 - A current plume map for sites with remaining groundwater contamination; and
 - A groundwater elevation contour map for each gauging event.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuISTM 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 Decision Document;
 - The operation and the effectiveness of all ECs , including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
 - An update to the climate change vulnerability assessment if site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities.
 - A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a site's environmental impacts and recommendations to improve the remedy's environmental footprint.
 The PRR will include the completed Summary of Green Remediation Metrics form provided in **Appendix G**.
 - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document; and
 - The overall performance and effectiveness of the remedy.

7.2.1 CERTIFICATION OF INSTITUTIONAL AND ENGINEERING CONTROLS

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice and registered in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

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

 The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;

- The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the site is compliant with the environmental easement:
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and
- The information presented in this report is accurate and complete.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Fuad Dahan, of 959 Route 46, Parsippany, New Jersey, am certifying as Owner.

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

- 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 assumptions made in the qualitative exposure assessment remain valid.

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

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

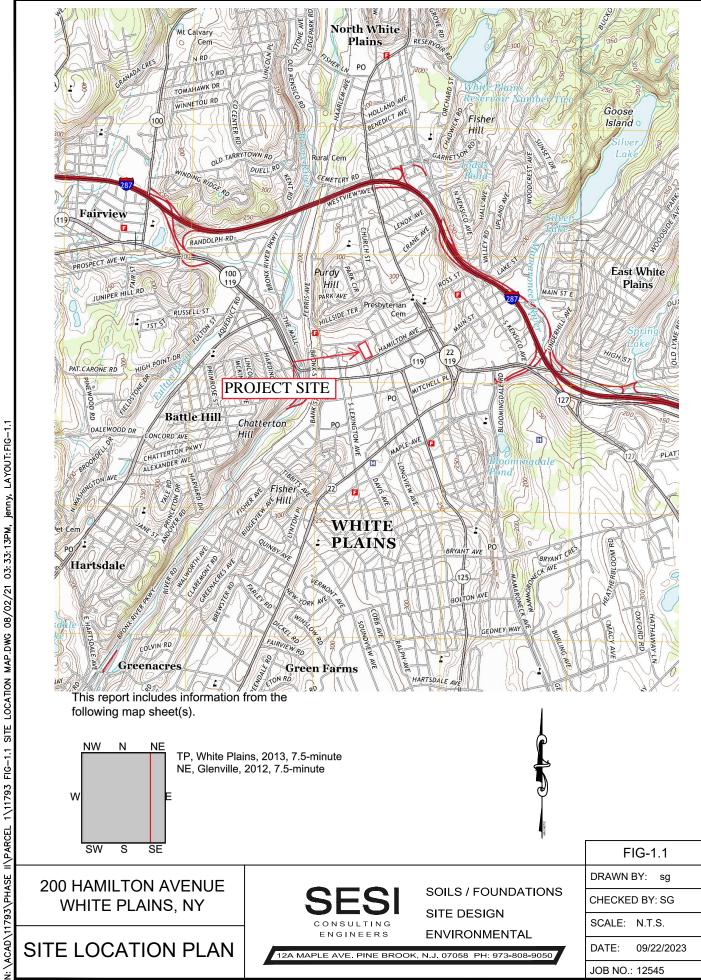
7.3 CORRECTIVE MEASURES WORK PLAN

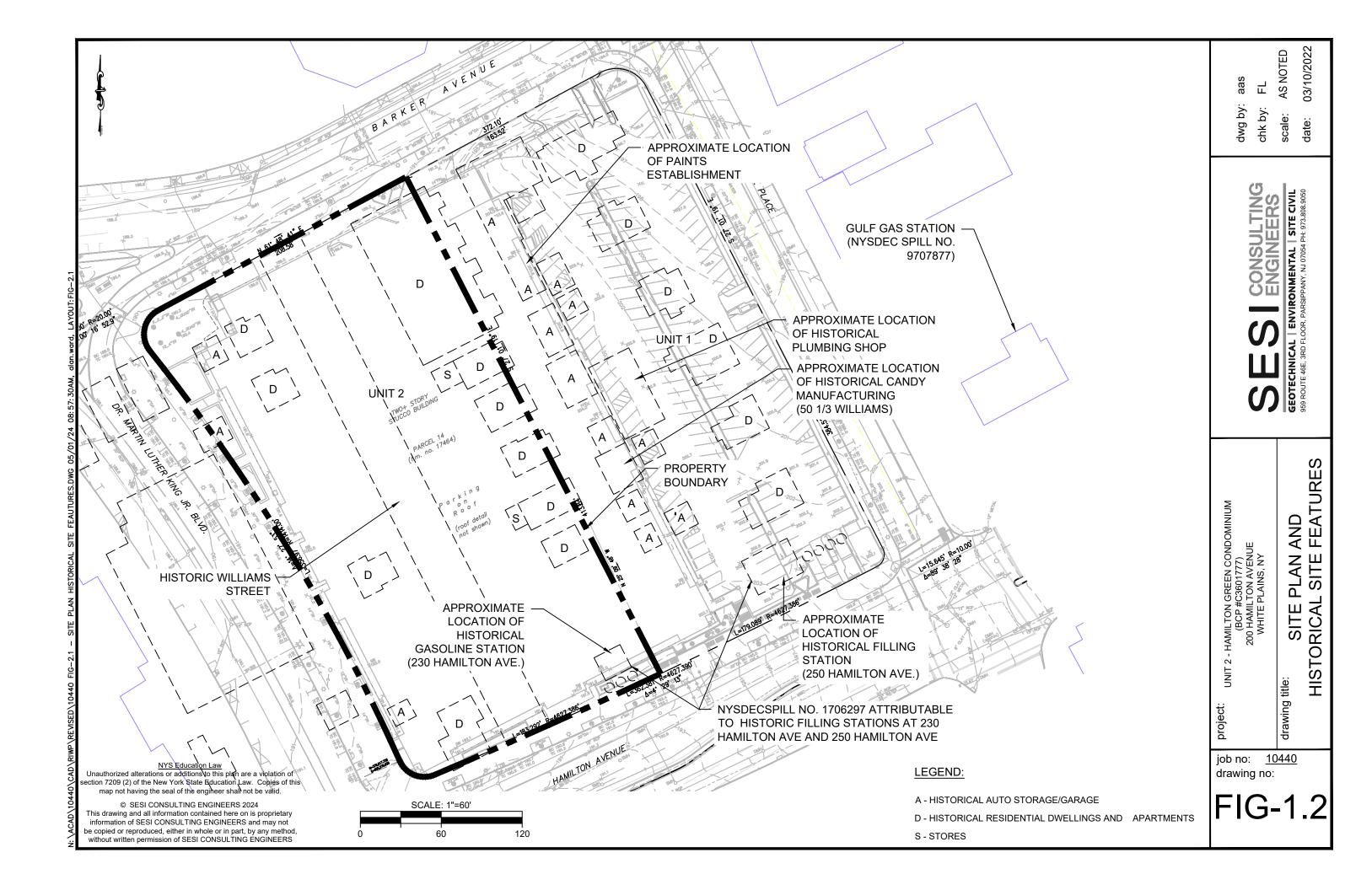
If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for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

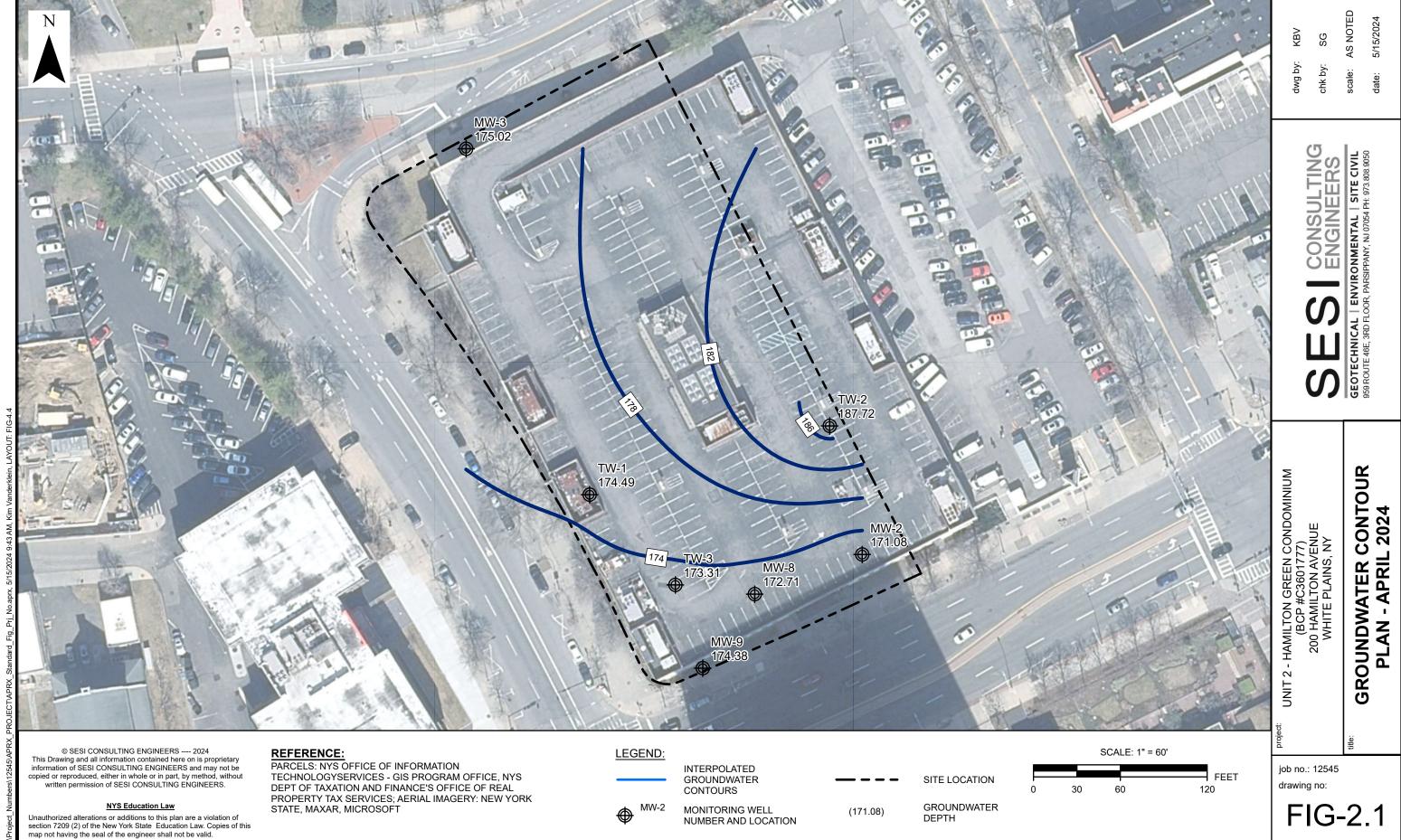
8.0 REFERENCES

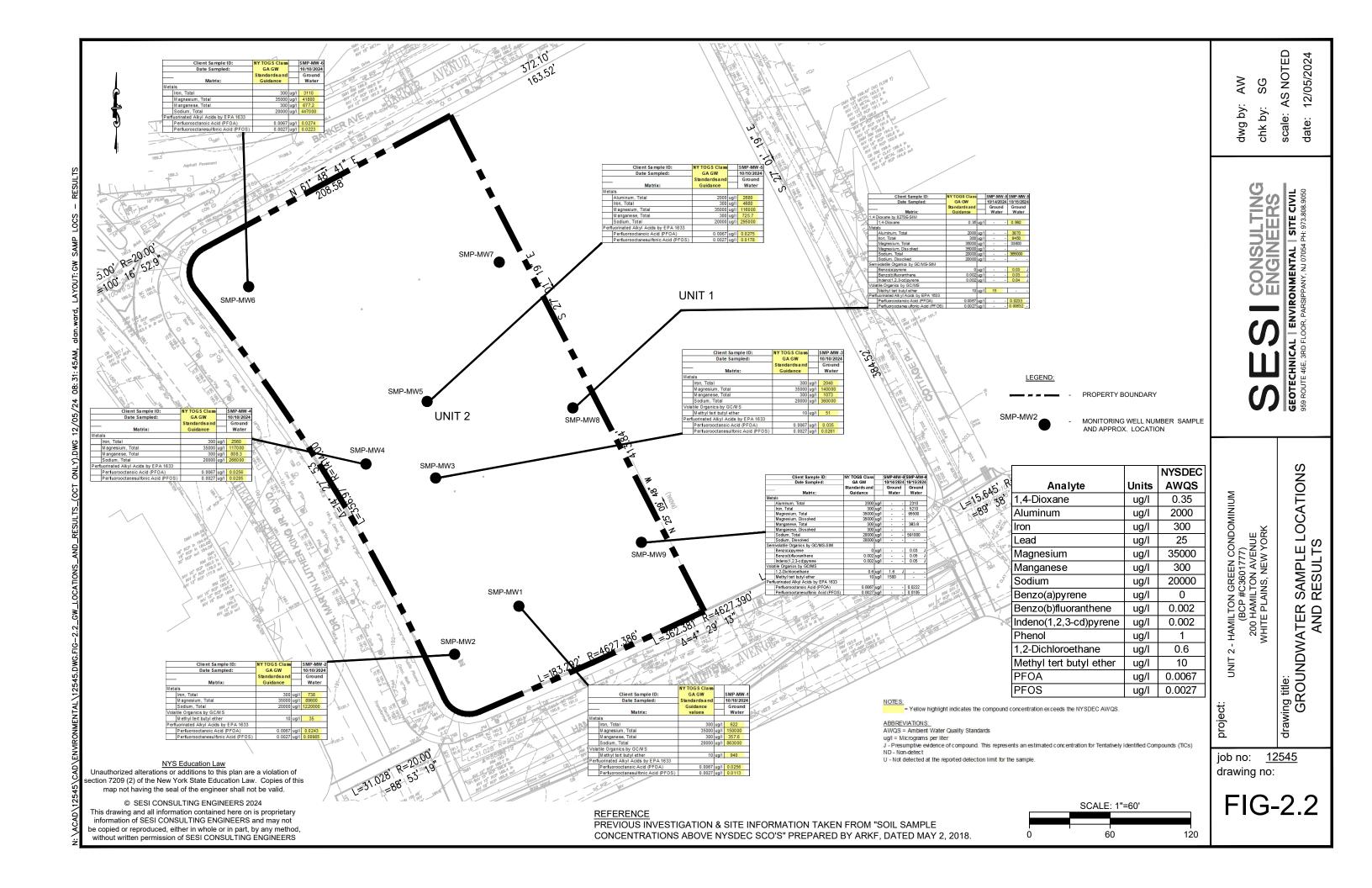
- 6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
- NYSDEC DER-10 "Technical Guidance for Site Investigation and Remediation".
- NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).
- Preliminary Geotechnical Engineering Report, White Plains Mall, White Plains, New York, GZA Project No. 12.0076394.00, November 2015.
- Phase I Environmental Site Assessment, 200 Hamilton Avenue, White Plains, New York, AKRF Project Number 170029, AKRF, Inc, May 10, 2017
- Subsurface (Phase II) Investigation, 200 Hamilton Avenue, White Plains, New York, AKRF Project Number 170029, October 2017
- Spill Investigation, NYSDEC Spill Number 1706297, White Plains Mall, 200 Hamilton Avenue, White Plains, New York, AKRF Project Number 170029, April 2018
- Phase I Environmental Site Assessment, Hamilton Green, 200 Hamilton Avenue, White Plains, New York, prepared by SESI September 2021.
- Phase II Environmental Site Assessment, Hamilton Green, 200 Hamilton Avenue, White Plains, New York, prepared by SESI September 2021.
- Remedial Investigation Report, Hamilton Green Site, 200 Hamilton Avenue, White Plains, New York, prepared by SESI January 2024.
- Remedial Action Work Plan, Hamilton Green Site, 200 Hamilton Avenue, White Plains, New York, prepared by SESI June 2024.
- Final Engineering Report, Hamilton Green Site, 200 Hamilton Avenue, White Plains, New York, prepared by SESI November.

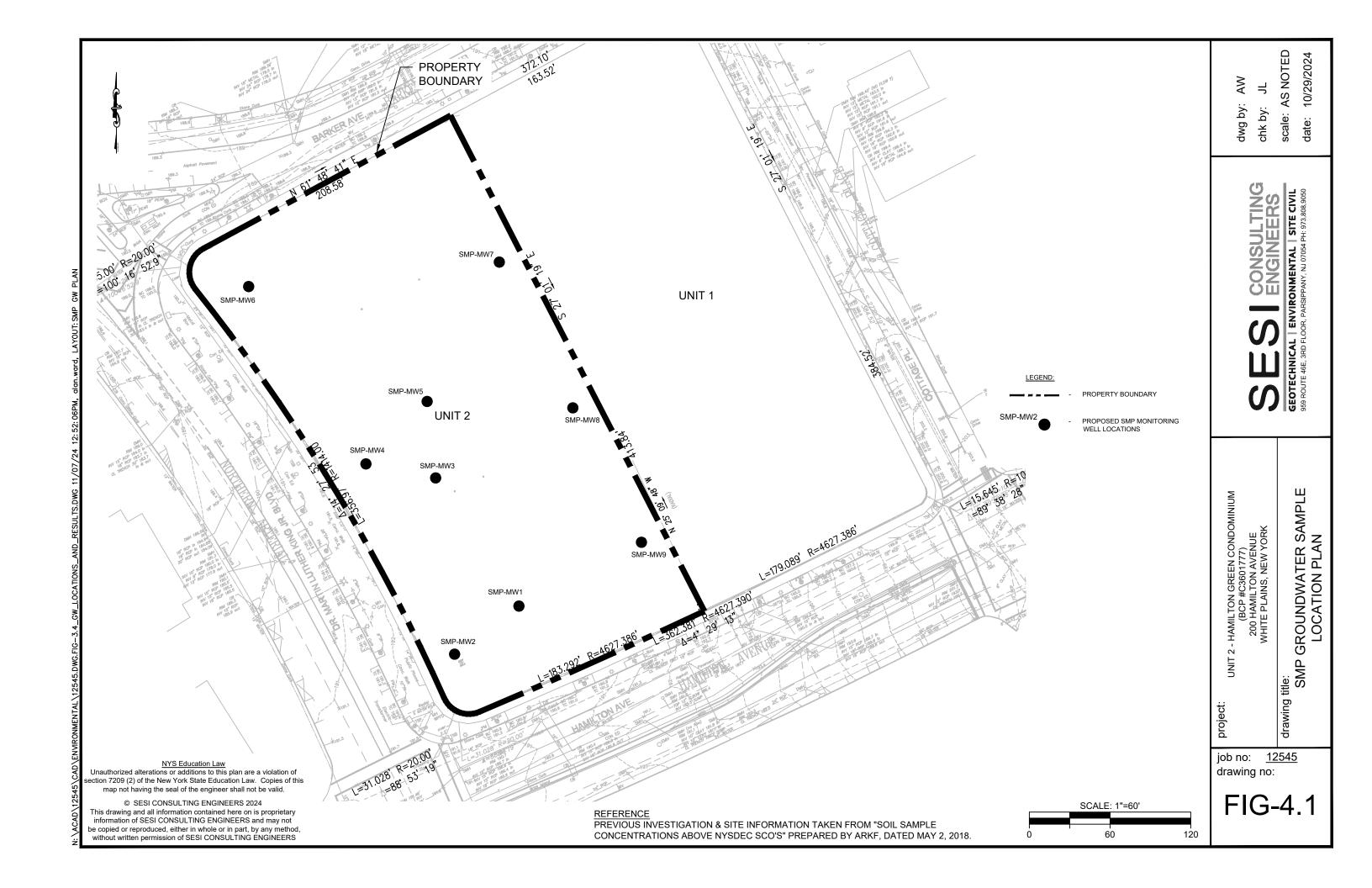












Appendix A:

Environmental Easement

SCHEDULE A

"Deed Description and Brownfield Cleanup Program Site Environmental Easement Area"

ALL that certain plot, piece or parcel of land situate, lying and being in the City of White Plains, County of Westchester and State of New York, bounded and described as follows:

BEGINNING at a point on the easterly side of Northern Arterial at the northerly end of a curve having a radius of 20.00 feet, a central angle of 100°.16′.52.9° and a length of 35.00 feet which curve connects the southerly side of Barker Avenue with the easterly side of Northern Arterial as shown on a certain map entitled "Disposition Parcel No. 14, W. P. Mall Corp." which map is filed in the Westchester County Clerk's Office, Division of Land Records on June 9, 1971 as Map No. 17464;

RUNNING THENCE along the southerly side of Barker Avenue North 61°48'41" East a distance of 208.58 feet

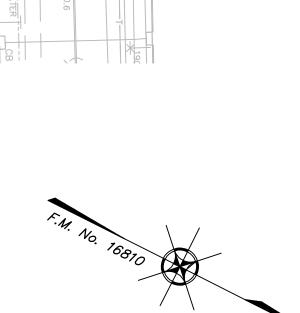
a point along THENCE through the lands known as Disposition Parcel 14, South 27 01' 19" East a distance of 413.84 feet to the northerly side of Hamilton Avenue;

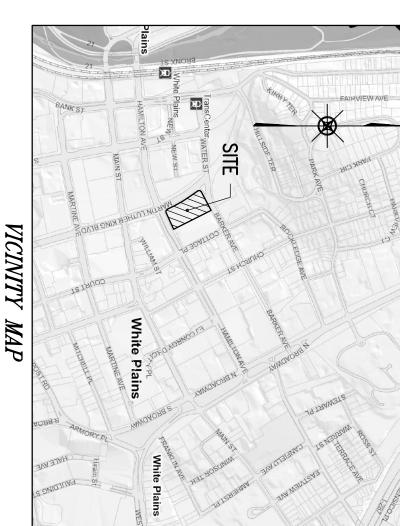
of 31.028 feet to a point; THENCE along a curve to the right having a radius of 20.00 feet, a central angle of 88° 53' 19" and a length THENCE along the northerly side of Hamilton Avenue, along a curve to the right having a radial bearing of North 25°09'48" West, a radius of 4627.386 and a length of 183.292 feet to a point;

THENCE along a curve to the right having a radius of 20.00 feet, a central angle of 100° 16' 52.9", and a length of 35.00 feet to the point and place of BEGINNING. THENCE along the easterly side of Northern Arterial along a curve to the left having a radius of 1414.00 feet, a central angle of 14. 27' 53" and a length of 356.97 feet to a point;

Containing within said bounds 1.940 acres of land.

Δ=100° R=20.00, 16, 52.9, BARKER 61° 48' 41" 208.58' AVENUE





THE THE KINC **(3)** 9 27' 53" R=1414.00' 27' $\Delta = 14^{\circ}$ L=356.97' POINT OF BEGINNING SITE NO.: C360177
TAX ID: 125.67-5-1..2
200 HAMILTON AVENUE,
WHITE PLAINS, NY 10601
ACREAGE: 1.940 S 27' 01' 19" E 413.84' N 25° <u>09</u>′ 48″ W (RADIAL)

REFERENCE IS MADE TO A MAP ENTITLED "CONDOMINIUM MAP PREPARED FOR HAMILTON GREEN CONDOMINIUM" FILED IN THE WESTCHESTER COUNTY CLERK'S OFFICE, DIVISION OF LAND RECORDS AS MAP No. 29553.

REFERENCE IS MADE TO A MAP ENTITLED *MAP SHOWING LANDS TO BE ACQUIRED BY THE CITY OF WHITE PLAINS FOR THE LAYING OUT AND WIDENING OF" ON FILE IN THE WESTCHESTER COUNTY CLERKS OFFICE, DIVISION OF LAND RECORDS AS MAP No. 16810. MAP ENTITLED *DISPOSITION PARCEL No. 14, W.P. MALL CORP." DATED MARCH 19, 1971 FILED IN THE WESTCHESTER COUNTY CLERKS OFFICE, DIVISION OF LAND RECORDS AS MAP No. 17464 AND LIBER 6992, PAGE 716.

PLANIMETRIC BACKGROUND INFORMATION WAS PROVIDED BY INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE P.C.

L=31.028' R=20.00' Δ=88' 53' 19"

L=183.292' I

R=4627.386

A BOOK AND A BOOK AND

BC 1921

N=376,917.726 E=655,278.830

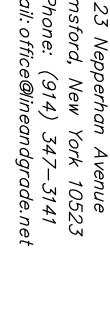
CONTOURS AND SPOT ELEVATIONS ARE RELATIVE TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD-88).

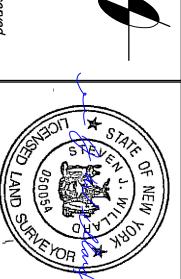
THE SURVEYOR'S SEAL, SIGNATURE AND ANY CERTIFICATION APPEARING HEREON SIGNIFY THAT, TO THE BEST OF HIS KNOWLEDGE AND BELIEF, THIS SURVEY WAS PREPARED IN ACCORDANCE WITH THE MINIMUM STANDARDS FOR LAND SURVEYS AS SET FORTH IN THE CODE OF PRACTICE ADOPTED BY THE NEW YORK STATE ASSOCIATION OF PROFESSIONAL LAND SURVEYORS, INC.

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

GRADE SURVEYORS D.P.C.

Phone: (914) 347—3141 email: office@lineandgrade.net Elmsford, New York 10523 Phone: (914) 347-3141





Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov." of Environmental Conservation, Division of Environmental Remediation, controls for this Easement are set forth in the Site Management Plan interest in the property. The SMP can be obtained from NYS Department (SMP). A copy of the SMP must be obtained by any party with an

"The Temporary Environmental Easement Area is subject to an environmental easement held by the New York State Department of

BROWNFIELD CLEANUP SITE ENVIRONMENTAL EASEMENT AREA

LEGEND:

York Environmental Conservation Law. The engineering and institutional

Environmental Conservation pursuant to Title 36 of Article 71 of the New

BROWNFIELD CLEANUP PROGRAM

PREPARED FOR CITY OF WHITE PLANS COUNTY PROPERTY S-MD, STATEOF WESTCHESTER
"E OF NEW YORK MAY 21, SITUATE IN THE Mp LLC

Law Office of Denise J. D'Ambrosio Attorney at Law

October 30, 2024

Hon. Thomas Roach Mayor, City of White Plains 255 Main Street White Plains, New York 10601

Re:

Notice to Municipality of Environmental Easement

Hamilton Green Site

NYS BCP Site No. C360177

Dear Mayor Roach:

Attached please find a copy of an environmental easement granted to the New York State Department of Environmental Conservation ("Department") on July 23, 2024 by S-WD/WP LLC for the property located at 200 Hamilton Avenue, White Plains, Tax Map No. Section 125.67, Block 5, Lot 1..2; the Site being the Hamilton Green Site, DEC BCP Site No.C360177.

This Environmental Easement temporarily restricts future use of the above-referenced property to restricted residential uses. Any on-site activity must be done in accordance with the Environmental Easement and the Site Management Plan which is incorporated into the Environmental Easement. Department approval is also required prior to any groundwater use.

Article 71, Section 71-3607 of the New York State Environmental Conservation Law requires that:

- 1. Whenever the department is granted an environmental easement, it shall provide each affected local government with a copy of such easement and shall also provide a copy of any documents modifying or terminating such 1-3 Pier Street environmental easement.
- 2. Whenever an affected local government receives an application for a building permit or any other application affecting land use or development of land that is subject to an environmental easement and that may relate to or impact such easement, the affected local government shall notify the department and refer such application to the department. The department shall evaluate whether the application is consistent with the environmental easement and shall notify the affected local government of its detelmination in a timely fashion, considering the time frame for the local government's review of the application. The affected local government shall not approve the application until it receives approval from the department.

An electronic version of every environmental easement that has been accepted by the Department is available to the public at:

http://www.dec.ny.gov/chemical/36045.html. Please forward this notice to your building and/or planning departments, as applicable, to ensure your compliance with these provisions of New York State Environmental Conservation Law. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,

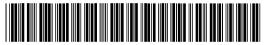
Denise J. D'Ambrosio

Counsel //

S-WD/WP LLC

Hamilton Green II Partners LLC

The Office of the Westchester County Clerk: This page is part of the instrument; the County Clerk will rely on the information provided on this page for purposes of indexing this instrument. To the best of submitter's knowledge, the information contained on this Recording and Endorsement Cover Page is consistent with the information contained in the attached document.



641383422FAS001X

Westchester County Recording & Endorsement Page Submitter Information Stewart Title Insurance Company (pick up by Ramon 914-993-9393 Phone: Name: 914-997-1698 Address 1: 711 Westchester Avenue, Ste 302 Fax: Address 2: Email: nymetrorecordings@stewart.com City/State/Zip: White Plains NY 10604 Reference for Submitter: 2334662/81292477 200 Hamilton Avenu **Document Details** Control Number: 641383422 Document Type: Easement (EAS) 2024051700205001001 Document Page Count: 10 Package ID: Total Page Count: 11 **Parties** Additional Parties on Continuation page 1st PARTY 2nd PARTY 1: S-WD/WP LLC - Other 1: NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL C - Other 2: 2: **NEW YORK STATE OF** Additional Properties on Continuation page **Property** Street Address: 200 HAMILTON AVENUE Tax Designation: 125.67-5-1..2 City/Town: WHITE PLAINS Village: Additional Cross-Refs on Continuation page **Cross-References** 2: 1: 4: **Supporting Documents** 1: TP-584 **Recording Fees Mortgage Taxes** Document Date: \$40.00 Statutory Recording Fee: Page Fee: Mortgage Amount: \$55.00 \$0.00 Cross-Reference Fee: Mortgage Affidavit Filing Fee: \$0.00 Basic: \$0.00 RP-5217 Filing Fee: \$0.00 Westchester: \$0.00 \$5.00 TP-584 Filing Fee: Additional: \$0.00 \$0.00 RPL 291 Notice Fee: MTA: \$0.00 Total Recording Fees Paid: \$100.00 Special: \$0.00 Transfer Taxes Yonkers: \$0.00 Consideration: \$0.00 Total Mortgage Tax: \$0.00 Transfer Tax: \$0.00 Exempt: Mansion Tax: Dwelling Type: \$0.00 Transfer Tax Number: Serial #: 3926 **Record and Return To** RECORDED IN THE OFFICE OF THE WESTCHESTER COUNTY CLERK ☐ Pick-up at County Clerk's office 10/29/2024 at 12:15 PM Recorded: Control Number: **641383422** Witness my hand and official seal Stewart Title Insurance 711 Westchester Avenue Suite 302 Timothy C.Idoni Westchester County Clerk White Plains, NY 10604

County: Westchester Site No: C360177 Brownfield Cleanup Agreement Index: C360177-03-22

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

ASOF

THIS INDENTURE made this 23rd day of July, 2024 between Owner, S-WD/WP LLC, having an office at c/o The Cappelli Organization 5 Renaissance Square, 42nd Floor, White Plains, County of Westchester, 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 200 Hamilton Avenue in the City of White Plains, County of Westchester and State of New York, known and designated on the tax map of the County Clerk of Westchester as tax map parcel number: Section 125.67 Block 5 Lot 1..2, being the same as that property conveyed to Grantor by deed dated November 30, 2022 and recorded in the Westchester County Clerk's Office in Instrument No. 623113486. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.94 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 21, 2024, and last revised June 17, 2024, prepared by Steven J. Willard, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement IndexNumber: C360177-03-22, 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. <u>Purposes</u>. 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. <u>Institutional and Engineering Controls</u>. 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:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), 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 Westchester 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 purposes as defined in 6NYCRR 375-1.8(g)(2)(i), 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. <u>Right to Enter and Inspect</u>. 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. <u>Reserved Grantor's Rights</u>. 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

County: Westernesser Site 10. C300177 Brownfield Cleanup regreement mack, C300177-03-22

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. <u>Notice</u>. 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: C360177

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. <u>Recordation</u>. 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. <u>Amendment</u>. 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. <u>Extinguishment.</u> 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. <u>Joint Obligation</u>. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.
- 11. <u>Consistency with the SMP</u>. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

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

S-WD/WP LLC:

By: B-13

Print Name: BRUCE BERG

ANTHORIZED

Title: SIGNATORY Date: 7/17/24

Grantor's Acknowledgment

STATE OF NEW YORK)	
COUNTY OF wishly for) ss:	
instrument and acknowledged to me capacity(ies), and that by his/her/their	, in the year 20 ½, before me, the undersigned, personally known to me or proved to me on the basis dividual(s) whose name is (are) subscribed to the withing that he/she/they executed the same in his/her/their r signature(s) on the instrument, the individual(s), or the dual(s) acted, executed the instrument.
Notary Public - State of New York	LYNN A. GORSLINE NOTARY PUBLIC, STATE OF NEW YORK Registration No. 01GO6015509

Qualified in Suffolk County Commission Expires 11/2/2026 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:

) ss:

Andrew O. Guglielm, Director

Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK

COUNTY OF ALBANY)

On the 2310 day of 1000, in the year 2020 before me, the undersigned, personally appeared Andrew O. Gyglielm, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/executed the same in his/her/capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Notary Public - State of New York

Cheryl A. Salem

k Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County

My Commission Expires March 3,

SCHEDULE "A" PROPERTY DESCRIPTION

Deed and Easement Description

ALL that certain plot piece or parcel of land, situate, lying and being in the part of the condominium located in the City of White Plains, County of Westchester and State of New York, known and designated as Unit No. 2, together with a 40.00% undivided interest in the common elements of the condominium, hereafter described as the same is defined in the Declaration of Condominium hereinafter referred to.

The real property above described is a unit shown on map entitled "Condominium Map prepared for Hamilton Green Condominium, located at 200 & 250 Hamilton Ave., White Plains, NY 10601 and W.P. Mall Realty LLC, property situate in the City of White Plains, County of Westchester, State of New York," prepared by Line & Grade Surveyors D.P.C., and filed in the Office of the Clerk of the County of Westchester on August 25, 2021 as Map No. 29553, defined in the Declaration of Condominium entitled "The Hamilton Green Condominium" made by W.P. Mall Realty, LLC, under Article 9-B of the New York Real Property Law dated as of August 24, 2021, and recorded in the Office of the Clerk of the County of Westchester on September 1, 2021, in Control No. 612383625, covering the property therein described.

The land area of Unit 2 is described as follows:

ALL that certain plot, piece or parcel of land situate, lying and being in the City of White Plains, County of Westchester and State of New York, bounded and described as follows:

BEGINNING at a point on the easterly side of Dr. Martin Luther King Blvd. (formerly known as Northern Arterial) at the northerly end of a curve having a radius of 20.00 feet, a central angle of 100° 16' 52.9" and a length of 35.00 feet which curve connects the southerly side of Barker Avenue with the easterly side of Dr. Martin Luther King Blvd. (formerly known as Northern Arterial) as shown on a certain map entitled "Disposition Parcel No. 14, W. P. Mall Corp." which map is filed in the Westchester County Clerk's Office, Division of Land Records on June 9, 1971 as Map No. 17464;

RUNNING THENCE along the southerly side of Barker Avenue North 61° 48' 41" East a distance of 208.58 feet to a point;

THENCE through the lands known as Disposition Parcel 14, South 27° 01' 19" East a distance of 413.84 feet to a point along the northerly side of Hamilton Avenue;

THENCE along the northerly side of Hamilton Avenue, along a curve to the right having a radial bearing of North 25°09'48" West, a radius of 4627.386 and a length of 183.292 feet to a point;

THENCE along a curve to the right having a radius of 20.00 feet, a central angle of 88° 53' 19" and a length of 31.028 feet to a point;

THENCE along the easterly side of Dr. Martin Luther King Blvd. (formerly known as Northern Arterial) along a curve to the left having a radius of 1414.00 feet, a central angle of 14° 27′ 53″ and a length of 356.97 feet to a point;

THENCE along a curve to the right having a radius of 20.00 feet, a central angle of 100° 16′ 52.9″, and a length of 35.00 feet to the point and place of BEGINNING.

For Information Only: Said premises are known as 200 Hamilton Avenue, White Plains, New York and designated as Tax Lot 1..2, Block 5, Section 125.67, on the tax map of the City of White Plains.

Containing within said bounds 1.940 acres of land.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION DIVISION OF ENVIRONMENTAL REMEDIATION

-----X

HAMILTON GREEN SITE NYS BCP C#360177 200 Hamilton Avenue White Plains, Westchester County Region 3

AFFIRMATION OF SERVICE OF NOTICE TO MUNICIPALITY

-----X

I, Denise J. D'Ambrosio, declare under penalty of perjury, that I am attorney in the Law Office of Denise J. D'Ambrosio, attorney for S-WD/WP LLC, and that I served the Notice to Municipality of Environmental Easement and Environmental Easement in the above captioned matter upon the following:

Hon. Thomas Roach Mayor, City of White Plains 255 Main Street White Plains, New York 10601

by mailing and depositing a true and correct copy of the documents in an official depository for delivery by mail to said address on October 31, 2024.

Dated: October 31, 2024 White Plains, New York

Law Office of Denise J. D'Ambrosio

Denise J. D'Ambrosio, Esq.

2 Westchester Park Drive, Suite 418 White Plains, New York 10604 914-393-9578

Appendix B:

List of Site Contacts

LIST OF CONTACTS HAMILTON GREEN BCP SITE (C360177) WHITE PLAINS, NEW YORK

Name	Company	Project Position	Address	Phone Number/Email
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Appendix C:

Remedial Investigation Boring and Monitoring Well Logs

					PROJECT NAME:	Hamilt	on Green		GEOPROBE NO.	F	RI-SB1	
	5	E	5		LOCATION:	White Pla	ins, New Yo	ork	JOB NO.		12545	
		ULTING			METHOD:	Dire	ct Push		GROUND ELEVATION:			
GEOP	ROBE BY:		AARCO		DATE STARTED:	: 10/7/2022			GROUNDWATER TABLE I	DEPTH:		
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/7/2022	10/7/2022 0 Hr.		24 Hr.	Date		
DEPTH		SAMPLE	DEI	PTH								
(ft)	RECOVERY	TUBE	FROM	TO	ENVIRONMENTAL		SOIL D	DESC	RIPTION AND STRATIFICATION		PID	
0	(in)	No.	(ft)	(ft)	SOIL SAMPLE NAME							
			0	1		Dar	k Brown me	dium	to fine SAND, trave Sillt, with plant	matter	0	
			1				. Drown mo	, ai ai i i			0	
											0	
											0	
5	48	1			(4.5'-5)						0	
_	10				(4.5-5)						0	
				6.5		Brown m	edium to fin	ا۵۵ ما	ND little Gravel with glacial till and	nlant matter	0	
			6.5	8	(7.5'-8')	DIOWITIII			ND, little Gravel, with glacial till and n medium to fine SAND, little Silt	plant matter	0	
			8	0	(7.5-6)		Ligiti	DIOWI	Timedian to line SAND, little Silt		0	
10	42	2	0	10			liaht k	hroun	modium to fine SAND little Clay		0	
10	42	2	10	10			Ligiti	orown	medium to fine SAND, little Clay		0	
			10								0	
											0	
					(40) 40 51)						0	
15	60	3			(13'-13.5')						0	
10	00	3									0	
											0	
											0	
					(40.51.401)						0	
20	60	4			(18.5'-19')						0	
20	60	4									0	
											0	
											0	
					(00 EL 04I)						0	
25	60	5			(23.5'-24')						0	
20	00	3									0	
											0	
				28.5			Oranga h	roum	secret to fine CAND, with glocial ti	au	0	
			28.5	20.0	(28.5'-29')		Orange-u	JIOWII	coarse to fine SAND, with glacial ti		0	
30	60	6	20.0	30	(20.3-29)	Grov modi	um to fino S	SVND	, little medium to fine Gravel with w	oathorod rock	0	
- 00	- 00	•		- 00		Grey medi			g Complete at 30 feet BGS	satileted fock	•	
							!	DOIII	g Complete at 30 leet BGS			
35												
33												
				}								
											<u> </u>	
40												
40		<u> </u>		<u> </u>							1	
Nomin	al I.D. of Ho	alo.			in The subsurface in	Commetica al	m haraan	a obt-	ined for the design and estimating purp		4	
	al I.D. of Ba		lor						oned for the design and estimating purp by may have access to the same information			
MOLLIN	aı I.D. UI Ba	arrei Sairip	101		178 III It IS Made avallable	c to authorized	users only tr	nat tne	y may have access to the same informa	mon available		

Nominal I.D. of Hole	ın.	The subsurface information shown hereon was obtained for the design and estimating purposes for our client.
Nominal I.D. of Barrel Sampler	1% in	It is made available to authorized users only that they may have access to the same information available
		to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations
		or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnica
		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

	C	E	C		PROJECT NAME:	Hamilt	on Greei	n	GEOPROBE NO.	F	RI-SB2
					LOCATION:	White Plai	ns, New	York	JOB NO.		12545
	CONS	ULTING	ENGINEE	=RS	METHOD:	METHOD: Direct Push GROUND ELEVATION:					
GEOF	ROBE BY:		AARCO			DATE STARTED: 10/7/2022 GROUNDWATER TABLE DEPTH:					
	CTOR:		TAJ		DATE COMPLETED:						
DEPTH		SAMPLE		PTH					<u> </u>		
(ft)	RECOVERY	TUBE	FROM	ТО	ENVIRONMENTAL		SOI	L DESC	CRIPTION AND STRATIFICATION		PID
0	(in)	No.	(ft)	(ft)	SOIL SAMPLE NAME						
			0	0.5					Concrete		0
			0.5		(1.5'-2')						0
					, ,						0
				4			Brown	medium	n to fine SAND, trace Silt; Historic Fill		0
5	48	1	4	5.5		D			um to fine SAND, little Silt, with glacial till		0
			5.5								0
											0
					(7.5'-8')						0
					(/						0
10	54	2		10				Grev-	-Brown coarse to fine SAND		0
			10								0
											0
					(12.5'-13')						0
				14	(1210 10)	Bro	wn coars	se to fin	e SAND, little Clay, Little Silt, trace Grave	el	0
15	54	3	14						,		0
											0
											0
											0
											0
20	60	4		20	(19.5'-20')			Gr	rey medium to fine SAND		0
			20	20.5	(1010 =0)	Brown medium to fine SAND, little Clay					0
			20.5								0
				23			Grey medium to fine SAND				
			23								0
25	60	5			(24-24.5')						0
	i e	1		i e	\/						0
				27.5			Br	own coa	arse to fine SAND, with glacial till		0
			27.5								0
											0
30	60	6		30	(29.5'-30')			G	rey coarse to fine SAND		0
					()				ng Complete at 30 feet BGS		
									-		
35											
40											

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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

			0		PROJECT NAME:	Hamilton (Green	GEOPROBE NO.	RI-	-SB3	
			S		LOCATION:	White Plains,	New York	JOB NO.	12	2545	
	CONS	ULTING	ENGINEE	ERS	METHOD:	Direct P	ush	GROUND ELEVATION:			
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/10/2022		GROUNDWATER TABLE DEPTH:			
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/10/2022 0 H	ŀr.	24 Hr. Dat	.e		
DEPTH		SAMPLE		PTH							
(ft)	RECOVERY (in)	TUBE No.	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME		SOIL DESCRIPTION AND STRATIFICATION				
0		110.	(ft)	(ft)							
			0	0.5				Concrete		0	
			0.5	2.5		Bro	own medium	to fine SAND, trace Silt; with glacial till		0	
			2.5						L	0	
					(3'-3.5')					0	
5	42	1								0	
										0	
					(6.5'-7')					0	
				8.5	(0.0 1)		Brown/grey	medium to fine SAND, trace Clay	_	0	
			8.5	0.0			Diowingley	medium to line GAND, trace diay		0	
10		2	0.0	10				" (C OAND (O''	-	0	
10	54			10			Grey m	edium to fine SAND, trace Silt			
			10						 	0	
					(12'-12.5')				L	0	
									L	0	
										0	
15	60	3								0	
										0	
									-	0	
					(17.5'18')					0	
					(17.5 16)				-	0	
00						4			F		
20	60	4							L	0	
									L	0	
				22.5			Bro	own coarse to fine SAND		0	
			22.5						L	0	
										0	
25	60	5			(24.5-25')		Grey med	ium to fine SAND, some Gravel		0	
							Boring Co	mplete at 25 feet BGS (Refusal)			
									-		
									_		
30									-	-	
- 30									-		
									F		
	-								-		
									_		
			ļ			1			L		
35									L		
									L		
40			l			1					
	1		1	1							
Nomin	al I.D. of H	nle			in The subsurface in	formation shown be	ereon was obta	ined for the design and estimating purposes for or	ur client		
	al I.D. of Ba		oler					ey may have access to the same information available.			

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strate: Inferred Change in Strate:

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

	C	E	C		PROJECT NAME:	Hamilt	on Greer	า	GEOPROBE NO.	I	RI-SB4
	-				LOCATION:	White Plai	ns, New	York	JOB NO.		12545
	CONS	ULTING	ENGINEE	=RS	METHOD:	Direc	t Push		GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/10/2022 GROUNDWATER TABLE I				TH:	
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/10/2022 0 Hr. 24 Hr.				Date	
DEPTH		SAMPLE	DE	PTH					•		
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME		SOIL	L DESC	RIPTION AND STRATIFICATION		PID
0	()	No.	(ft)	(ft)	SOIL SAIVIFLE IVAIVIE						
			0	0.5					Concrete		0
			0.5		(0.5'-1')						0
				3.5			FILL: Bro	own me	edium to fine SAND, little Silt, little Clay		0
			3.5								0
5	42	1		5.5				Brown	CLAY, little Silt, trace Gravel		0
			5.5	6					Concrete		0
			6								0
				8.5	(7'-7.5')		Brown m	nedium	to fine SAND, trace Silt, with glacial till		0
			8.5		, ,						0
10	36	2		10			Dar	k Browr	n medium to fine SAND, little Clay		0
			10								0
											0
											0
											0
15	60	3		15.5	(14'-14.5')			Bro	own coarse to fine SAND		0
			15.5		(** *******)						0
											0
											0
											0
20	54	4		20	(19'-19.5')		Brow	n mediu	ım to fine SAND, little Clay, little Silt		0
			20		(10 10.0)						0
											0
											0
											0
25	48	5		25	(24.5-25')		Bro	own coa	arse to fine SAND, with glacial till		0
			25	i e	, , , , , ,						0
											0
											0
				29				Brown	coars to fine SAND, little Clay		0
30	24	6	29	30	(29.5'-30')				own medium to fine SAND		0
					(=0:0 00)				ng Complete at 30 feet BGS		
									.gp		
35											
					1						
					1						
					1						
40											
		1		1	<u> </u>						1

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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

					PROJECT NAME:	Hamilt	on Green	GEOPI	ROBE NO.	RI-SB5	
	3	E	J		LOCATION:	White Plai	ns, New Yor	k JOB N	0.	12545	
		ULTING			METHOD:	Dire	ct Push	GROU	ND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/8/2022		GRO	UNDWATER TABLE DEPT	H:	
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/8/2022	0 Hr.		24 Hr. Date	е	
DEPTH		SAMPLE	DE	PTH							
(ft)	RECOVERY (in)	TUBE No.	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME	s	SOIL DESCRIPTION AND STRATIFICATION				
0		NO.	(ft)	(ft)							
			0	1				Concre	ete	0	
			1							0	
					(3'-3.5')					0	
_				_						0	
5	42	1	_	5		 			n to fine SAND;	0	
			5	6		 	Brow	n medium to	o fine SAND	0	
			6							0	
				8	(7.5'-8')	E	rown mediu	m to fine Silt	y Sand; trace Gravel	0	
			8							0	
10	48	2		10			D:	ark Brown C	layey Silt	0	
			10	11		Brown	medium to f	fine SAND w	ith fragments of concrete	0	
			11		(11.5'-12')					0	
										0	
				14			Brown me	edium to fine	SAND, trace Silt	0	
15	60	3	14							0	
										0	
										0	
										0	
					(18'-18.5')					0	
20	60	4								0	
										0	
					(21'-21.5')					0	
										0	
										0.1	
25	24	5								0	
				27.5		Ora	ange-brown i	medium to fi	ne SAND, little Gravel	0	
			27.5			<u> </u>				0	
										0	
										0	
30	60	6		30	(29.5'-30')	Gı	ey fine to me	edium SANE	with weathered rock	0	
							Boring	Complete a	t 30 feet BGS		
							· ·	•			
35											
40											
	<u> </u>			1	1						

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:
0.11 1.7	1 C D	

	C		C		PROJECT NAME:	Hamilton Green		า	GEOPROBE NO.	RI-SB6	
			S		LOCATION:	White Plains, New York		York	JOB NO.	12545	
	CONS	ULTING	ENGINE	ERS	METHOD:	Direct Push			GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/8/2022 GROUNDWATER TABLE DEPT			DEPTH:		
	NSPECTOR: TAJ			DATE COMPLETED:	10/8/2022 0 Hr. 24 Hr. Date						
DEPTH		SAMPLE	DE	PTH							
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL	SOIL DESCRIPTION AND STRATIFICATION					PID
0	(III)	No.	(ft)	(ft)	SOIL SAMPLE NAME						
			0	1	(0.5'-1')				Concrete		0
			1								0
											0
											0
5	42	1		5		FILL: Brown medium to fine SAND,little Gravel, trace Silt		Silt	0		
			5	6					Concrete		0
			6		(6'-6.5')						0
											0
				9		B			fine SAND; little Silt, trace Clay		0
10	42	2	9	10			Black	c mediu	m to fine SAND, little Clay		0
			10	11		Brow	n mediur	n to fine	SAND with fragments of concr	ete	0
			11								0
					(12.5'-13')						0
											0
15	60	3		15					nedium to fine SAND		0
			15	15.5					e SAND, little Clay, with brick fra	agments	0
			15.5	16.5	(15.5'-16')		Orange-b	rown m	edium to fine SAND, little Clay		0
			16.5								0
											0
20	42	4		20				Brown r	nedium to fine SAND		0
			20								0
											0
				22.5		G	rey medii	um to fii	ne SAND, little Gravel, trace Silt	t	0
		_	22.5		(22.5'-23')						0
25	60	5		07.5			_		, , , , , , , , , , , , , , , , , , , ,		0
			07.5	27.5	(07.5) 000		Bro	own/gre	y medium to fine SAND		0
			27.5		(27.5'-28')						0
											0
20	60			20				•	P. 1 C. 04115		0
30	60	6		30					nedium to fine SAND		0
							Во	ring Co	mplete at 30 Feet BGS		
25											
35											
40											
40											

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		or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical					
		engineers recommendations contained in the report from which these logs were extracted.					
		Pp: Pocket Penetrometer; DP: Direct Push					
		Approximate Change in Strata: Inferred Change in Strata:					
0.11.1							

					PROJECT NAME:	Hamilton Green		GEOPROBE NO.	l	RI-SB7		
			S		LOCATION:	White Plains, New Yo	ork .	JON NO.		12545		
	CONS	ULTING	ENGINE	ERS	METHOD:	Direct Push		GROUND ELEVATION:				
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/10/2022		GROUNDWATER TABLE DE	PTH:			
INSPE	CTOR:		TAJ		DATE COMPLETED:): 10/10/2022 0 Hr.		24 Hr. Date				
DEPTH		SAMPLE	DE	PTH		<u> </u>						
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME	SOIL D	SOIL DESCRIPTION AND STRATIFICATION					
0	()	No.	(ft)	(ft)	OOIL OAWII EL WAWE							
			0	1				Concrete		0		
			1							0		
					(2'-2.5')					0		
					(2 2.0)					0		
5	42	1		5		Brow	un ma	dium to fine SAND,with Quartz		0		
	72		5	6.5						0		
		-	6.5	0.5		DIOWI	II IIIeu	ium to fine SAND, some Gravel		0		
			0.5	0	(7.51.01)		_	I'		0		
			_	8	(7.5'-8')	FILL: b	Brown	medium to fine SAND, little Clay				
			8							0		
10	42	2								0		
				11		FILL	.: Blac	k CLAY, with wood fragments		0		
			11		(11'-11.5')					0		
										0		
										0		
15	54	3								0		
										0		
					(16.5'-17')					0		
					(1 1)					0		
										0		
20	60	4								0		
	00	_								0		
					(24) 24 51)					0		
				23.5	(21'-21.5')		_			0		
			00.5	23.3			Bro	wn coarse to fine SAND				
			23.5							0		
25	60	5								0		
					(25.5'-26')					0		
										0		
										0		
										0		
30	60	6		30			Gr	ey coarse to fine SAND		0		
						E	Boring	Complete at 30 feet BGS				
35												
		t	1									
		1	1	1						 		
40		 								 		
40		ı	ı	I	l					1		
No:-	allD afti	olo			in The selection is	C	1	and for the design on the discretion	C	-4		
	al I.D. of Ho		ler					ned for the design and estimating purpose		и.		

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		engineers recommendations contained in the report from which these logs were extracted.			
		Pp: Pocket Penetrometer; DP: Direct Push			
		Approximate Change in Strate: Inferred Change in Strate:			

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

					PROJECT NAME:	Hamilt	on Greer	1	GEOPROBE NO.		RI-SB8
	5		S		LOCATION:	White Plai	ns New	Vork	JOB NO.		12545
	CONS	ULTING	ENGINEE	RS				TOTA			12040
0505	DODE DV				METHOD:		Direct Push GROUND ELEVATION:			E DEDTU	
	ROBE BY:		AARCO		DATE STARTED:				GROUNDWATER TABL		
	CTOR:		TAJ	PTH	DATE COMPLETED:	10/8/2022	0 Hr.		24 Hr.	Date	
DEPTH	RECOVERY	SAMPLE TUBE			ENVIRONMENTAL		SOII DE	CCDID.	TION AND STRATIFICATIOI	J	PID
(ft) 0	(in)	No.	FROM (ft)	TO (ft)	SOIL SAMPLE NAME		SOIL DE	SCRIP	HON AND STRATIFICATION	•	PID
			0	0.5					Concrete		0
			0.5								0
				2.5	(1.5'-2')		FIL	L: Brow	n medium to fine SAND		0
			2.5	4				Grey m	nedium to fine SAND		0
5	32	1	4	5			Brow	n medi	um to fine SAND, little Silt		0
			5	6					Concrete		0
			6	7		В	rown coa	arse to f	ine SAND; some Clay, little	Silt	0
			7		(7'-7.5')						0
											0
10	42	2									0
				11	(10.5'-11')		Orange-l	orown n	nedium to fine SAND, little S	lt	0
			11								0
											0
											0
15	60	3		15				Brown r	nedium to fine SAND		0
			15		(15'-15.5')						0
											0
											0
											0
20	60	4									0
					(20.5'-21')						0
											0
											0
25	60	5									0
25	60	o o									0
				27	(26'-26.5')	Brown	madium	to fine	SAND, trace medium to fine	Gravel	0
				<u> </u>	(20-20.0)	DIUWI	mediuli	io ille	OCIVE, HAGE ITECHNITION THE	Olavel	0
											0
30	60	6		30		Grev	medium	to fine	SAND, little medium to fine (Gravel	0
- 00		Ŭ		- 00		Oley			omplete at 30 feet BGS	Jiavei	·
							В	ning oc	implete at 00 feet Bee		
35											
40											
-					<u>ı</u>						1

Nominal I.D. of Hole	in.	The subsurface information shown hereon was obtained for the design and estimating purposes for our client.
Nominal I.D. of Barrel Sampler	1% in	It is made available to authorized users only that they may have access to the same information available
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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

	C		C		PROJECT NAME:	Hamil	ton Greei	n	GEOPROBE NO.	RI-SB9	
		E			LOCATION:	White Pla	ins, New	York	JOB NO.		12545
	CONS	ULTING	ENGINEE	ERS	METHOD:	Dire	ect Push		GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/8/2022 GROUNDWATER TABLE DEPTH:					
	CTOR:		TAJ		DATE COMPLETED:	 		24 Hr.	Date		
DEPTH		SAMPLE		PTH							
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL		SOIL DE	SCRIP	TION AND STRATIFICATION		PID
0	(III)	No.	(ft)	(ft)	SOIL SAMPLE NAME						
			0	0.5					Concrete		0
			0.5		(0.5'-1')						0
											0
											0
5	36	1		5			FIL	L: Brow	n medium to fine SAND		0
			5	6					Concrete		0
			6	7	(6'-6.5')	Daı	k brown	coarse	to fine SAND; some Clay, little	Silt	0
			7								0
											0
10	54	2		10			Light b	rown me	edium to fine SAND, little Silt		0
			10								0
				12	(11.5'-12')		Da	rk brow	n medium to fine SAND		0
			12	12.5					Concrete		0
			12.5								0
15	24	3									0
											0
											0
				17.5				Brown r	medium to fine SAND		0
			17.5		(17.5'-18')						0
20	60	4									0
											0
											0
					(00.51.041)						0
0.5	00	-		0.5	(23.5'-24')				"		0
25	60	5	25	25			Light bro	own me	dium to fine SAND, little Clay		0
			25								0
											0
					(20 El 201)						0
30	60	6		30	(28.5'-29')			Droves	ocaraa ta fina CAND		0
30	00	0		30			D.		coarse to fine SAND		0
							D	oning Co	omplete at 30 feet BGS		
35											
55											
40											
70				l							

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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:
0.11.1		

			0		PROJECT NAME:	Hamilton Gree	en	GEOPROBE NO.	F	RI-SB10
	Section 1		S		LOCATION:	White Plains, Nev	v York	JOB NO.		12545
	CONS	ULTING	ENGINE	ERS	METHOD:	Direct Push		GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/7/2022		GROUNDWATER TABLE DE	PTH:	
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/7/2022 0 Hr.		24 Hr.	Date	
DEPTH		SAMPLE	DE	PTH		•	•		•	
(ft) 0	RECOVERY (in)	TUBE No.	FROM (ft)	TO (ft)	ENVIRONMENTAL SOIL SAMPLE NAME	SC		PID		
			0	1				Concrete		0
			1							0
					(2.5'-3')					0
					, ,					0
5	36	1		5		F	ILL: Bro	wn coarse to fine SAND, little Silt		0
			5	6				Concrete		0
			6							0
					(7.5'-8')					0
					(*****)					0
10	38	2								0
										0
				12	(11'-11.5')	FILL: Orange-broy	vn medii	ım to fine Sand, little Silt, with concrete	fragments	0
			12		(11-11.0)	TILL. Orange-brow	vii iiicaic	in to fine dand, little dift, with condicte	naginonis	0
										0
15	36	3	14	15						0
10	00	Ů	15	10	(15.5'-16')					0
			10		(13.3-10)					0
										0
				19		Onomara h		divine to fine County course Cueval little C	\:I4	0
20	60	4	19	19		Orange-b	rown me	dium to fine Sand, some Gravel, little S	olit	0
20	60	4	19							-
										0
										0
					(22 FL 2 (I))					
0.5	00	-		05	(23.5'-24')					0
25	60	5	0.5	25		Gi	ey-brow	n medium to fine SAND, trace Silt		0
			25							0
										0
				1	(00 5: 00)					0
		_		00	(28.5'-29')		_			0
30	60	6		30				rey medium to fine SAND		0
							Borin	g Complete at 30 feet BGS		
		}	ļ							
				-						
35				ļ						<u> </u>
				ļ						<u> </u>
40				<u> </u>						
	al I.D. of H				in. The subsurface int	formation shown hereor	was obta	ained for the design and estimating purpose	s for our clien	nt.

Nominal I.D. of Hole	in.	The subsurface information shown hereon was obtained for the design and estimating purposes for our client.
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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

	SESI		PI	ROJECT NAME:	Hamilt	on Gree	n	GEOPROBE NO.	RI-SB11			
						LOCATION:	White Pla	ins, New	/ York	JOB NO.		12545
	CONS	ULTING	ENGINE	ERS		METHOD:	Dire	ct Push		GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		D	ATE STARTED:	10/7/2022			GROUNDWATER TABLE DEF	PTH:	
INSPE	CTOR:		TAJ		DATI	E COMPLETED:	10/7/2022	0 Hr.		24 Hr.	Date	
DEPTH		SAMPLE		PTH						•		
(ft) O	RECOVERY (in)	TUBE No.	FROM (ft)	TO (ft)		RONMENTAL SAMPLE NAME		SO	IL DESC	RIPTION AND STRATIFICATION		PID
0				(11)		(0.51.41)						0
			0			(0.5'-1')						0
												0
												0
				3.5					Orange	e-brown medium to fine SAND		0
5	42	1	3.5	5								0
			5	6			Darl	k-brown	medium	to fine SAND, trace medium to fine Gr	avel	0
			6			(6'-6.5')						0
						(0-0.0)						0
		_										0
10	54	2		10			Orange-gre	y-brown	medium	to fine Sand, little Silt, little mediumt to	fine Gravel	0
			10									0
					((11'-11.5')						0
												0
												0
15	60	3										0
-10	00											0
					!							
					((16.5'-17')						0
												0
												0
20	60	4										0
												0
				22					Bro	own medium to fine SAND		0
			22		-	(22.5'-23')						0
					· ·	22.0-20)						0
0.5	20	_										L
25	60	5										0
												0
												0
				27.5					Gr	ey medium to fine SAND		0
			27.5		((27.5'-28')						0
30	60	6		30					Grey m	edium to fine SAND, little Clay		0
										g Complete at 30 feet BGS		
										gp		
35												
40					1							
۰,0		<u> </u>	<u> </u>	<u> </u>								1
NI. ·	-U.D. (2)	.1-			1	m 1 0 1					c	
	al I.D. of Ho									ained for the design and estimating purpose		ıt.
Nomin	al I.D. of Ba	arrel Samp	ier		17/8 IN	It is made availabl	e to authorized	users on	ly that th	ey may have access to the same information	ı avaılable	

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

	C		C		PROJECT NAME:	Hamilt	on Greer	า	GEOPROBE NO.	RI-SB12
		E			LOCATION:	White Plai	ns, New	York	JOB NO.	12545
	CONS	ULTING	ENGINEE	=RS	METHOD:	Dire	ct Push		GROUND ELEVATION:	
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/7/2022			GROUNDWATER TABLE DEPTH:	
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/7/2022	0 Hr.		24 Hr. Date	
DEPTH		SAMPLE	DE	PTH						
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME		SOII	L DESC	RIPTION AND STRATIFICATION	PID
0	()	No.	(ft)	(ft)	SOIL SAIVIFLE NAIVIE					
			0	1					Concrete	0
			1							0
										0
										0
5	12	1	3.5	5	(4.5'-5')	FILL: Dark-b	rown me	dium to	fine SAND, some mediumt to fine Gravel, little Sil	t 0
			5							0
				7.5		FILL:	Dark-bro	own me	dium to fine SAND, with concrete fragments	0
			7.5		(7.5'-8')					0
										0
10	24	2		10				Brown n	medium to fine SAND, little Silt	0
			10	11.5		Brov	vn mediu	ım to fin	ne SAND, little Silt, with concrete fragments	0
			11.5		(11.5'-12')					0
										0
										0
15	42	3								0
										0
										0
										0
					(18'-18.5')					0
20	60	4		20			Oran	ge-brow	n medium to fine SAND, Little Clay	0
			20							0
										0
					(22.5'-23')					0
										0
25	60	5		25		Brown	n mediun	n to fine	SAND, little Silt, little medium to fine Gravel	0
			25			l				0
				26.5				Brown n	nedium to fine SAND, little Silt	0
			26.5							0
										0
30	60	6		30	(29.5'-30')			Grey-l	brown medium to fine SAND	0
								Borin	ng Complete at 30 feet BGS	
35										
40										

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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

			C		PROJECT NAME:	Hamilto	n Green		GEOPROBE NO.	F	RI-SB13
			S		LOCATION:	White Plair	ns, New Y	′ork	JOB NO.		12545
	CONS	ULTING	ENGINEE	ERS	METHOD:	Direc	t Push		GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/7/2022			GROUNDWATER TABLE DEPTH:		
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/7/2022	0 Hr.		24 Hr. Da	ite	
DEPTH		SAMPLE	DE	PTH			<u> </u>				
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME		SOIL	DESC	RIPTION AND STRATIFICATION		PID
0	(111)	No.	(ft)	(ft)	SOIL SAWIFLE NAIVIE						
			0	1					Concrete		0
			1			••••••					0
											0
					(3'-3.5')						0
5	42	1	3.5	5		FILL; Da	ark-brown	mediu	ım to fine SAND, some medium to fine Gra	/el	0
			5	6		••••••			e-Brown coarse to fine SAND		0
			6								0
					(7'-7.5')						0
				9			В	rown n	nedium to fine SAND, little Silt		0
10	60	2	9								0
				11		ا	Brown me	edium t	to fine SAND, with concrete fragments		0
			11	12	(11'-11.5')		Br	own m	edium to fine SAND, little Clay		0
			12								0
											0
15	60	3		15		Oran	ge-Brown	coarse	e to fine SAND, some coarse to fine Gravel		0
			15								0
											0
					(17'-17.5')						0
											0
20	60	4		20							0
			20								0
											0
											0
					(23.5'-24')						0
25	60	5		25				Bro	own coarse to fine SAND		0
			25								0
											0
											0
											0
30	60	6		30	(29.5'-30')		Grey		n medium to fine SAND, little Clay		0
								Borin	g Complete at 30 feet BGS		
35											
40											

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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strate: Informed Change in Strate:

	C		C		PROJECT NAME:	Hamilt	on Greer	า	GEOPROBE NO.	F	RI-SB14
		E			LOCATION:	White Pla	ins, New	York	JOB NO.		12545
	CONS	ULTING	ENGINEE	-KS	METHOD:	Dire	ct Push		GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/7/2022			GROUNDWATER TABLE DEPTI	 :	
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/7/2022	0 Hr.	Date			
DEPTH		SAMPLE	DE	PTH					<u>. </u>		
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME		SOII	L DESC	RIPTION AND STRATIFICATION		PID
0	()	No.	(ft)	(ft)	SOIL SAIVII LL IVAIVIL						
			0	0.5					Concrete		0
			0.5								0
											0
											0
5	42	1		5	(4.5'-5')			FILL: B	frown medium to fine SAND;		0
			5	6		FIL	L: Light b	orown m	edium to fine SAND, with brick fragments		0
			6	6.5					Concrete		0
			6.5								0
				8.5	(7.5'-8')			Light I	prown medium to fine SAND		0
10	60	2	8.5			•••••					0
				11				Light	brown coarse to fine SAND		0
			11	12.5	(11.5'-12')	•••••	Lig		n coarse to fine SAND, little Clay		0
			12.5			•••••					0
											0
15	60	3		15				Bro	wn medium to fine SAND		0
			15								0
											0
											0
											0
20	60	4			(19.5'-20')						0
					, ,						0
											0
											0
											0
25	60	5			(24.5'-25')						0
											0
											0
				28			I	Brown o	coarse to fine SAND, little Clay		0
			28			•••••					0
30	60	6		30	(29.5'-30')			Bla	ack medium to fine Sand		0
								Borin	g Complete at 30 feet BGS		
35											
40											
					•						•

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strate: Infarred Change in Strate:

					PROJECT NAME:	Hamil	ton Greer	1	GEOPROBE NO.	R	I-SB15	
		E	5		LOCATION:	White Pla	ins New'	York	JOB NO.	12545		
	CONS	ULTING	ENGINE	RS			,	TOTAL			12010	
					METHOD:		ct Push		GROUND ELEVATION:			
	ROBE BY:		AARCO		DATE STARTED:	10/6/2022			GROUNDWATER TABLE D			
	CTOR:		TAJ	DTU	DATE COMPLETED:	10/6/2022	0 Hr.		24 Hr.	Date	1	
DEPTH	RECOVERY	SAMPLE		PTH	ENVIRONMENTAL			PID				
(ft) 0	(in)	TUBE No.	FROM (ft)	TO (ft)	SOIL SAMPLE NAME		SOIL DESCRIPTION AND STRATIFICATION					
			0	0.5					Concrete		0	
			0.5								0	
					(2'-2.5')						0	
											0	
5	48	1									0	
											0.5	
											1.2	
				7.5	(7'-7.5')	Brown SIL	Γ, trace m	edium	to fine Sand, trace medium to fir	ne gravel	0.1	
			7.5	8.5			Light bro	own me	dium to fine SAND, trace Silt		0	
10	60	2	8.5			••••••••••	••••••				0.3	
					(10.5'-11')						0.1	
											0.8	
											2.2	
											0.1	
15	60	3		15			Brown	n SILT,	trace medium to fine Sand		0	
			15		(15'-15.5')						8.6	
											8.7	
											8.7	
				18.5			Brown	SILT,	some medium to fine Sand		9.6	
20	60	4	18.5			•••••••••	•••••••				7.8	
											5.4	
											3.1	
					(22'-22.5')						0.1	
											0.4	
25	40	5									1.2	
											0	
					(26'-26.5')						2.4	
				28			Brown	n mediu	ım to fine SAND, some Silt		1.2	
											0.5	
30	60	6		30			Grey	/ coars	e to fine SAND, some Silt		0.6	
							Во	ring Co	omplete at 30 feet BGS			
35												
40												

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

	SESI				PROJECT NAME:	Hamilto	on Green		GEOPROBE NO. RI		I-SB16	
					LOCATION:	White Plair	ns, New Y	⁄ork	JOB NO.		12545	
	CONS	ULTING	ENGINE	ERS	METHOD:	Direc	t Push		GROUND ELEVATION:			
GEOPI	ROBE BY:		AARCO		DATE STARTED:				GROUNDWATER TABLE DEF			
	CTOR:		TAJ		DATE COMPLETED:		0 Hr.		24 Hr. Da			
DEPTH	01011.	SAMPLE		PTH	BATE OOM! EETEB.	10/0/2022	• • • • • • • • • • • • • • • • • • • •					
(ft)	RECOVERY	TUBE	FROM	TO	ENVIRONMENTAL	(SOIL DES	SCRIP1	TION AND STRATIFICATION		PID	
0	(in)	No.	(ft)	(ft)	SOIL SAMPLE NAME							
			0	0.5					Concrete		0	
			0.5		(0.5'-1')	••••••					0.1	
											0.4	
				4		Brown SIL	T, trace c	oarse t	to fine Sand, trace coarse to fine gr	ravel	0.4	
5	32	1	4	5		••••••			ım to fine SAND, trace Silt		0.3	
			5	6		Brov			ravel, some medium to fine Sand		0.3	
			6		(6'-6.5')	•••••					0.1	
				8			Brown	mediu	ım to fine SAND, trace Silt		0.1	
			8			•••••					0.7	
10	50	2		10			Dark bro	wn SIL	.T, little medium to fine Sand		2.6	
			10		(10'-10.5')						9.1	
					,						8.2	
											4.6	
				14			Brown	n mediı	um to fine SAND, little Silt		10.1	
15	60	3	14	15			Dark bro	wn SIL	T, little medium to fine Sand		4	
			15								1.1	
											3.5	
					(17'-17.5')						28.1	
					·						23.4	
20	36	4		20							23.6	
			20		(20.5'-21')						14.4	
											14.3	
				23			Grey r	mediur	m to fine SAND, little SILT		9.7	
			23			••••••					6.9	
25	56	5		25			Brown m	nedium	to fine SAND, little Silt (wet)		6.8	
			25				48 88 88 88 88 88 88				0	
											0.1	
				27.5			(Grey m	edium to fine SAND		0	
			27.5		(27.5'-28')		48 88 88 88 88 88 88				0.3	
30	34	6		30		Grey SI	LT, trace	mediu	m to fine Sand, with weathered roc	:k	0	
									mpleted at 30 feet BGS			
35												
40												

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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

	C	E	C		PROJECT NAME:	Hamilt	on Gree	n	GEOPROBE NO.	R	I-SB17
		ULTING			LOCATION:	White Plai	ns, New	York	JOB NO.	1	12545
	CONS	OLING	ENGINEE	- 115	METHOD:	Dire	ct Push		GROUND ELEVATION:		
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/7/2022			GROUNDWATER TABLE DEF	PTH:	
INSPE	CTOR:		TAJ		DATE COMPLETED:	10/7/2022 0 Hr. 24 Hr. Date				Date	
DEPTH		SAMPLE	DE	PTH							
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL SOIL SAMPLE NAME		SOI	L DESC	RIPTION AND STRATIFICATION		PID
0	()	No.	(ft)	(ft)	SOIL SAWIFLE NAME						
			0	1					Concrete		0
			1		(1.5'-2')					•••••••••	0
											0
											0
5	24	1									0
				6		E	Brown me	edium to	o fine SAND; little medium to fine Grave	l .	0
			6	6.5					Concrete		0
			6.5	7.5	(6.5'-7')		Grey m	nedium 1	to fine SAND, some Gravel, little Clay	•••••••••	0
			7.5								0
10	42	2		10			E	Brown m	nedium to fine SAND, little Clay		0
			10	11					Concrete		0
			11	11.5			Lig	ht brow	n coarse to fine SAND, little Clay		0
			11.5		(12'-12.5')						0
											0
15	60	3									0
											0
				17.5				Brown r	medium to fine SAND, little Silt		0
			17.5								0
					(18.5'-19')						0
20	60	4									0
											0
				22.5				Bro	own medium to find SAND		0
			22.5		(22.5'-23')	••••••					0
											0
25	60	5									0
											0
											0
											0
					(28.5'-29')						0
30	60	6		30				Grey-	brown medium to fine SAND		0
								Borin	ng Complete at 30 feet BGS		
35											
40											

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		engineers recommendations contained in the report from which these logs were extracted.
		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

SESI				PROJECT NAME:	Hamil	ton Gree	n	GEOPROBE NO. RI-		-SB18		
	P				LOCATION:	White Pla	ins, New	York	JOB NO.	12545		
	CONS	ULTING	ENGINEE	-RS	METHOD:	Dire	ct Push		GROUND ELEVATION:			
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/6/2022	1		GROUNDWATER TABLE	DEPTH:		
	CTOR:		TAJ		DATE COMPLETED:	10/6/2022						
DEPTH		SAMPLE		PTH								
(ft)	RECOVERY (in)	TUBE	FROM	TO	ENVIRONMENTAL		SOIL DE	SCRIP	TION AND STRATIFICATION		PID	
0	(11)	No.	(ft)	(ft)	SOIL SAMPLE NAME							
			0	0.5					Concrete		0	
			0.5								2.3	
											8.6	
				4		Light brown	coarse to	fine SA	AND, some coarse to fine Grave	el, trace Silt	11.5	
5	36	1	4	5	(4.5'-5')	Brov	vn CLAY,	, some r	nedium to fine Sand, with bould	ders	13.2	
			5	6							6.1	
			6								8.4	
				8	(7.5'-8')						23.2	
			8								29.2	
10	40	2		10							28.7	
			10								0.1	
					(11'-11.5')						0.1	
											0.1	
				14							0.1	
15	10	3	14	15		Brown me	dium to fi	ine SAN	D, little Silt, trace medium to fin	ne Gravel	0.1	
			15	16			Brown	ı CLAY,	some medium to fine Sand		0.9	
			16		(16'-16.5')						1.1	
											0	
											0.1	
20	60	4		20			Grey	y mediui	m to fine SAND, some Silt		0.1	
			20	21		• • • • • • • • • • • • • • • • • • • •		Grey	/ SILT, trace Sand		0.1	
			21		(21.5'-22')						0	
											0.1	
											0.1	
25	58	5		25			Grey	y mediui	m to fine SAND, some Silt		0	
			25	_							0	
				27			Grey-bro	wn med	lium to fine SAND, some Clay		0.1	
			27								1.1	
											0.7	
30	60	6		30	(29.5'-30')				m to fine SAND, some Silt		5.1	
							В	oring Co	omplete at 30 feet BGS			
25												
35												
40												
40					l							

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:

PROJECT NAME: Hamilton Green GEOPROBE NO. LOCATION: White Plains, New York JOB NO.	12545
CONSULTING ENGINEERS METHOD: Direct Push GROUND ELEVATION:	
GEOPROBE BY: AARCO DATE STARTED: 10/6/2022 GROUNDWATER TABLE	DEPTH:
INSPECTOR: TAJ DATE COMPLETED: 10/6/2022 0 Hr. 24 Hr.	Date
DEPTH SAMPLE DEPTH SAMPLE DEPTH	•
(ft) RECOVERY (in) TUBE FROM TO SOIL SAMPLE NAME SOIL DESCRIPTION AND STRATIFICATION	PID
0 No. (ft) (ft)	
0 1 Concrete	0
1	2.3
(2.5'-3')	8.6
	11.5
5 36 1	13.2
	6.1
(6.5'-7')	8.4
	23.2
	29.2
10 38 2 10 Light brown medium to fine SAND, little coarse to fine Grave	el, trace Silt 28.7
10	0.1
	0.1
(11.5'-12')	0.1
Grey medium to fine SAND, some Silt, trace medium to fine	Gravel, with 0.1
15 36 3 14 15 boulders	0.1
15	0.9
	1.1
	0
(18.5'-19')	0.1
20 60 4	0.1
	0.1
	0
	0.1
(23.5'-24')	0.1
25 60 5	0
	0
	0.1
	1.1
Light brown medium to fine SAND, trace Silt	0.7
30 60 6 30 (29.5'-30') Light brown medium to fine SAND, some Clay, trace medium	to fine Gravel 5.1
Boring Complete at 30 feet BGS	
35	
40	

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strate: Inferred Change in Strate:

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

					PROJECT NAME:	Hamilton Green		GEOPROBE NO.	RI-SB20
					LOCATION:	White Plains, New Yo	ork	Job No	12545
	CONS	ULTING	ENGINE	ERS	METHOD:	Direct Push		GROUND FLEVATION:	NA
GEOP	ROBE BY:		AARCO						
								Ī	
LOCATION: White Plains, New York Job No 12545									
		TUBE	FROM			SOIL I	DESC	RIPTION AND STRATIFICATION	PID
				1	(0-0.5)				10.2
					(3-2-2)				5.6
									3.5
									0
5	36	1							0
									0
									0
					(7.5-8)				0
				9	(1.0 0)	Light brown mediur	m to fi	ne SAND, little coarse to fine Gravel, trace Silt	12
10	38	2	9			Light brown modul			4.3
									0
									0
									0
					(12 12 5)				20.3
15	36	3		15		Grov modium to	fino S	AND some Silt trace Gravel with boulders	18.1
10	30	<u> </u>	15	10	(14-14.5)	Grey medium to	illie S	AND, Some Siit, trace Graver, with bounders	0
			13						0
									0
									0
20	60	1							0
20	60	4							
									0
									0
									0
05	00	-			(0.1.5.05)				0
25	60	5		00	(24.5-25)			"	
			00	26		Light	brown	i medium to fine SAND, trace Silt	0
			26						0
									0
20	00	0		00	(00.00.5)				0
30	60	6		30	(29-29.5)				0
							Boring	g Complete at 30 feet BGS	
35		ļ							
		ļ							
		ļ							
40									
									
Nomin	al I.D. of H	ole	_		in. The subsurface in	formation shown hereon wa	as obta	ined for the design and estimating purposes for our c	lient.

Nominal I.D. of Hole	in.	The subsurface information shown hereon was obtained for the design and estimating purposes for our client.
Nominal I.D. of Barrel Sampler	1% in	It is made available to authorized users only that they may have access to the same information available
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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strate: Inferred Change in Strate:

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

					PROJECT NAME:	Hamil	ton Greer	1	GEOPROBE NO.	RI	I-SB21
	<u>S</u>	E	<u>5</u>	_[LOCATION:	White Pla	ins. New `	York	JOB NO.	1	2545
	CONS	ULTING	ENGINEE	ERS		Dire	at Duah		CDOLIND ELEVATION.		
CEOD	ROBE BY:		AARCO		METHOD: DATE STARTED:	10/8/2022	ct Push		GROUND ELEVATION: GROUNDWATER TABLE	E DEDTU:	
	CTOR:		TAJ		DATE STARTED:	10/8/2022	0 Hr.		24 Hr.	Date	
DEPTH	CTOR.			PTH	DATE COMPLETED.	10/6/2022	и пі.		24 ⊓।.	Date	
	RECOVERY	SAMPLE TUBE	FROM	то	ENVIRONMENTAL		SOII DE	SCDID.	TION AND STRATIFICATION	1	PID
(ft) 0	(in)	No.	(ft)	(ft)	SOIL SAMPLE NAME		SOIL DL	JUNIF	HON AND STRATIFICATION		FID
			0	0.5					Concrete		0
			0.5								0
											0
				4			Browi	n mediu	ım to fine SAND; trace Silt		0
5	36	1	4		(4.5'-5')	Dark brown	medium	to fine S	SAND, some medium to fine (Gravel, trace	0
				5.5					Silt	,	0
			5.5	6.5					Concrete		0
			6.5		(7.5'-8')						0
											0
10	54	2		9.5			Gray-br	own me	edium to fine SAND, little Silt		0
			9.5								0
					(11.5'-12')						0
											0
				13.5			Orange-b	orown c	oarse to fine SAND, trace Sil	t	0
15	54	3	13.5	14.5			Gre	y coars	e to fine SAND, trace Silt		0
			14.5								0
											0
											0
				18.5			Orar	nge-bro	wn medium to fine SAND		0
20	42	4	18.5	20	(19'-19.5')	Grey-B	lack coar	se to fir	ne SAND, some coarse to fine	e Gravel	0
			20								0
											0
											0
				24	(23'-23.5')				se to Fine SAND; Bedrock		0
25	42	5				Во	ring Com	plete at	24 feet BGS (Refusal)□		
00											
30											
25											
35											
40						 					
70											

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		Pp: Pocket Penetrometer; DP: Direct Push
		Approximate Change in Strata: Inferred Change in Strata:
C-11 1	M Dum	wiston yuloog othograigs moted

	C		C		PROJECT NAME:	Hamil	ton Greei	n	GEOPROBE NO.	R	RI-SB22		
					LOCATION:	White Pla	ins, New	York	JOB NO.	1	12545		
	CONS	ULTING	ENGINE	ERS	METHOD:	Dire	ect Push		GROUND ELEVATION:				
GEOP	ROBE BY:		AARCO		DATE STARTED:	10/8/2022	1		GROUNDWATER TABLE D	EPTH:			
	CTOR:		AARCO TAJ DEPTH FROM TO (ft) (ft) 0 0.5 0.5 5 6.5 6.5 6.5 10.5 11 11 14 14 14 17.5 17.5 20 30	DATE COMPLETED:	10/8/2022	0 Hr.	Date						
DEPTH		SAMPLE		PTH			1 -		24 Hr.				
(ft)	RECOVERY (in)	TUBE		TO	ENVIRONMENTAL			PID					
0	(111)	No.	(ft)	(ft)	SOIL SAMPLE NAME								
				0.5					Concrete		0		
			0.5								0		
											0		
											0		
5	42	1		5	(4'-4.5')		Brow	n mediu	ım to fine SAND; trace Silt		0		
			5	6.5	, ,	Brown me	dium to f	ine SAN	ID, little medium to fine Gravel, t	race Silt	0		
			6.5								0		
					(7.5'-8')						0		
					, ,						0		
10	54	2		10.5			Dark bro	own coa	rse to fine SAND, some Clay		0		
			10.5	11					Concrete		0		
			11		(11'-11.5')						0		
					,						0		
				14		Grey/Br	own med	ium to f	ine SAND, little medium to fine C	Gravel	0		
15	60	3	14								0		
											0		
											0		
				17.5	(17'-17.5')		Orai	nge-bro	wn medium to fine SAND		0		
			17.5								0		
20	60	4		20		Grey med	lium to fin	e SANI), trace Silt, trace medium to fine	e Gravel	0		
											0		
											0		
					(22'-22.5')						0		
											0		
25	36	5									0		
											0		
											0		
					(27'-27.5')						0		
											0		
30	36	6		30				Brown r	nedium to fine SAND		0		
							Во	oring Co	mplete at 30 feet BGS				
35													
40													
Nomin	allD of Ho	ole.			in The cubcurfoce inf	ormation char	ın hereon	wae obto	ined for the design and estimating t	nurnosas for	our client		

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		Pp: Pocket Penetrometer; DP: Direct Push
	·	Approximate Change in Strata: Inferred Change in Strata:

			PROJECT NAME:		Hamilto	on Greer	1				BORIN	IG ID/MONITORING WELL ID		IW-2
SE	S		PROJECT LOCATION:			Plains, N		Κ.			JOB N			2545
CONSULTING	ENGINEER	S						•				ND ELEVATION:	<u> </u>	2010
BORING BY: Coastal			DATE STARTED		4/2	1/23	DEVEL	OPMEN	JT PFRI	IOD	1 hour	INSIDE CASING DIAMETER (in)		2"
INSPECTOR: TAJ			DATE COMPLETED			1/23	DEVELOPMENT METHOD				Sub Pump	BOREHOLE DIAMETER (in)		6"
NJ DEP PERMIT NO.:			DATE DEVELOPED			1/23		OPMEN			NA NA	INITIAL WATER LEVEL (ft):		21.98
NO DEF PERIMIT NO			DATE DEVELOPED	DEPTH		1/23	DLVLL	.OF WILI	NI IVAII	- 	INA	INTIAL WATER LEVEL (II).		21.90
	WELL	CONSTRUC	CTION	(ft) 0	Sample	0/6	Blows o	n Spoor 12/18	18/24	REC (in)	SOIL	DESCRIPTION AND STRATIFICA	TION	P.I.D.
Depth (feet below g	ırade)													NA
Top of Casing	+3'		Casing Type:											NA
Ground Surface	0		Flushmount											NA
														NA
				5									_	NA
			Well Cap: Yes											NA
Top of Seal	14.5		Grout Type: NA											NA
]			NA
Top of Sand Pack	16.5		Well Key: No]			NA
				10							Light brown m	edium to fine SAND, little Clay		NA
											<u> </u>			NA
			Riser Pipe: PVC											NA
											1			NA
											1			NA
Top of Screen	18.5			15							Grey-brown m fine Gravel	edium to fine SAND, some Silt, trac	e medium to	NA NA
											IIIIe Glavei			NA
											1			NA
											1			NA
			04											NA
			Sand	20							-			NA NA
			Pack Size: #2	20							-		-	NA NA
											ł			
											ł			NA
			Screen Size: 0.010											NA
					-					 	1			NA
				25	}					-	1		=	NA
										-	1			NA
											-			NA
											Light brown m	edium to fine SAND, little Clay		NA
												Boring Complete at 28.5 feet BGS		
				30							1		_	
										ļ	1			
											1			
											1			
				35]		_	
													-	
Bottom of Screen	28.5										1			
Bottom of Boring	28.5										1			
Remarks	1883										1			
				40						l	1			
			vimata Changa in Strat		I	ı	Inform			<u> </u>	1			

0 = 0	•	PROJECT NAME:		Hamilto	on Green	ı				BORIN	IG ID/MONITORING WELL ID	MV	V-3
SES		PROJECT LOCATION:			Plains, N		•			JOB N			545
CONSULTING ENGINEERS	s						•				ND ELEVATION:	.2.	J. 10
BORING BY: Coastal		DATE STARTED		4/1	9/23	DEVEL	OPMEN	NT PERI	IOD	1 hour	INSIDE CASING DIAMETER (in)		2"
INSPECTOR: TAJ		DATE COMPLETED						NT METI		Sub Pump	BOREHOLE DIAMETER (in)		6"
NJ DEP PERMIT NO.:		DATE DEVELOPED						NT RATE		NA NA	INITIAL WATER LEVEL (ft):		17.42
NJ DEP PERIVIT NO		DATE DEVELOPED	DEPTH		9123	DEVEL	OFINE	NI KAII	-	NA .	INITIAL WATER LEVEL (II).		17.42
WELL	CONSTRUC	TION	(ft) 0	Sample	0/6	-	n Spoor 12/18	18/24	REC (in)	SOIL	DESCRIPTION AND STRATIFICA	TION	P.I.D.
Depth (feet below grade)					0,0	0/12	12,10	10/21	()				NA
Top of Casing +3'		—								1			NA
Ground Surface 0		Casing Type: Stickup								1			NA
										1			NA
			5							1			NA
		Well Cap: Yes								1		_	NA
Top of Seal		Grout Type: NA								Brown medium	n to fine SAND, little medium to fine	Gravel	NA
		,			\vdash				 	c.modium			NA
Top of Sand Book 16.5		Wall Kara Na											NA NA
Top of Sand Pack		Well Key: No	10							Light brown	edium to fine SAND, little Clay		NA NA
										Light brown me	edium to line SAND, little Clay		
													NA
		Riser Pipe: PVC								-			NA
										-			NA
10 5													NA
Top of Screen 18.5			15							1		_	NA
													NA
													NA
													NA
		Sand											NA
		Pack Size: #2	20									_	NA
													NA
													NA
		Screen Size: 0.010								1			NA
]			NA
			25]			NA
										1		_	NA
]	Allows to Store OANIS IIII		NA
										Grey-brown me with weathered	edium to fine SAND, little medium to d rock	o fine Gravel	NA
										 _	Boring Complete at 28.5 feet BGS		
			30							1			
										1		_	1
										1			
									 	1			
					$\vdash \vdash \vdash$				 	†			
			35	 					-	1			-
			30		\vdash				-	1		_	1
Rottom of Screen 28.5										1			-
Bottom or Corcon					$\vdash \vdash \vdash$				 	1			
Bottom of Boring 28.5 Remarks					$\vdash\vdash$				-	1			-
- terramo				-						-			<u> </u>
		viscata Changa in Strate	40			lmfa rr							

0.50		PROJECT NAME:		Hamilte	on Gree	1				во	RING ID/MONITORING WELL ID		MW-8
SES		PROJECT LOCATION:			Plains, N		k				3 NO.		12545
CONSULTING ENGINEE	ERS										OUND ELEVATION:		
BORING BY: Coastal		DATE STARTED		4/1	4/19/23 DEVE		OPMEN	IT PERI	OD	1 hour	INSIDE CASING DIAMETER (in	1)	2"
INSPECTOR: TAJ		DATE COMPLETED			9/23		OPMEN			Sub Pum		'/	6"
											` '		
NJ DEP PERMIT NO.:		DATE DEVELOPED	DEPTH		9/23	DEVELOPMENT RATI			= 	NA	INITIAL WATER LEVEL (ft):		22.3
WEL	L CONSTRUC	TION	(ft) 0	Blows on Spoon REC 0/6 6/12 12/18 18/24 (in)						S	SOIL DESCRIPTION AND STRATIFICATION		
Depth (feet below grade)						, . <u>_</u>			. ,				NA
Top of Casing +3'													NA
Ground Surface 0		Casing Type: Stickup											NA
													NA
			5							Brown med	ium to fine SAND, little medium to fi	ne Gravel	NA
		Well Cap: Yes		l						 			NA
Top of Seal		Grout Type: NA			1					1			NA
TOP OF GOAL		Glout Type, NA		-	1					1			NA
Top of Sand Back 14.5		M-IIIZ N		<u> </u>						1			
Top of Sand Pack		Well Key: No	10	-	1					D	in the first CANID 1941 Character		NA NA
			.0							Brown med	ium to fine SAND, little Clay		-
				<u> </u>						4			NA
		Riser Pipe: PVC								_			NA
										_			NA
													NA
Top of Screen 16.5			15										NA
													NA
													NA
													NA
		Sand											NA
		Pack Size: #2	20										NA
										1			NA
													NA
		00.040											
		Screen Size: 0.010		-	1					1			NA
										-			NA
			25							4			NA NA
										Brown med	ium to fine SAND with weathered ro		NA
										4	Boring Complete at 26.5 feet BO	SS	NA
]			NA
			30										
										1			
										1			
										1			
			35							1			
			55							1			
Bottom of Screen 26.5				-						1			
Bottom of Corcon										-			
Bottom of Boring 26.5 Remarks										4			
<u>romana</u>										4			
			40										

	<u> </u>	PROJECT NAME:	PROJECT NAME:							BORIN	/IW-9		
SES	SI	PROJECT LOCATION:			Plains, N		r			JOB N	G ID/MONITORING WELL ID		2545
CONSULTING ENGI	INEERS			TT INC		O	•				ND ELEVATION:	<u> </u>	
BORING BY: Coastal		DATE STARTED		4/1	9/23	DEVE	ODMEN	IT DEDI	OD	1	INSIDE CASING DIAMETER (in)		2"
INSPECTOR: TAJ		DATE COMPLETED		1			DEVELOPMENT PERIOD DEVELOPMENT METHOD			1 hour INSIDE CASING DIAMETER (in) Sub Pump BOREHOLE DIAMETER (in)			6"
NJ DEP PERMIT NO.:		DATE DEVELOPED		t		DEVEL				NA NA		-	20.3
NJ DEP PERMIT NO.:		DATE DEVELOPED	DEPTH		9/23	DEVEL	OPMEN	II KAIE	-	NA	INITIAL WATER LEVEL (ft):		20.3
v	WELL CONSTRUC	TION	(ft)	Sample	0/6	Blows or	12/18	18/24	REC (in)	SOIL	P.I.D.		
Depth (feet below grade))								, ,			NA	
Top of Casing	+3'	Casing Type:											NA
Ground Surface	0	Flushmount											NA
													NA
			5										NA
		Well Cap: Yes								Light Brown me	edium to fine SAND, some medium	to fine Grav	vel NA
Top of Seal	2.6	Grout Type: NA								<u> </u>			NA
,		2.22.7,60.10.								1			NA
Top of Sand Pack	4.6	Well Key: No											NA
			10							1			NA
										1		-	NA
		Diago Diago DVC											NA
		Riser Pipe: PVC								ł			
										1			NA
	6.6		15							-			NA NA
Top of Screen			- 13	-						Grey-brown me	ediumt to fine SAND, some Silt with	boulders	_
													NA
													NA
													NA
		Sand								1			NA
		Pack Size: #2	20							1		_	NA
													NA
													NA
		Screen Size: 0.010											NA
										1			NA
			25							Light brown me	edium to fine SAND, little Clay, trac	e coarse to-	NA
										fine Gravel			NA
										_	Boring Complete at 26.5 feet BGS		NA
													NA
]			NA
			30							1			
										1		-	
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										1			
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			35							1			
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Rottom of Screen 26	6.6			-						1			
Bottom of Corcon				 						1			
Bottom of Boring 26 Remarks	6.6			 						1			<u> </u>
				 						1			
		vimata Changa in Strat	40	<u> </u>		Inform				<u> </u>			

SESI			PROJECT NAME: PROJECT LOCATION:			on Gree	n				BORIN	BORING ID/MONITORING WELL ID		
						Plains, N	lew Yorl	k			JOB NO.			V-1 545
CONSULTING	ENGINEERS										GROU	ND ELEVATION:		
BORING BY: Coastal DATE STARTED			DATE STARTED		4/20/23		DEVELOPMENT PERIOD				1 hour	INSIDE CASING DIAMETER (in)		2"
INSPECTOR: TAJ DATE COMPLETED				4/20/2						Sub Pump	BOREHOLE DIAMETER (in)		6"	
NJ DEP PERMIT NO.: DATE DEVELOPED				4/20/23		DEVELOPMENT RATE			1	NA	INITIAL WATER LEVEL (ft):		21.1	
WELL CONSTRUCTION			DEPTH (ft)	Sample	0/6	Blows o	n Spoor 12/18	18/24	REC	SOIL DESCRIPTION AND STRATIFICATION			P.I.D.	
Depth (feet below grade)			Ů		0/0	0/12	12/10	10/24	()				NA	
Top of Casing	+3'										1			NA
Ground Surface	0		Casing Type: Flushmount								1			NA
			, idealine											NA
				5							1			NA
			Well Cap: Yes								Dark Brown m	edium to fine SAND, some medium	to fine Grave	NA
Top of Seal	16.5		Grout Type: NA								<u>~ :</u>			NA
			<i>,</i> .								1			NA
Top of Sand Pack	18.5		Well Key: No											NA
				10							1			NA
											1		_	NA
			Riser Pipe: PVC								1			NA
											1			NA
														NA
Top of Screen	19.5			15							Brown coarse	to fine SAND, trace Silt		NA
														NA
														NA
														NA
			Sand]			NA
			Pack Size: #2	20]		_	NA
]			NA
														NA
			Screen Size: 0.010								1			NA
											1			NA
				25							1		_	NA
											4			NA
											4			NA
											4			NA NA
											Grey-brown m	edium to fine SAND, little Clay		NA
				30							4	Boring Complete at 29.5 feet BGS	_	
											4			
											4			
											4			
											-			
				35	 						4		_	
	20.5				<u> </u>						4			
Bottom of Screen	29.5				<u> </u>						4			<u> </u>
Bottom of Boring Remarks	29.5				 						4			
. tomano					 						4			\vdash
				40										

	\overline{CI}	PROJECT NAME:	Hamilto	on Greei	า				BORIN	NG ID/MONITORING WELL ID	TW-2		
PROJECT LOCATION:				White Plains, New York						JOB N	JOB NO.		i45
CONSULTING E	NGINEERS									GROU	IND ELEVATION:		
BORING BY: Coastal DATE STARTED				4/19/23		DEVELOPMENT PERIOD				1 hour	1 hour INSIDE CASING DIAMETER (in)		4"
INSPECTOR: TAJ DATE COMPLETED			4/19		4/19/23 DE		EVELOPMENT METHOD			Sub Pump	BOREHOLE DIAMETER (in)		6"
NJ DEP PERMIT NO.: DATE DEVELOPED				4/19/23		DEVELOPMENT RATE				NA	NA INITIAL WATER LEVEL (ft):		2.2
WELL CONSTRUCTION			DEPTH (ft)	Sample			n Spoon	18/24	REC	SOIL	DESCRIPTION AND STRATIFICAT	ΓΙΟΝ	P.I.D.
Depth (feet below grade) - Grade is appx. 25 feet BGS in this location			0		0/6	6/12	12/18	18/24	(in)				NA
Top of Casing +3'										1			NA
Ground Surface	0	Casing Type: Stickup								1			NA
	•	Guoing Type: Guokup								Brown mediun	n to fine SAND with weathered rock		NA
			5							 -	Boring Complete at 4 feet BGS		NA
		Well Cap: Yes								1	25.ing Complete at 4 leet DGC	_	NA
Top of Seal	0.5	Grout Type: NA								1			NA
Top or ocar		Grout Type. NA								†			NA
Top of Sand Pack	0.5	Well Key: No								1			NA NA
Top of Sand Fack		Well Ney. NO	10		 				 	1			NA NA
										†		_	NA NA
		Riser Pipe: PVC								1			NA
		Riser Pipe: PVC											NA NA
													NA NA
T	0.5		15										NA NA
Top of Screen			13									_	NA NA
													NA NA
										1			NA NA
										1			
		Sand	20							1			NA NA
		Pack Size: #2	20									_	NA NA
										1			NA NA
		0 0 00								1			NA NA
		Screen Size: 0.010			 					1			NA NA
			25	<u> </u>	 				 	1			NA NA
			20							1		_	
				<u> </u>	 				 	1			NA NA
				<u> </u>	 				 	1			NA NA
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			35		-					4		_	\vdash
	3.8									4			\vdash
Bottom of Screen				-						4			
Bottom of Boring Remarks	3.8									4			\vdash
<u>Ivelliaiva</u>										4			
			40		<u> </u>]				

	PROJECT NAME:	Hamilto	on Greer	n				BORING ID/MONITORING WELL ID JOB NO.		TV	V-3	
SESI	PROJECT LOCATION:	White I	Plains, N	lew York	k						545	
CONSULTING ENGINEERS									GROU	IND ELEVATION:		
BORING BY: Coastal	DATE STARTED		4/19/23		DEVELOPMENT PERIOD				1 hour INSIDE CASING DIAMETER (in)			2"
INSPECTOR: TAJ DATE COMPLETED			4/1	4/19/23		OPMEN	NT METH	HOD	Sub Pump	BOREHOLE DIAMETER (in)		6"
NJ DEP PERMIT NO.: DATE DEVELOPED			4/19/23		DEVELOPMENT RATE			Ī	NA	INITIAL WATER LEVEL (ft):		22.3
WELL CONSTRUCTION			Sample		Blows o	n Spoor	ı	REC	SOIL DESCRIPTION AND STRATIFICATION			P.I.D.
			Sa	0/6	6/12	12/18	18/24	(in)				
Depth (feet below grade)								, ,				NA
Top of Casing +3'	 1								1			NA
Ground Surface 0	Casing Type: Stickup								1			NA
									1			NA
		5							Brown mediun	n to fine SAND, little medium to fine	Gravel	NA
	Well Cap: Yes								 -			NA
Top of Seal	Grout Type: NA								1			NA
. Sp 51 00th	Clour Type. NA								1			NA
Top of Sand Pack	Well Key: No								1			NA
		10							Brown mediun	n to fine SAND, little Clay		NA
												NA
	Riser Pipe: PVC											NA
	Triser ripe. r vo											NA
												NA
Top of Screen		15							1			NA
Top of Screen									1		_	NA
									1			NA
									1			NA
	Sand								1			NA
	Pack Size: #2	20							1			NA
	Fack Size. #2	- 20							1		_	NA
									1			NA
	Screen Size: 0.010								1			NA NA
	Scieeti 3/26. 0.010		 						1			NA NA
		25	 						†			NA NA
			1						1		_	NA NA
			 						†			NA NA
			 						Brown modition	a to fine SAND with weethered!		NA NA
			 						DIOWII Mealun	n to fine SAND with weathered rock		
		30	\vdash						1	Boring Complete at 28.5 feet BGS		
		30							1		_	+
			 						1			
			-						4			
			-						-			
			-						-			
		35	}						4		_	
Rottom of Screen 28									4			
Bottom of corcon			 						4			
Bottom of Boring 28 Remarks			<u> </u>						4			
ivements									4			
		40										

Appendix D:

Quality Assurance Project Plan

Hamilton Green Site

WHITE PLAINS, NEW YORK NYSDEC NUMBER: C360177

Quality Assurance Project Plan (QAPP)

Prepared for:

S-WD/WP LLC c/o Law Offices of Denise J. D'Ambrosio 2 Westchester Park Drive, Suite 418 White Plains, New York 10604

Prepared by: SESI CONSULTING ENGINEERS, D.P.C. 959 Route 46E, Floor 3, Suite 300 Parsippany NJ 07054

> SEPETEMBER 2021 REVISED DECEMBER 2024

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1.0 PROJECT DESCRIPTION

This document presents the quality assurance project plan (QAPP) for the Site Management Plan (SMP) of the property located at 200 Hamilton Avenue, Westchester County, White Plains, New York (the "Site"). The Site consists of a 1.94-acre parcel and is identified as Section 125.67/Block 5/Lot 1.2 on the Westchester County Tax Map. The Site contains a portion of the former mall that was razed in September and October 2022. The Site is bounded to the north by Barker Avenue, to the east by the WP Mall Cleaners & Gas Station Site (C360221), to the south by Hamilton Avenue, and to the west by the Martin Luther King Jr. Boulevard. The nearest surface water body is the Bronx River located approximately 0.6 miles west of the Site.

Historically as identified on the 1930 through 1950 Sanborn fire insurance maps, and as outlined in AKRF's Phase I Environmental Site Assessment (ESA) (Section 2.3.2 below), the Site was bisected by historical William Street and was improved with several private residential dwellings and residential apartments with automotive storage garages (address ranges 45 Williams to 70 Williams), stores at 50 and 62 Williams, and a gasoline station with three (3) gasoline tanks at a former address of 230 Hamilton Avenue which was located on the southern portion of the Site. An off-Site gas station with greasing operations and four (4) gasoline tanks was identified at a former address of 250 Hamilton Avenue which was located on the eastern adjacent parcel (BCP # C360221) on the 1950 Sanborn map. Numerous private dwellings were shown within the former mall building footprint on Sanborn maps from 1894 to 1950. In addition, there is a Gulf Gasoline Station located to the east across Cottage Place with an open NYSDEC Spill No. 9707877 that may be impacting the Site. Based on these findings, the Phase I ESA identified the potential for abandoned underground storage tanks (USTs) and/or associated petroleum contamination in the Site subsurface associated with the gasoline stations and/or heating oil for the residential dwellings. The former on-Site structures were likely present until construction of the current two-story shopping mall and east-adjacent asphalt-paved parking lot. Based on historic records and interviews, the western adjacent shopping mall was constructed in 1972 and has operated as the White Plains Mall with a variety of tenants since its construction, including a potential dry cleaner listed in historic City Directories.

2.0 PROJECT ORGANIZATION

The SMP monitoring will be conducted by Soils Engineering Services, Inc. (SESI), on behalf of S-WD/WP LLC. The organization of SESI's key project management and field staff, and respective areas of responsibility, is presented below.

2.1 Project Principal

Fuad Dahan PhD, P.E.

Provide technical and administrative oversight and guidance throughout the project, assist in securing company resources, participate in technical review of deliverables, and attend key meetings as needed.

2.2 Principal Engineer

Fuad Dahan, PhD, P.E.

Provide technical guidance and review of reports, analytical data. Will have key involvement in screening and development of remedial alternatives.

2.3 Project Manager

Steven Gustems

Responsible for maintaining the day-to-day schedule for completing the fieldwork and deliverables according to BCP program requirements and client expectations.

2.4 Remedial Program Manager

Steven Gustems

Responsible for coordinating and directing field efforts of SESI staff and subcontractors, and for maintaining that work is done according to QAPP specifications.

2.5 Field Team Leader

Jeffrey Lamborn

Responsible for overseeing field work during the RI, including observing subcontractors, maintaining field notes, and collecting samples of various environmental media, in accordance with the NYSDEC-approved Work Plan.

2.6 Quality Assurance Officer

Jeffrey Lamborn

Responsible for reviewing sampling procedures and certify that the data was collected and analyzed using the appropriate procedures.

3.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

In cases where NYSDOH ELAP Certification exists for a specific group or category of parameters, the laboratories performing analysis in connection with this project will have appropriate NYSDOH ELAP Certification. Analytical Service Protocol (ASP, June 2000) Category B deliverables are required for all samples. For QAPP procedures for PFAS and 1,4 Dioxane, see the Remedial Investigation Interim Remedial Measures Work Plan (RI IRMWP) Appendix E, Soil and Groundwater Sampling Plan for Emerging Contaminants.

Detection limits set by NYSDEC-ASP (June 2000) will be used for all sample analyses unless otherwise noted. If NYSDEC-ASP-dictated detection limits prove insufficient to assess project goals (i.e., comparison to drinking water standards or attainment of ARARs), then ASP Special Analytical Services (SAS) or other appropriate methods will be utilized.

The quality assurance/quality control objectives for all measurement data include completeness, representativeness, comparability, precision and accuracy.

3.1 COMPLETENESS

The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. Data must meet QC acceptance criteria for 100 percent or more of requested determinations.

3.2 REPRESENTATIVENESS

Samples must be taken of the population and, where appropriate, the population will be characterized statistically to express the degree to which the data accurately and

precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where Target Compound List (TCL) volatiles are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory, will accompany each set of sample bottles from the laboratory to the field and back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for TCL volatile organic compounds along with the groundwater samples to ensure that contamination with TCL volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for TCL volatile organic compounds. The TCL compounds are identified in the United States Environmental Protection Agency (USEPA) Contract Laboratory Program dated October 2016.

The analysis results obtained from the determination of identical parameters in field duplicate samples can be used to further assess the representativeness of the sample data.

3.3 COMPARABILITY

Consistency in the acquisition, preparation, handling and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To ensure the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by NYSDEC-approved methods. The NYSDEC-ASP mandated holding times for various analyses will be strictly adhered to.

3.4 PRECISION AND ACCURACY

The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), colorimetry, atomic spectroscopy, gravimetric and titrametric

techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control. All data evaluations will be consistent with NYSDEC-ASP procedures (June 2000). Data will be 100 percent compliant with NYSDEC-ASP requirements.

The number of duplicate, spiked and blank samples analyzed will a minimum of 1 duplicate for every 20 samples per each medium of groundwater and soil. The inclusion and frequency of analysis of field blanks will be on the order of one per every 20 samples (soil) but not more than one per day. For the aqueous matrix field blanks will be collected at a frequency of one per day. Samples to be analyzed for volatile organic compounds will be accompanied by a trip blank for each shipment and field blanks (water matrix) or field blanks (soil).

Quality assurance audit samples will be prepared and submitted by the laboratory QA manager for each analytical procedure used. The degree of accuracy and the recovery of analyte to be expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis, and compound or element being determined. The concentration of the analyte relative to the detection limit is also a major factor in determining the accuracy of the measurement. The lower end of the analytical range for most analyses is generally accepted to be five times the detection limit. At or above this level, the determination and spike recoveries for metals in water samples will be expected to range from 75 to 125 percent. The recovery of organic surrogate compounds and matrix spiking compounds determined by GC/MS will be compared to the guidelines for recovery of individual compounds as established by the United States Environmental Protection Agency Contract Laboratory Program dated 7/85 or as periodically updated.

The quality of results obtained for inorganic ion and demand parameters will be assessed by comparison of QC data with laboratory control charts for each test.

4.0 SAMPLING PROCEDURES

4.1 SAMPLING PROGRAM

The sampling program for this project may include groundwater. Groundwater samples will be collected from groundwater monitoring wells using low flow purging techniques.

4.1.1 Drilling/Sampling Procedures

Groundwater samples will be collected by means of a drilling. Groundwater borings shall be completed using the hollow stem auger drilling methods, direct push methods,

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or rotary drilling methods, whichever methods are determined to be best suited to site conditions by the SESI project manager and SESI field team leader.

A geologist or engineer will be on site during the drilling operations to fully describe each soil sample, following the New York State Soil Description Procedure, and to retain representative portions of each sample.

The drilling contractor will be responsible for obtaining accurate and representative samples, informing the geologist of changes in drilling pressure, keeping a separate general log of soils encountered including blow counts [i.e., the number of blows from a soil sampling drive weight (140 pounds)] required to drive the split-spoon sampler in 6-inch increments and installing monitoring wells to levels directed by the supervising geologist following specifications further outlined in this protocol.

4.1.2 Monitoring Well Completion

Monitoring wells will be constructed of 0.010-inch slot size PVC well screen and riser casing. Other materials utilized for completion will be washed silica sand (Q-Rock No. 4 or approved equivalent) bentonite grout, Portland cement, and a protective steel locking well casing and cap with locks. The depth of the wells will be determined based on the depth to water, type of contaminant and field conditions encountered.

The monitoring well installation method for wells installed within unconsolidated sediments shall be to place the screen and riser assembly into the casing once the screen interval has been selected. At that time, a washed silica sand pack will be placed around the well screen if required to prevent screen plugging. If a sand pack is not warranted, the auger string will be pulled back to allow the native aquifer material to collapse 2 to 3 feet above the top of the screen. Bentonite pellets will then be added to the annulus between the casing and the inside auger to insure proper sealing. Cement/bentonite grout will continue to be added during the extraction of the augers until the entire aquifer thickness has been sufficiently sealed off from horizontal and/or vertical flow above the screened interval. During placement of sand and bentonite pellets, frequent measurements will be made to check the height of the sand pack and thickness of bentonite layers by a weighted drop tape measure.

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A bolt-down protective curb box will be installed, flush with the ground, or steel "stick-up" protective casing and secured by a Portland cement seal. The cement seal shall extend laterally at least 1 foot in all directions from the protective casing and shall slope gently away to drain water away from the well.

4.1.3 Well Development

All monitoring wells will be developed or cleared of all fine-grained materials and sediments that have settled in or around the well during installation so that the screen is transmitting representative portions of the groundwater. The development will be by one of two methods, pumping or bailing groundwater from the well until it yields relatively sediment-free water.

A decontaminated pump or bailer will be used and subsequently decontaminated after each use following procedures outlined in the Decontamination Protocol. Pumping or bailing will cease when the turbidity falls below 50 NTUs or until specific conductivity, pH, and temperature are stable (i.e., consecutive readings are within 10 percent with no overall upward or downward trends in measurements). Well development water will be contained in drums and properly disposed off-site.

4.1.4 Decontamination

All drilling equipment and associated tools including augers, drill rods, sampling equipment, wrenches and any other equipment or tools that have come in contact with contaminated materials will be decontaminated before any drilling on site begins, between each well, and prior to removing any equipment from the site. The preferred decontamination procedure will be to scrape the equipment from any residual soils and then rinse with water and Alconox®. Every effort will be made to minimize the generation of contaminated water, which will be drummed, to extent possible, for disposal.

4.1.5 PFAS Sampling Considerations

This section contains the materials limitations for Per- and polyfluoroalkyl substances sampling in accordance with the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (April 2023).

The groundwater samples will be analyzed for PFAS using Modified USEPA Method 1633. Reporting limits for PFOA and PFOS will not exceed 2 nanograms per liter (ng/L). Category B deliverables and an electronic data deliverable will be completed.

PFAS are very persistent in the environment and in the human body. Due to their presence in a variety of products, persistence in the environment and very low drinking water standards, care must be used when groundwater sampling for PFAS to avoid cross contamination from the sampling equipment and personal protective equipment (PPE).

No fabric softener will be used on clothing to be worn in field. Cosmetics, moisturizers, hand cream, unauthorized sunscreen, insect repellent or other related products will not be used the morning of sampling. The field samplers will wear powder-free nitrile gloves while filling and sealing the sample bottles. The sampling equipment components and sample containers will not come in contact with material that may potentially contain PFAS such as aluminum foil, low density polyethylene (LDPE), glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials will be avoided. Food and drink packaging materials will be avoided, as well.

Sampling will be performed using certified PFAS-free sampling materials such as stainless steel, high density polyethylene (HDPE), PVC, silicone, acetate or polypropylene pump and tubing. Rinse water must be laboratory-provided certified PFAS-free distilled or de-ionized water. Standard two step decontamination using Alconox® detergent and clean certified PFAS-free water rinse will be performed for equipment that does come in contact with PFAS materials.

No waterproof field books, plastic clipboards, binders, or spiral hard cover will be used for PFAS containers. No adhesives (i.e. Post-It® Notes), sharpies, or permanent markers will be used for PFAS containers. The PFAS containers will be labeled with ballpoint pens. PFAS samples will be stored in separate cooler filled with regular ice only with no chemical (blue) ice packs.

Pre-cleaned sample bottles with closures, coolers, sample labels and a chain of custody form will be provided by the laboratory.

4.2 GROUNDWATER SAMPLING PROGRAM.

4.2.1 Well Evacuation

Prior to sampling a monitoring well, the static water level will be recorded. All well data will be recorded on a field sampling record. The wells will be sampled in accordance with the USEPA guidelines for the Low Flow Purging Sampling (LFPS). The purpose of LFPS is to collect groundwater samples from monitoring wells that are representative of

ambient groundwater conditions in the aquifer. The LFPS method reduces turbidity which is needed particularly when sampling for metals.

4.2.2 Sampling Procedure

The wells will be sampled using the LFPS technique. A flow rate of 100 ml to 250 ml per minute is used to purge the wells. Drawdown should not exceed 0.3 feet. QED bladder pumps or peristaltic pumps are used for this method. The pump intake is lowered to the mid-point of the water column or as subsurface features such as bedrock fractures or more permeable zones warrant. At the initiation of low flow purging a water level is recorded as well as field parameters. Field parameters are then monitored every five minutes during low flow purging using a flow through cell. When three consecutive measurements of pH differ by 0.1 units or less, with ORP within 10 mv or less, turbidity varies 10 percent or less, conductivity differs by 3 percent or less and dissolved oxygen by 10 percent or less, sampling may begin. Flow through cells are used so continuous real time readings are made. When the parameters stabilize the flow through cell is disconnected and sample bottles are filled directly from the tubing.

4.4 SAMPLE PRESERVATION AND SHIPMENT

Since all bottles will contain the necessary preservatives as shown in Table 4.1, they need only be filled. The 40 ml VOA vials must be filled brim full with no air bubbles. The other bottles should be filled to within about 1 inch from the top.

The bottles will be sent from the laboratory in coolers which will be organized on a per site basis. Following sample collection, the bottles should be placed on ice in the shipping cooler. The samples will be cooled to 4°C, but not frozen.

Final packing and shipment of coolers will be performed in accordance with guidelines outlined in the ASP.

5.0 SAMPLE CUSTODY

The program for sample custody and sample transfer is in compliance with the NYSDEC-ASP, as periodically updated. If samples may be needed for legal purposes, chain-of-custody procedures, as defined by NEIC Policies and Procedures (USEPA-330/9-78-001-R, Revised June 1988) will be used. Sample chain-of-custody is initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples should be minimized.

5.1 FIELD SAMPLE CUSTODY

A chain-of-custody record accompanies the samples from initial sample container selection and preparation at the laboratory, shipment to the field for sample containment and preservation, and return to the laboratory. Two copies of this record follow the samples to the laboratory. The laboratory maintains one file copy and the completed original is returned to the site inspection team. Individual sample containers provided by the laboratory are used for shipping samples. The shipping containers are insulated and ice is used to maintain samples at approximately 4°C until samples are returned and in the custody of the laboratory. All sample bottles within each shipping container are individually labeled and controlled. Samples are to be shipped to the laboratory within 24-48 hours of the day of collection depending on parameter holding times.

Each sample shipping container is assigned a unique identification number by the laboratory. This number is recorded on the chain-of-custody record and is marked with indelible ink on the outside of the shipping container. The field sampler will indicate the sample designation/location number in the space provided on the appropriate chain-of-custody form for each sample collected. The shipping container is closed and a seal provided by the laboratory is affixed to the latch. This seal must be broken to open the container, and this indicates possible tampering if the seal is broken before receipt at the laboratory. The laboratory will contact the site investigation team leader and the sample will not be analyzed if tampering is apparent.

5.2 LABORATORY SAMPLE CUSTODY

The site investigation team leader or Project Quality Assurance Officer notifies the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample program meets the following criteria:

- The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check the original chain-ofcustody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chainof-custody record and records the date and time received.
- Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the site investigation team leader as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such

as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.

- The samples are stored in a secured area at a temperature of approximately 4°C until analyses are to commence.
- A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
- A copy of the chain-of-custody form will accompany the laboratory report and will become a permanent part of the project records.

5.3 FINAL EVIDENCE FILES

Final evidence files include all originals of laboratory reports and are maintained under documented control in a secure area.

A sample or an evidence file is under custody if:

- It is in your possession; it is in your view, after being in your possession.
- It was in your possession and you placed it in a secure area.
- It is in a designated secure area.

6.0 CALIBRATION PROCEDURES

Instruments and equipment used to gather, generate or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the appropriate manufacturer's specifications or project specific requirements. The procedures for instrument calibration, calibration verification, and the frequency of calibrations are described in the ASP. The calibration of instruments used for the determination of metals will be as described in the appropriate CLP standard operating procedures.

Calibration of other instruments required for measurements associated with these analyses will be in accordance with the manufacturer's recommendations and the standard operating procedures of the laboratory.

7.0 ANALYTICAL PROCEDURES

Analytical procedures shall conform to the most recent revision of the NYSDEC-ASP (June 2005) and are summarized on Table 7.1. In the absence of USEPA or NYSDEC guidelines, appropriate procedures shall be submitted for approval by NYSDEC prior to use.

The procedures for the sample preparation and analysis for organic compounds are as specified in the NYSDEC-ASP. Analytical cleanups are mandatory where matrix interferences are noted. No sample shall be diluted any more than 1 to 5 times. The

sample shall be either re-extracted, re-sonicated, re-stream distilled, etc. or be subjected to any one analytical cleanup noted in SW846 or a combination thereof. The analytical laboratory shall expend such effort and discretion to demonstrate good laboratory practice and demonstrate an attempt to best achieve the method detection limit.

7.1 VOLATILE ORGANICS (VOA)

For the analysis of water samples for Target Compound List (TCL), volatile organic compounds (VOCs), no sample preparation is required. The analytical procedure for volatiles is detailed in NYSDEC-ASP (Volume I, Section D-I). A measured portion of the sample is placed in the purge and trap apparatus and the sample analysis is performed by gas chromatography/mass spectrometry for the first round. USEPA Method 8260C will be used, plus tentatively identified compounds (TICs). USEPA Methods 8010 or 8020 (gas chromatography with different detectors) will be used if subsequent rounds with lower limits of detection are warranted.

7.2 SEMI-VOLATILE ORGANIC COMPOUNDS

The extraction and analytical procedures used for preparation of water, soil and sediment samples for the analysis of the TCL semi-volatile organic compounds are described in NYSDEC-ASP Volume I, Section D-III. USEPA Method 8270D will be used, plus tentatively identified compounds (TICs).

Instrument calibration, compound identification, and quantitation are performed as described in Section 6 of this document and in the NYSDEC-ASP.

7.4 METALS

Water, soil and waste samples will be analyzed for the metals listed in Table 7.1. The detection limits for these metals are as specified in the NYSDEC-ASP, Section D-V. The instrument detection limits will be determined using calibration standards and procedures specified in the NYSDEC-ASP. The detection limits for individual samples may be higher due to the sample matrix. The procedures for these analyses will be as described in the NYSDEC-ASP.

The analyses for metals will be performed by atomic absorption spectroscopy (AAS) or inductively-coupled plasma emission spectroscopy (ICPES), as specified in the ASP with regard to AAS flame analysis.

7.5 PER- AND POLYFLUOROALKYL SUBSTANCES

The NYSDEC has developed a list of 40 PFAS Analytes List on Table 7.1 for remedial programs. These are:

- Perfluorobutanesulfonic acid
- Perfluoropentanesulfonic acid
- Perfluorohexanesulfonic acid
- Perfluoroheptanesulfonic acid
- Perfluorooctanesulfonic acid
- Perfluorononanesulfonic acid
- Perfluorodecanesulfonic acid
- Perfluorododecanesulfonic acid
- Perfluorobutanoic acid
- Perfluoropentanoic acid
- Perfluorohexanoic acid
- Perfluoroheptanoic acid
- Perfluorooctanoic acid
- Perfluorononanoic acid
- Perfluorodecanoic acid
- Perfluoroundecanoic acid
- Perfluorododecanoic acid
- Perfluorotridecanoic acid
- Perfluorotetradecanoic acid
- Perfluorohexadecanoic acid
- Hexafluoropropylene oxide dimer acid
- 4,8-Dioxa-3H-perfluorononanoic acid
- Perfluoro-3-methoxypropanoic acid
- Perfluoro-4-methoxybutanoic acid
- Nonafluoro-3,6-dioxaheptanoic acid
- 4:2 Fluorotelomer sulfonic acid
- 6:2 Fluorotelomer sulfonate
- 8:2 Fluorotelomer sulfonate
- 3:3 Fluorotelomer carboxylic acid
- 5:3 Fluorotelomer carboxylic acid
- 7:3 Fluorotelomer carboxylic acid
- Perfluroroctane sulfonamide

- N-methylperfluorooctane sulfonamide
- N-ethylperfluorooctane sulfonamide
- N-methyl perfluorooctanesulfonamidoacetic acid
- N-ethyl perfluorooctanesulfonamidoacetic acid
- N-methylperfluorooctane sulfonamidoethanol
- N-ethylperfluorooctane sulfonamidoethanol
- 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)
- 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)
- Perfluoro(2-ethoxyethane) sulfonic acid

Currently, ELAP does not offer certification for PFAS compounds in matrices other than finished drinking water. Per the NYSDEC April 2023 memo on emergent contaminant sampling, the analytical procedure for soil and groundwater sampling of PFAS is Modified EPA Method 1633. The reporting limit for PFAS in soil samples is 0.5 ug/kg. Reporting limits for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in groundwater should not exceed 2 ng/L.

7.6 SITE SPECIFICITY OF ANALYSES

Work plans prepared for remedial investigation waste sites contain recommendations for the chemical parameters to be determined for each site. Thus, some or all of the referenced methods will apply to the analysis of samples collected at the individual waste sites. Analyses of Target Compound List (TCL) analytes will be performed on all samples.

TABLE 4.1 – SAMPLE CONTAINERIZATION

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE ⁽¹⁾	HOLDING TIME
Aqueous Samples				
SVOCs (BNAs) – USEPA 8270D or E	2	1-liter amber glass bottle	None	7 days (until extraction) 40 days (extracted)
VOCs – USEPA 8260C or D	2	40 mL, glass vial with septum cap	Hydrochloric Acid to pH <2	14 days
Metals ^{(2) –} 6010C or D, Mercury 7470A	1	1-liter, plastic bottle	Nitric acid to pH <2	180 days Mercury: 28 days
Cyanide – SM 4500- CN-E	1	1-liter, plastic	Sodium Hydroxide to pH >12	14 days
PFAS – USEPA 537M	2	250 ml HDPE plastic bottle	unpreserved	14 days
Soil, Sediment, Solid Wa	ste Sample	es		
VOCs – USEPA 8260C or D	3	15-gram EnCore samplers	None	14 days
SVOCs (BNAs) – USEPA 8270D oe E	1	4-oz. glass jar with Teflon lid	None	14 days (until extraction, 40 days extracted)
Metals ^{(2) –} 6010C or D, Mercury 7471B	1	4-oz. glass jar with Teflon lid	None	180 days Cyanide: 14 days Mercury: 28 days
PFAS – USEPA 537M	1	4-oz HDPE Plastic jar	unpreserved	14 days
Soil Vapor / Indoor Air S	amples			
VOCs – USEPA TO-15	1	Summa Canister	None	30 days

⁽¹⁾ All samples will be preserved with ice during collection and shipment to 0-6 degrees C.(2) From verified time of sample receipt by the analytical laboratory (within 24 to 48 hours of collection).(3) A complete list of compounds is provided on Table 7.1.

TABLE 4.2 – SAMPLING PROCEDURE FOR MONITORING WELLS USING VOLUME AVERAGED PURGING

- 1. Initial static water level recorded with an electric contact probe accurate to the nearest 0.1 foot.
- 2. Sampling device and electric contact probe decontaminated.
 - Sampling device and probe are rinsed with pesticide-grade methanol and distilled water.
 - b. Methanol is collected into a large funnel which empties into a five- gallon container.
- 3. Sampling device lowered into well.
 - a. Bailer lowered by dedicated PVC or polypropylene line.
- 4. Sample taken.
 - a. Sample is poured slowly from the open end of the bailer with the sample bottle tilted so that aeration and turbulence are minimized.
 - b. Duplicate sample is collected when appropriate.
- 5. Samples are capped, labeled and placed in laboratory coolers with ice packs or bagged ice.
- 6. All equipment is cleaned with successive rinses of pesticide-grade methanol and distilled water.
 - a. Dedicated line is disposed of or left at well site.
- 7. Equipment/wash blanks are collected when non-dedicated sampling equipment is used.
- 8. Chain-of-custody forms are completed in triplicate.
 - a. The original and one carbon copy are put into a zip-lock bag and placed into the cooler.
- 9. The original will be returned following sample analysis.
 - a. A second carbon copy is kept on file.
- 10. Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of sample.

TABLE 4.3 – SAMPLING PROCEDURE FOR MONITORING WELLS USING LOW-STESS (LOW-FLOW) METHODS

- 1. Initial static water level recorded with an electric contact probe accurate to the nearest 0.1 foot.
- 2. Sampling device is lowered into well. Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well. Pump intake must be no less than 2 feet from the bottom of the well to prevent disturbance and resuspension of sediments which may be at the bottom of the well.
- 3. Measure water level again: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.
- 4. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.
- 5. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):
 - a. 0.1 for pH
 - b. 3% for specific conductance (conductivity)
 - c. 10 mv for redox potential
 - d. 10% for DO and turbidity
- 6. Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.
- 7. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.
- 8. Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and

- equal volume of water (e.g., 40 ml). Groundwater purged from the well prior to sampling can be used for this purpose.
- 9. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.
- 10. Measure and record well depth.
- 11. Close and lock the well.
- 12. Samples are capped, labeled and placed in laboratory coolers with ice packs or bagged ice.
- 13. All equipment is cleaned with successive rinses of pesticide-grade methanol and distilled water.
 - a. Dedicated line is disposed of or left at well site.
- 14. Equipment/wash blanks are collected when non-dedicated sampling equipment is used.
- 15. Chain-of-custody forms are completed in triplicate.
 - a. The original and one carbon copy are put into a zip-lock bag and placed into the cooler. The original will be returned following sample analysis.
 - b. A second carbon copy is kept on file.
- 16. Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of sample.

Table 7. 1 PFAS Compound List and Reporting and Method Detection Limits for Soil and Groundwater

	PFAS	Reporting Limit — Groundwater (ng/l)
1	Perfluorobutanesulfonic acid (PFBS)	1.6
2	Perfluoropentanesulfonic acid (PFPeS)	1.6
3	Perfluorohexanesulfonic acid (PFHxS)	1.6
4	Perfluoroheptanesulfonic acid (PFHpS)	1.6
5	Perfluorooctanesulfonic acid (PFOS)	1.6
6	Perfluorononanesulfonic acid (PFNS)	1.6
7	Perfluorodecanesulfonic acid (PFDS)	1.6
8	Perfluorododecanesulfonic acid (PFDoS)	1.6
9	Perfluorobutanoic acid (PFBA)	6.4
10	Perfluoropentanoic acid (PFPeA)	3.2
11	Perfluorohexanoic acid (PFHxA)	1.6
12	Perfluoroheptanoic acid (PFHpA)	1.6
13	Perfluorooctanoic acid (PFOA)	1.6
14	Perfluorononanoic acid (PFNA)	1.6
15	Perfluorodecanoic acid (PFDA)	1.6
16	Perfluoroundecanoic acid (PFUnA)	1.6
17	Perfluorododecanoic acid (PFDoA)	1.6
18	Perfluorotridecanoic acid (PFTrDA)	1.6
19	Perfluorotetradecanoic acid (PFTeDA)	1.6
20	Hexafluoropropylene oxide dimer acid (HFPO-DA)	6.4
21	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	6.4
22	Perfluoro-3-methoxypropanoic acid (PFMPA)	3.2
23	Perfluoro-4-methoxybutanoic acid (PFMBA)	3.2
24	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	3.2
25	4:2 Fluorotelomer sulfonic acid (4:2-FTS)	6.4
26	6:2 Fluorotelomer sulfonic acid (6:2-FTS)	6.4
27	8:2 Fluorotelomer sulfonic acid (8:2-FTS)	6.4
28	3:3 Fluorotelomer carboxylic acid (3:3 FTCA)	8.0
29	5:3 Fluorotelomer carboxylic acid (5:3 FTCA)	40
30	7:3 Fluorotelomer carboxylic acid (7:3 FTCA)	40
31	Perfluorooctane sulfonamide (PFOSA)	1.6
32	N-methylperfluorooctane sulfonamide (NMeFOSA)	1.6
33	N-ethylperfluorooctane sulfonamide (NEtFOSA)	1.6
34	N-methylperfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	1.6
35	N-ethylperfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	1.6
36	N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)	16
37	N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)	16
38	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) (9CL-PF3ONS)	6.4
39	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) (11CL-PF3OUDS)	6.4
40	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)	3.2
41	Perfluorohexadecanoic acid (PFHxDA) ¹	~

	Reporting
PFAS	Limit —
	Groundwater (ng/l)
1,4-dioxane	5

	PFAS	Reporting Limit — Soil (ng/g)
1	Perfluorobutanesulfonic acid (PFBS)	0.2
2	Perfluoropentanesulfonic acid (PFPeS)	0.2
3	Perfluorohexanesulfonic acid (PFHxS)	0.2
4	Perfluoroheptanesulfonic acid (PFHpS)	0.2
5	Perfluorooctanesulfonic acid (PFOS)	0.2
6	Perfluorononanesulfonic acid (PFNS)	0.2
7	Perfluorodecanesulfonic acid (PFDS)	0.2
8	Perfluorododecanesulfonic acid (PFDoS)	0.2
9	Perfluorobutanoic acid (PFBA)	0.8
10	Perfluoropentanoic acid (PFPeA)	0.4
11	Perfluorohexanoic acid (PFHxA)	0.2
12	Perfluoroheptanoic acid (PFHpA)	0.2
13	Perfluorooctanoic acid (PFOA)	0.2
14	Perfluorononanoic acid (PFNA)	0.2
15	Perfluorodecanoic acid (PFDA)	0.2
16	Perfluoroundecanoic acid (PFUnA)	0.2
17	Perfluorododecanoic acid (PFDoA)	0.2
18	Perfluorotridecanoic acid (PFTrDA)	0.2
19	Perfluorotetradecanoic acid (PFTeDA)	0.2
20	Hexafluoropropylene oxide dimer acid (HFPO-DA)	0.8
21	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	0.8
22	Perfluoro-3-methoxypropanoic acid (PFMPA)	0.4
23	Perfluoro-4-methoxybutanoic acid (PFMBA)	0.4
24	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	0.4
25	4:2 Fluorotelomer sulfonic acid (4:2-FTS)	0.8
26	6:2 Fluorotelomer sulfonic acid (6:2-FTS)	0.8
27	8:2 Fluorotelomer sulfonic acid (8:2-FTS)	0.8
28	3:3 Fluorotelomer carboxylic acid (3:3 FTCA)	1.0
29	5:3 Fluorotelomer carboxylic acid (5:3 FTCA)	5.0
30	7:3 Fluorotelomer carboxylic acid (7:3 FTCA)	5.0
31	Perfluorooctane sulfonamide (PFOSA)	0.2
32	N-methylperfluorooctane sulfonamide (NMeFOSA)	0.2
33	N-ethylperfluorooctane sulfonamide (NEtFOSA)	0.2
34	N-methylperfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	0.2
35	N-ethylperfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	0.2
36	N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)	2.0
37	N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)	2.0
38	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	0.8

	PFAS	Reporting Limit — Soil (ng/g)
	(F-53B Major) (9CL-PF3ONS)	
39	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) (11CL-PF3OUdS)	0.8
40	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)	0.4
41	Perfluorohexadecanoic acid (PFHxDA) ¹	~

Source: EPA Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS, Second Draft Method 1633, April 2023

Data for this table are derived from the single-laboratory validation study and are only provided as examples for this draft method. The data will be updated to reflect the interlaboratory study results in a subsequent revision. Therefore, these criteria will change after interlaboratory validation.

 $^{^{\}rm 1}\,\text{This}$ compound was not listed in the EPA Method 1633 $2^{\rm nd}$ draft and currently no known values exist

Volatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Aqueous Samples

	Volatile Analyte	CAS Number	Trace Water By SIM (µg/L)	Trace Level Water (µg/L)	Low Level Water (µg/L)
1.	Dichlorodifluoromethane	75-71-8		0.50	5.0
2.	Chloromethane	74-87-3		0.50	5.0
3.	Vinyl Chloride	75-01-4		0.50	5.0
4.	Bromomethane	74-83-9		0.50	5.0
5.	Chloroethane	75-00-3		0.50	5.0
6.	Trichlorofluoromethane	75-69-4		0.50	5.0
7.	1,1-Dichloroethene	75-35-4		0.50	5.0
8.	1,1,2-Trichloro-1,2,2- trifluoroethane	76-13-1		0.50	5.0
9.	Acetone	67-64-1		5.0	10.0
10.	Carbon Disulfide	75-15-0		0.50	5.0
11.	Methyl Acetate	79-20-9		0.50	5.0
12.	Methylene chloride	75-09-2		0.50	5.0
13.	trans-1,2-Dichloroethene	156-60-5		0.50	5.0
14.	Methyl tert-Butyl Ether	1634-04-4		0.50	5.0
15.	1,1-Dichloroethane	75-34-3		0.50	5.0
16.	cis-1,2-Dichloroethene	156-59-2		0.50	5.0
17.	2-Butanone	78-93-3		5.0	10.0
18.	Bromochloromethane	74-97-5		0.50	5.0
19.	Chloroform	67-66-3		0.50	5.0
20.	1,1,1-Trichloroethane	71-55-6		0.50	5.0
21.	Cyclohexane	110-82-7		0.50	5.0
22.	Carbon tetrachloride	56-23-5		0.50	5.0
23.	Benzene	71-43-2		0.50	5.0
24.	1,2-Dichloroethane	107-06-2		0.50	5.0
25.	1,4-Dioxane	123-91-1	1.0	25	125
26.	Trichloroethane	79-01-6		0.50	5.0

Table 7.1

Volatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Aqueous Samples (Continued)

	Volatile Analyte	CAS Number	Trace Water By SIM (µg/L)	Trace Level Water (µg/L)	Low Level Water (µg/L)
27.	Methylcyclohexane	108-87-2		0.50	5.0
28.	1,2-Dichloropropane	78-87-5		0.50	5.0
29.	Bromodichloromethane	75-27-4		0.50	5.0
30.	cis-1,3-Dichloropropene	10061-01-5		0.50	5.0
31.	4-methyl-2-pentanone	108-10-1		5.0	10.0
32.	Toluene	108-88-3		0.50	5.0
33.	Trans-1,3-Dichloropropene	10061-02-6		0.50	5.0
34.	1,1,2-Trichloroethane	79-00-5		0.50	5.0
35.	Tetrachloroethene	127-18-4		0.50	5.0
36.	2-Hexanone	591-78-6		5.0	10.0
37.	Dibromochloromethane	124-48-1		0.50	5.0
38.	1,2-Dibromoethane	106-93-4	0.05	0.50	5.0
39.	Chlorobenzene	108-90-7		0.50	5.0
40.	Ethylbenzene	100-41-4		0.50	5.0
41.	Xylenes (Total)	1330-20-7		0.50	5.0
42.	Styrene	100-42-5		0.50	5.0
43.	Bromoform	75-25-2		0.50	5.0
44.	Isopropylbenzene	98-82-8		0.50	5.0
45.	1,1,2,2-Tetrachloroethane	79-34-5		0.50	5.0
46.	1,3-Dichlorobenzene	541-73-1		0.50	5.0
47.	1,4-Dichlorobenzene	106-46-7		0.50	5.0
48.	1,2-Dichlorobenzene	95-50-1		0.50	5.0
49.	1,2-Dibromo-3-chloropropane	96-12-8	0.05	0.50	5.0
50.	1,2,4-Trichlorobenzene	120-82-1		0.50	5.0
51.	1,2,3-Trichlorobenzene	87-61-6		0.50	5.0

Table 7.1

Volatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Solid Samples

	Volatile Analyte	CAS Number	Low Level Soil (µg/Kg)	Med. Level Soil (µg/Kg)
1.	Dichlorodifluoromethane	75-71-8	5.0	500
2.	Chloromethane	74-87-3	5.0	500
3.	Vinyl Chloride	75-01-4	5.0	500
4.	Bromomethane	74-83-9	5.0	500
5.	Chloroethane	75-00-3	5.0	500
6.	Trichlorofluoromethane	75-69-4	5.0	500
7.	1,1-Dichloroethene	75-35-4	5.0	500
8.	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5.0	500
9.	Acetone	67-64-1	10.0	1000
10.	Carbon Disulfide	75-15-0	5.0	500
11.	Methyl Acetate	79-20-9	5.0	500
12.	Methylene chloride	75-09-2	5.0	500
13.	trans-1,2-Dichloroethene	156-60-5	5.0	500
14.	Methyl tert-Butyl Ether	1634-04-4	5.0	500
15.	1,1-Dichloroethane	75-34-3	5.0	500
16.	cis-1,2-Dichloroethene	156-59-2	5.0	500
17.	2-Butanone	78-93-3	10.0	1000
18.	Bromochloromethane	74-97-5	5.0	500
19.	Chloroform	67-66-3	5.0	500
20.	1,1,1-Trichloroethane	71-55-6	5.0	500
21.	Cyclohexane	110-82-7	5.0	500
22.	Carbon tetrachloride	56-23-5	5.0	500
23.	Benzene	71-43-2	5.0	500
24.	1,2-Dichloroethane	107-06-2	5.0	500
25.	1,4-Dioxane	123-91-1	125	12500
26.	Trichloroethane	79-01-6	5.0	500
27.	Methylcyclohexane	108-87-2	5.0	500
28.	1,2-Dichloropropane	78-87-5	5.0	500

Table 7.1

Volatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Solid Samples (Continued)

	Volatile Analyte	CAS Number	Low Level Soil (µg/Kg)	Med. Level Soil (µg/Kg)
29.	Bromodichloromethane	75-27-4	5.0	500
30.	cis-1,3-Dichloropropene	10061-01-5	5.0	500
31.	4-methyl-2-pentanone	108-10-1	10.0	1000
32.	Toluene	108-88-3	5.0	500
33.	Trans-1,3-Dichloropropene	10061-02-6	5.0	500
34.	1,1,2-Trichloroethane	79-00-5	5.0	500
35.	Tetrachloroethene	127-18-4	5.0	500
36.	2-Hexanone	591-78-6	10.0	1000
37.	Dibromochloromethane	124-48-1	5.0	500
38.	1,2-Dibromoethane	106-93-4	5.0	500
39.	Chlorobenzene	108-90-7	5.0	500
40.	Ethylbenzene	100-41-4	5.0	500
41.	Xylenes (Total)	1330-20-7	5.0	500
42.	Styrene	100-42-5	5.0	500
43	Bromoform	75-25-2	5.0	500
44.	Isopropylbenzene	98-82-8	5.0	500
45.	1,1,2,2-Tetrachloroethane	79-34-5	5.0	500
46.	1,3-Dichlorobenzene	541-73-1	5.0	500
47.	1,4-Dichlorobenzene	106-46-7	5.0	500
48.	1,2-Dichlorobenzene	95-50-1	5.0	500
49.	1,2-Dibromo-3-chloropropane	96-12-8	5.0	500
50.	1,2,4-Trichlorobenzene	120-82-1	5.0	500
51.	1,2,3-Trichlorobenzene	87-61-6	5.0	500

Table 7.1

Semivolatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Aqueous Samples

	Semivolatile Analyte	CAS Number	Low Water By SIM ¹ (µg/L)	Water (µg/L)
1.	Benzaldehyde	100-52-7		5.0
2.	Phenol	108-95-2	0.10	5.0
3.	Bis-(2-chlorothyl) ether	111-44-4		5.0
4.	2-Chlorophenol	95-57-8	0.10	5.0
5.	2-Methylphenol	95-48-7	0.10	5.0
6.	2,2'-Oxybis (1-chloropropane) ³	108-60-1		5.0
7.	Acetophenone	98-86-2		5.0
8.	4-Methylphenol	106-44-5	0.10	5.0
9.	N-Nitroso-di-n-propylamine	621-64-7		5.0
10.	Hexachloroethane	67-72-1		5.0
11.	Nitrobenzene	98-95-3		5.0
12.	Isophorone	78-59-1		5.0
13.	2-Nitrophenol	88-75-5	0.10	5.0
14.	2,4-Dimethylphenol	105-67-9	0.10	5.0
15.	Bis (2-chloroethoxy) methane	111-91-1		5.0
16.	2,4-Dichlorophenol	120-83-2	0.10	5.0
17.	Naphthalene	91-20-3	0.10	5.0
18.	4-Chloroaniline	106-47-8		5.0
19.	Hexachlorobutadiene	87-68-3		5.0
20.	Caprolactam	105-60-2		5.0
21.	4-Chloro-3-methylphenol	59-50-7	0.10	5.0
22.	2-Methylnaphthalene	91-57-6		5.0
23.	Hexachlorocyclopentadiene	77-47-4		5.0
24.	2,4,6-Trichlorophenol	88-06-2	0.10	5.0
25.	2,4,5-Trichlorophenol ⁴	95-95-4	0.20	10.0
26.	1,1'-Biphenyl	92-52-4		5.0
27.	2-Chloronaphthalene	91-58-7		5.0

Table 7.1

Semivolatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Aqueous Samples (Continued)

	Semivolatile Analyte	CAS Number	Low Water By SIM ¹ (µg/L)	Water (µg/L)
28.	2-Nitroaniline ⁴	88-74-4		10.0
29.	Dimethylphthalate	131-11-3		5.0
30.	2,6-Dinitrotoluene	606-20-2		5.0
31.	Acenaphthylene	208-96-8	0.10	5.0
32.	3-Nitroaniline ⁴	99-09-2		10.0
33.	Acenaphthene	83-32-9	0.10	5.0
34.	2,4-Dinitrophenol ⁴	51-28-5	0.20	10.0
35.	4-Nitrophenol ⁴	100-02-7	0.20	10.0
36.	Dibenzofuran	132-64-9		5.0
37.	2,4-Dinitrotoluene	121-14-2		5.0
38.	Diethylphthalate	84-66-2		5.0
39.	Fluorene	86-73-7	0.10	5.0
40.	4-Chlorophenyl-phenyl ether	7005-72-3		5.0
41.	4-Nitroaniline ⁴	100-01-6		10.0
42.	4,6-Dinitro-2-methylphenol ⁴	534-52-1	0.20	10.0
43.	N-Nitrosodiphenylamine	86-30-6		5.0
44.	1,2,4,5-Tetrachlorobenzene	95-34-3		5.0
45.	4-Bromophenyl-phenylether	101-55-3		5.0
46.	Hexachlorobenzene	100-52-7		5.0
47.	Atrazine	108-95-2	0.10	5.0
48.	Pentachlorophenol	111-44-4	0.20	10.0
49.	Phenanthrene	95-57-8	0.10	5.0
50.	Anthracene	95-48-7	0.10	5.0
51.	Carbazole	108-60-1		5.0
52.	Di-n-butylphthalate	98-86-2		5.0

Table 7.1

Semivolatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Aqueous Samples (Continued)

	Semivolatile Analyte	CAS Number	Low Water By SIM ¹ (µg/L)	Water (µg/L)
53.	Fluoroanthene	106-44-5	0.10	5.0
54.	Pyrene	621-64-7		5.0
55.	Butylbenzylphthalate	67-72-1		5.0
56.	3,3'-Dichlorobenzidine	98-95-3		5.0
57.	Benzo (a) anthracene	78-59-1		5.0
58.	Chrysene	88-75-5	0.10	5.0
59.	Bis (2-ethylhexyl) phthalate	105-67-9	0.10	5.0
60.	Di-n-octylphthalate	111-91-1		5.0
61.	Benzo (b) fluoranthene	120-83-2	0.10	5.0
62.	Benzo (k) fluoranthene	91-20-3	0.10	5.0
63.	Benzo (a) pyrene	106-47-8		5.0
64.	Indeno (1,2,3-cd) pyrene	87-68-3		5.0
65.	Benzo (a,h) anthracene	105-60-2		5.0
66.	Benzo (g,h,i) perylene	59-50-7	0.10	5.0

Table 7.1

Semivolatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Solid Samples

	Semivolatile Analyte	CAS Number	Low Level By SIM ¹ (µg/Kg)	Low Level Solids ² (µg/Kg)	Med. Level Solids ² (µg/Kg)
1.	Benzaldehyde	100-52-7		170	50000
2.	Phenol	108-95-2	3.3	170	50000
3.	Bis-(2-chlorothyl) ether	111-44-4		170	50000
4.	2-Chlorophenol	95-57-8	3.3	170	50000
5.	2-Methylphenol	95-48-7	3.3	170	50000
6.	2,2'-Oxybis (1-chloropropane) ³	108-60-1		170	50000
7.	Acetophenone	98-86-2		170	50000
8.	4-Methylphenol	106-44-5	3.3	170	50000
9.	N-Nitroso-di-n-propylamine	621-64-7		170	50000
10.	Hexachloroethane	67-72-1		170	50000
11.	Nitrobenzene	98-95-3		170	50000
12.	Isophorone	78-59-1		170	50000
13.	2-Nitrophenol	88-75-5	3.3	170	50000
14.	2,4-Dimethylphenol	105-67-9	3.3	170	50000
15.	Bis (2-chloroethoxy) methane	111-91-1		170	50000
16.	2,4-Dichlorophenol	120-83-2	3.3	170	50000
17.	Naphthalene	91-20-3	3.3	170	50000
18.	4-Chloroaniline	106-47-8		170	50000
19.	Hexachlorobutadiene	87-68-3		170	50000
20.	Caprolactam	105-60-2		170	50000
21.	4-Chloro-3-methylphenol	59-50-7	3.3	170	50000
22.	2-Methylnaphthalene	91-57-6		170	50000
23.	Hexachlorocyclopentadiene	77-47-4		170	50000
24.	2,4,6-Trichlorophenol	88-06-2	3.3	170	50000

Table 7.1

Semivolatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Solid Samples (Continued)

	Semivolatile Analyte	CAS Number	Low Level By SIM ¹ (µg/Kg)	Low Level Solids ² (µg/Kg)	Med. Level Solids ² (µg/Kg)
25.	2,4,5-Trichlorophenol ⁴	95-95-4	6.7	330	100000
26.	1,1'-Biphenyl	92-52-4		170	50000
27.	2-Chloronaphthalene	91-58-7		170	50000
28.	2-Nitroaniline ⁴	88-74-4		330	100000
29.	Dimethylphthalate	131-11-3		170	50000
30.	2,6-Dinitrotoluene	606-20-2		170	50000
31.	Acenaphthylene	208-96-8	3.3	170	50000
32.	3-Nitroaniline ⁴	99-09-2		330	100000
33.	Acenaphthene	83-32-9	3.3	170	50000
34.	2,4-Dinitrophenol ⁴	51-28-5	6.7	330	100000
35.	4-Nitrophenol ⁴	100-02-7	6.7	330	100000
36.	Dibenzofuran	132-64-9		170	50000
37.	2,4-Dinitrotoluene	121-14-2		170	50000
38.	Diethylphthalate	84-66-2		170	50000
39.	Fluorene	86-73-7	3.3	170	50000
40.	4-Chlorophenyl-phenyl ether	7005-72-3		170	50000
41.	4-Nitroaniline ⁴	100-01-6		330	100000
42.	4,6-Dinitro-2-methylphenol ⁴	534-52-1	6.7	330	100000
43.	N-Nitrosodiphenylamine	86-30-6		170	50000
44.	1,2,4,5-Tetrachlorobenzene	95-34-3		170	50000
45.	4-Bromophenyl-phenylether	101-55-3		170	50000
46.	Hexachlorobenzene	118-74-1		170	10000
47.	Atrazine	1912-24-9		170	50000
48.	Pentachlorophenol	87-86-5	6.7	330	100000

Table 7.1

Semivolatiles Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) for Solid Samples (Continued)

	Semivolatile Analyte	CAS Number	Low Level By SIM ¹ (µg/Kg)	Low Level Solids ² (µg/Kg)	Med. Level Solids ² (µg/Kg)
49.	Phenanthrene	85-01-8	3.3	170	50000
50.	Anthracene	120-12-7	3.3	170	50000
51.	Carbazole	86-74-8		170	50000
52.	Di-n-butylphthalate	84-74-2		170	50000
53.	Fluoroanthene	206-44-0	3.3	170	50000
54.	Pyrene	129-00-0	3.3	170	50000
55.	Butylbenzylphthalate	85-68-7		170	50000
56.	3,3'-Dichlorobenzidine	91-94-1		170	50000
57.	Benzo (a) anthracene	56-55-3	3.3	170	50000
58.	Chrysene	218-01-9	3.3	170	50000
59.	Bis (2-ethylhexyl) phthalate	117-81-7		170	50000
60.	Di-n-octylphthalate	117-84-0		170	50000
61.	Benzo (b) fluoranthene	205-99-2	3.3	170	50000
62.	Benzo (k) fluoranthene	207-08-9	3.3	170	50000
63.	Benzo (a) pyrene	50-32-8	3.3	170	50000
64.	Indeno (1,2,3-cd) pyrene	193-39-5	3.3	170	50000
65.	Benzo (a,h) anthracene	53-70-3	3.3	170	50000
66.	Benzo (g,h,i) perylene	191-24-2	3.3	170	50000

Pesticide Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) For Aqueous and Solid Samples

	Pesticide Analyte	CAS Number	Water (µg/L)	Solids ¹ (µg/Kg)
1.	alpha-BHC	319-84-6	0.050	1.7
2.	beta-BHC	319-85-7	0.050	1.7
3.	delta-BHC	319-86-8	0.050	1.7
4.	gamma-BHC (Lindane)	58-89-9	0.050	1.7
5.	Heptachlor	76-44-8	0.050	1.7
6.	Aldrin	309-00-2	0.050	1.7
7.	Heptachlor epoxide ²	1024-57-3	0.050	1.7
8.	Endosulfan I	959-98-8	0.050	1.7
9.	Dieldrin	60-57-1	0.10	3.3
10.	4,4'-DDE	72-55-9	0.10	3.3
11.	Endrin	72-20-8	0.10	3.3
12.	Endosulfan II	33213-65-9	0.10	3.3
13.	4,4'-DDD	72-54-8	0.10	3.3
14.	Endosulfan sulfate	1031-07-8	0.10	3.3
15.	4,4'-DDT	50-29-3	0.10	3.3
16.	Methoxychlor	72-43-5	0.10	3.3
17.	Endrin ketone	53494-70-5	0.10	3.3
18.	Endrin aldehyde	7421-93-4	0.10	3.3
19.	alpha-Chlordane	5103-71-9	0.050	1.7
20.	gamma-Chlordane	5103-74-2	0.050	1.7
21.	Toxaphene	8001-35-2	5.0	34

Pesticide Notes

¹ There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of pesticides.

² Only the exo-epoxy isomer (isomer B) of heptachlor epoxide is reported on the data reporting forms (Exhibit B).

Table 7.1

PCB Aroclor Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) For Aqueous and Solid Samples

	Aroclor Analyte	CAS Number	Water (µg/L)	Solids ¹ (µg/Kg)
1.	Arochlor-1016	12674-11-2	1.0	33
2.	Arochlor-1221	11104-28-2	1.0	33
3.	Arochlor-1232	11141-16-5	1.0	33
4.	Arochlor-1242	53469-21-9	1.0	33
5.	Arochlor-1248	12672-29-6	1.0	33
6.	Arochlor-1254	11097-69-1	1.0	33
7.	Arochlor-1260	11096-82-5	1.0	33
8.	Arochlor-1262	37324-23-5	1.0	33
9.	Arochlor-1268	11100-14-4	1.0	33

Aroclor PCB Notes

¹ There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of Aroclor PCBs.

Table 7.1

PCB Congeners Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) For Aqueous and Solid Samples

	Congener Analyte	IUPAC Number	CAS Number	Water (pg/L)	Solids ¹ (ng/Kg)
1.	2-MoCB	1	2051-60-7	20	2.0
2.	4-MoCB	3	2051-62-9	20	2.0
3.	2,2'-DiCB	4	13029-08-8	20	2.0
4.	4,4'-DiCB	15	2050-68-2	20	2.0
5.	2,2',6'-TrCB	19	38444-73-4	20	2.0
6.	3,4,4'-TrCB	37	38444-90-5	20	2.0
7.	2,2',6,6'-TeCB	54	15968-05-5	20	2.0
8.	3,3',4,4'-TeCB	77	32598-13-3	20	2.0
9.	3,4,4',5-TeCB	81	70362-50-4	20	2.0
10.	2,2',4,6,6'-PeCB	104	56558-16-8	20	2.0
11.	2,3,3',4,4'-PeCB	105	32598-14-4	20	2.0
12.	2,3,4,4',5-PeCB	114	74472-37-0	20	2.0
13.	2,3',4,4',5-PeCB	118	31508-00-6	20	2.0
14.	2',3,4,4',5-PeCB	123	65510-44-3	20	2.0
15.	3,3',4,4',5-PeCB	126	57465-28-8	20	2.0
16.	2,2',4,4',6,6'-HxCB	155	33979-03-2	20	2.0
17.	2,3,3',4,4',5-HxCB	156	38380-08-4	20	2.0
18.	2,3,3',4,4',5'-HxCB	157	69782-90-7	20	2.0
19.	2,3',4,4',5,5'-HxCB	167	52663-72-6	20	2.0
20.	3,3',4,4',5,5'-HxCB	169	32774-16-6	20	2.0
21.	2,2',3,4',5,6,6'-HpCB	188	74487-85-7	20	2.0
22.	2,2',3,4',5,6,6'-HpCB	189	39635-31-9	20	2.0
23.	2,2',3,3',5,5',6,6'-OcCB	202	2136-99-4	20	2.0
24.	2,3,3',4,4',5,5',6-OcCB	205	74472-53-0	20	2.0
25.	2,2',3,3',4,4',5,5',6-NoCB	206	40186-72-9	20	2.0

Table 7.1

PCB Congeners Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) For Aqueous and Solid Samples (Continued)

	Congener Analyte	IUPAC Number	CAS Number	Water (pg/L)	Solids ¹ (ng/Kg)
26.	2,2',3,3',4,5,5',6,6'-NoCB	208	52663-77-1	20	2.0
27.	DeCB	209	2051-24-3	20	2.0

Congener PCB Notes

¹There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of congener PCBs.

Table 7.1

PCDD/F Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL) For Aqueous and Solid Samples

	PCDD/F Analyte	CAS Number	Water (pg/L)	Solids ¹ (ng/Kg)
1.	2,3,7,8-TCDD	1746-01-6	10	1.0
2.	1,2,3,7,8-PeCDD	40321-76-4	50	5.0
3.	1,2,3,6,7,8-HxCDD	57653-85-7	50	5.0
4.	1,2,3,4,7,8-HxCDD	39227-28-6	50	5.0
5.	1,2,3,7,8,9-HxCDD	19408-74-3	50	5.0
6.	1,2,3,4,6,7,8-HpCDD	35822-46-9	50	5.0
7.	OCDD	3268-87-9	100	10
8.	2,3,7,8-TCDF	51207-31-9	10	1.0
9.	1,2,3,7,8-PeCDF	57117-41-6	50	5.0
10.	2,3,4,7,8-PeCDF	57117-31-4	50	5.0
11.	1,2,3,6,7,8-HxCDD	57117-44-9	50	5.0
12.	1,2,3,7,8,9-HxCDD	72918-21-9	50	5.0
13.	1,2,3,4,7,8-HxCDD	70648-26-9	50	5.0
14.	2,3,4,6,7,8-HxCDD	60851-34-5	50	5.0
15.	1,2,3,4,6,7,8-HpCDD	67562-39-4	50	5.0
16.	1,2,3,4,7,8,9-HpCDD	55673-89-7	50	5.0
17.	OCDF	39001-02-0	100	10

PCDD/F Notes

¹ There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of PCDDs and PCDFs.

Table 7.1

Inorganic Target Compound List (TCL) and Contract Required Quantitation Limits (CRQLs) For Aqueous and Solid Samples

				100 4501	
			ICP-AES ¹ CRQL for	ICP-AES ¹ CRQL for	ICP-MS ¹ for
	Analyte	CAS Number	Water (µg/L)	Solids (mg/Kg)	Water (µg/L)
	,				
1.	Aluminum	7429-90-5	200	40	30
2.	Antimony	7440-36-0	60	12	2
3.	Arsenic	7440-38-2	15	3	1
4.	Barium	7440-39-3	200	40	10
5.	Beryllium	7440-41-7	5	1	1
6.	Cadmium	7440-43-9	5	1	1
7	Calcium	7440-70-2	5000	1000	
8.	Chromium	7440-47-3	10	2	2
9.	Cobalt	7440-48-4	50	10	0.5
10.	Copper	7440-50-8	25	5	2
11.	Iron	7439-89-6	100	20	
12.	Lead	7439-92-1	10	2	1
13.	Magnesium	7439-95-4	5000	1000	
14.	Manganese	7439-96-5	15	3	0.5
15.	Mercury ²	7439-97-6	0.2	0.1	
16.	Nickel	7440-02-0	40	8	1
17.	Potassium	7440-09-7	5000	1000	
18.	Selenium	7782-49-2	35	7	5
19.	Silver	7440-22-4	10	2	1
20.	Sodium	7440-23-5	5000	1000	
21.	Thallium	7440-28-0	25	5	1
22.	Vanadium	7440-62-2	50	10	1
23.	Zinc	7440-66-6	60	12	1
24.	Cyanide ²	57-12-5	10	1	

Appendix E:

Health and Safety Plan

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Hamilton Green Site 200 Hamilton Avenue White Plains, New York

Prepared For:

S-WD/WP LLC c/o Law Offices of Denise J. D'Ambrosio 2 Westchester Park Drive, Suite 418 White Plains, New York 10604

Prepared By:

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Project No.: 12545

SEPTEMBER 2021 REVISED DECEMBER 2024

Disclaimer: This Health and Safety Plan (HASP) is based upon information provided [and, if applicable, conditions discovered during a site visit], and is limited by the project scope.

The HASP should be periodically reviewed and updated based on a number of factors, including but not limited to: (1) changes in applicable governmental requirements; (2) changes in procedures at the site; and (3) site conditions which were unknown to SESI Consulting Engineers (SESI) as of the time the HASP was prepared.

This HASP has been prepared for the sole and exclusive use of S-WD/WP LLC, and may not be relied upon by any other person without the express written consent and authorization of SESI.

SITE-SPECIFIC HEALTH AND SAFETY PLAN

For Hamilton Green Site 200 Hamilton Ave. White Plains, New York

Prepared by: Steven Gustems

SESI- Project Manager

Approved by: Fuad Dahan

SESI-Principal

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List of Acronyms

ACGIH American Conference of Governmental Industrial Hygienists

COC Constituent(s) of Concern
CRZ Contamination Reduction Zone

EZ Exclusion Zone FS Field Supervisor

GFCI Ground Fault Circuit Interrupter

HASP Health and Safety Plan
HSM Health and Safety Manager
LEL Lower Explosive Limit
MSDS Material Safety Data Sheet

OSHA Occupational Safety and Health Administration

PCB Polychlorinated Biphenyls
PEL Permissible Exposure Limit
PID Photoionization Detector

PM Project Manager PO Project Officer

PPE Personal Protective Equipment SESI SESI Consulting Engineers

SSO Site Safety Officer

SVOC Semi-Volatile Organic Compound

SZ Support Zone

TLV Threshold Limit Value USCG United States Coast Guard

USEPA United States Environmental Protection Agency

VOC Volatile Organic Compound

HEALTH AND SAFETY PLAN SUMMARY

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site Chemicals of Concern (COCs). COCs at the site VOCs, SVOCs, metals, and PFAS. Concentrations of airborne COCs during site tasks may be measurable and will require air monitoring during certain operations.

The potential for inhalation of site COCs is low. The potential for dermal contact with soils containing site COCs during remedial operations is moderate.

The following table summarizes airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

Parameter	Reading	Action
Dust	0 to .5 mg/m3	Normal operations
	0.5 to 1 mg/m3	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 1 mg/m3	Stop work, fully implement dust control plan
Oxygen	<u><</u> 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	<u>≥</u> 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to <u><</u> 20 ppm	Normal operations
	> 20 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the Field Supervisor and Site Safety Officer. The following table presents a selection matrix to determine appropriate Personal Protective Equipment.

Task	Anticipated Level of Protection
Mobilization	Level D
Subsurface Intrusive Activities (Mass	Modified Level D/Level C
Excavation, Drilling, Soil Grouting)	
Earthwork/Grading	Level D
Additional Chemical Sampling / Delineation	Modified Level D/Level C
Decontamination	Modified Level D
Demobilization	Level D

1.0 INTRODUCTION

1.1 Objective

The objective of this Health and Safety Plan (HASP) is to provide a mechanism for establishing safe working conditions during post certificate of complete (COC) Site Management Plan (SMP) activities. The safety organization, procedures, and protective equipment have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of injury, illness, or other hazardous incident.

The HASP was written to meet the requirements of all applicable Federal, State, and local health and safety regulations, including 29 CFR 1910.120. The HASP is based on current knowledge regarding the specific chemical and physical hazards that are known or anticipated at the Site. This HASP is a dynamic document, for which changes and/or revisions may be realized as changes in scope and/or site conditions are encountered. Should revised documents be produced, said revised documents will refer to the specific changes and why they were made.

1.2 Site and Facility Description

This document presents the quality assurance project plan (QAPP) for the Site Management Plan (SMP) of the property located at 200 Hamilton Avenue, Westchester County, White Plains, New York (the "Site"). The Site consists of a 1.94-acre parcel and is identified as Section 125.67/Block 5/Lot 1.2 on the Westchester County Tax Map. The Site contains a portion of the former mall that was razed in September and October 2022. The Site is bounded to the north by Barker Avenue, to the east by the WP Mall Cleaners & Gas Station Site (C360221), to the south by Hamilton Avenue, and to the west by the Martin Luther King Jr. Boulevard. The nearest surface water body is the Bronx River located approximately 0.6 miles west of the Site.

Historically as identified on the 1930 through 1950 Sanborn fire insurance maps, and as outlined in AKRF's Phase I Environmental Site Assessment (ESA) (Section 2.3.2 below), the Site was bisected by historical William Street and was improved with several private residential dwellings and residential apartments with automotive storage garages (address ranges 45 Williams to 70 Williams), stores at 50 and 62 Williams, and a gasoline station with three (3) gasoline tanks at a former address of 230 Hamilton Avenue which was located on the southern portion of the Site. An off-Site gas station with greasing operations and four (4) gasoline tanks was identified at a former address of 250 Hamilton Avenue which was located on the eastern adjacent parcel (BCP # C360221) on the 1950 Sanborn map. Numerous private dwellings were shown within the former mall building footprint on Sanborn maps from 1894 to 1950. In addition, there is a Gulf Gasoline Station located to the east across Cottage Place with an open NYSDEC Spill No. 9707877 that may be impacting the Site. Based on these findings, the Phase I ESA identified the potential for abandoned underground storage tanks (USTs) and/or associated petroleum contamination in the Site subsurface associated with the gasoline stations and/or heating oil for the residential dwellings. The former on-Site structures were likely present until construction of the current two-story shopping mall and east-adjacent asphalt-paved parking lot. Based on historic records and interviews, the western adjacent shopping mall was constructed in 1972 and has operated as the White Plains Mall with a variety of tenants since its construction, including a potential dry cleaner listed in historic City Directories.

1.3 Policy Statement

The policy of SESI Consulting Engineers (SESI) is to provide a safe and healthful work environment. No aspect of operations is of greater importance than injury and illness prevention. A fundamental principle of safety management is that all injuries, illnesses, and incidents are preventable. SESI will take every reasonable step to eliminate or control hazards in order to minimize the possibility of injury, illness, or incident.

This HASP prescribes the procedures that must be followed by SESI personnel during activities at the site. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager (PM) and the Health and Safety Manager (HSM). This document will be reviewed periodically by the HSM to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will require a review and modification to this HASP. Such changes will be completed in the form of an addendum or a revision to the plan.

The provisions of this plan are mandatory for all SESI personnel and are advisory for all contractors, and subcontractors assigned to the project. Subcontractors will be responsible for preparing their own site-specific HASPs that meet the basic requirements outlined in this HASP. All visitors to SESI work areas at the site must abide by the requirements of this plan.

1.4 References

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, United States Environmental Protection Agency (USEPA) regulations, and SESI health and safety policies and procedures. This plan follows the guidelines established in the following:

- Standard Operating Safety Guides, USEPA (Publication 9285.1-03, June 1992).
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, USEPA (86116, October 1985).
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.
- Title 29 of the Code of Federal Regulations (CFR), Part 1926.
- Pocket Guide to Chemical Hazards, DHHS, PHS, CDC, NIOSH (2004).
- Threshold Limit Values, ACGIH (2005).
- Guide to Occupational Exposure Values, ACGIH (2005).
- Quick Selection Guide to Chemical Protective Clothing, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).

1.5 Definitions

The following definitions (listed alphabetically) are applicable to this HASP:

- Contamination Reduction Zone (CRZ) Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- Exclusion Zone (EZ) Any portions of the site where hazardous substances are, or are reasonably suspected to be present, and pose an exposure hazard to on-site personnel.

- Incident All losses, including first aid cases, injuries, illnesses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- On-Site Personnel All SESI and subcontractors involved with the project.
- Project All on-site work performed under the scope of work.
- Site The area described in Section 1.2, Site and Facility Description, where the work is to be performed by SESI personnel and subcontractors.
- Support Zone (SZ) All areas of the site except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- Subcontractor Includes contractor personnel hired by SESI.
- Visitor All other personnel, except the on-site personnel.
- Work Area The portion of the site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ, CRZ, and EZ. If the work area is located in an area on the site that is not contaminated, or suspected of being contaminated, the entire work area may be a SZ.

2.0 PROJECT SCOPE OF WORK

This HASP contains information for the following tasks that SESI is anticipated to conduct at the Site. Should additional and/or different tasks be identified, amendments to this HASP will be required to address these changed items.

- Mobilization/Sample location stakeout;
- Monitoring Well Sampling;
- Monitoring Well Installation;
- Chemical sampling of groundwater; and
- Decontamination and demobilization/site restoration.

3.0 ROLES AND RESPONSIBILITIES

3.1 All Personnel

All SESI project personnel must adhere to the procedures outlined in this HASP during the performance of their work. Each person is responsible for completing tasks safely and reporting any unsafe acts or conditions to their supervisor. No person may work in a manner that conflicts with these procedures. After due warnings, the PM will dismiss from the site any SESI employee or subcontractor who violates safety procedures.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all SESI personnel will attend an initial hazard briefing prior to beginning work at the site.

The roles of key safety personnel and subcontractors are outlined in the following sections. Key project personnel and contacts are summarized in **Table 1** on page 7.

3.2 Key Safety Personnel

3.2.1 Project Officer (PO)

The PO is responsible for providing resources to assure project activities are completed in accordance with this HASP, and for meeting all regulatory and contractual requirements.

3.2.2 Project Manager (PM)

The PM is responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The PM is responsible for confirming that the Field Supervisor (FS) has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or that subcontractors assigned to this project meet the requirements established by SESI. It is also the responsibility of the PM to:

- Consult with the HSM on site health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work:
- Verify that all incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications of this HASP; and
- Suspend work or modify work practices, as necessary, for personal safety, protection of property, and regulatory compliance.

3.2.3 Health and Safety Manager (HSM)

The HSM or his designee, the health and safety manager (HSM), has overall responsibility for the technical health and safety aspects of the project, including review and approval of this HASP. Inquiries regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSM or his designee must approve changes or addenda to this HASP.

3.2.4 Site Safety Officer (SSO)

The SSO is responsible for field health and safety issues, including the execution of this HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The SSO will advise the PM on health and safety issues and will establish and coordinate the project air-monitoring program if one is deemed necessary (see Section 5.1, Air Monitoring). The SSO is the primary site contact on health and safety matters. It is the responsibility of the SSO to:

- Provide on-site technical assistance, if necessary;
- Participate in all accident/incident reports and ensure that they are reported to the HSM, client, and PM within 24 hours;
- Coordinate site and personal air monitoring as required, including equipment maintenance and calibration;
- Conduct site safety orientation training and safety meetings;
- Verify that project personnel have received the required physical examinations and medical certifications;
- Review site activities with respect to compliance with this HASP;
- · Maintain required health and safety documents and records; and

 Assist the FS in instructing field personnel on project hazards and protective procedures.

3.2.5 Field Supervisor (FS)

The FS is responsible for implementing this HASP, including communicating requirements to on-site personnel and subcontractors. The FS will be responsible for informing the PM of changes in the work plan, procedures, or site conditions so that those changes may be addressed in this HASP. Other responsibilities are to:

- Consult with the SSO on site health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a site map and determine and post routes to medical facilities and emergency telephone numbers;
- Notify local public emergency representatives (as appropriate) of the nature of the site operations, and post their telephone numbers (i.e., local fire department personnel who would respond for a confined space rescue);
- Observe on-site project personnel for signs of ill health effects;
- Investigate and report any incidents to the SSO;
- Verify that all on-site personnel have had applicable training;
- Verify that on-site personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control the hazards; and
- Issue/obtain any required work permits (hot work, confined space, etc.).

3.2.6 Field Personnel (FP)

All SESI field personnel are responsible for following the Health and Safety procedures specified in this HASP and work practices specified in applicable operation procedures. Some specific responsibilities include, but are not limited to:

- Reading and understanding the HASP;
- Reporting all accidents, incidents, injuries, or illnesses to the FS;
- Complying with the requests of the SSO;
- Immediately communicating newly identified hazards or noncompliance issues to the FS or SSO; and
- Stopping work in cases of immediate danger.

3.3 Subcontractors

Subcontractors and their personnel must understand and comply with applicable regulations and site requirements established in this HASP. Subcontractors will prepare their own site-specific HASP that must be consistent with the requirements of this HASP.

All subcontractor personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. All subcontractor personnel will attend an initial hazard briefing prior to beginning work at the site. Additionally, on-site subcontractor personnel must conduct daily site safety meetings.

Subcontractors must designate individuals to function as the PM, HSM, SSO, and FS. In some firms the HSM to be carried out by the PM. This is acceptable provided the PM has the required knowledge, training, and experience to properly address all hazards associated with the work, and to prepare, approve, and oversee the execution of the site-specific HASP. A subcontractor may designate the same person to perform the duties of both the SSO and the FS. However, depending on the level of complexity of a contractor's scope of work, it may be infeasible for one person to perform both functions satisfactorily.

3.4 Stop Work Authority

Every SESI employee and subcontractor is empowered, expected, and has the responsibility to stop the work of another co-worker if the working conditions or behaviors are considered unsafe.

3.5 All On-Site Personnel

All on-site SESI personnel (including SESI subcontractors) must read and acknowledge their understanding of their respective HASPs before commencing work and abide by the requirements of the plans. All on-site SESI personnel shall sign their HASP Acknowledgement Form following their review of their HASP.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all on-site personnel will attend an initial hazard briefing provided by the SSO prior to beginning work at the site and conduct daily safety meetings thereafter.

On-site personnel will immediately report the following to the FS or SSO:

- Personal injuries and illnesses no matter how minor;
- Unexpected or uncontrolled release of chemical substances:
- Symptoms of chemical exposure;
- Unsafe or hazardous situations;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;
- Damage to equipment or property; and
- Situations or activities for which they are not properly trained.

3.6 Visitors

All SESI personnel and subcontractors visiting the Site must check in with the FS. Visitors will be cautioned to avoid skin contact with surfacesgroundwater, or other materials that may impacted or be suspected to be impacted by constituents of concern (COCs).

Visitors requesting to observe work at the site must don appropriate personal protective equipment (PPE) prior to entry to the work area and must have the appropriate training and medical clearances to do so. If respiratory protective devices are necessary, visitors who wish to enter the work area must have been respirator-trained and fit tested for a respirator within the past 12 months.

SESI Personnel				
Role	Name	Address/Telephone No.		
Project Officer (PO)	Fuad Dahan	Pine Brook, NJ/973.747.9567		
Project Manager (PM)	Steven Gustems	Pine Brook, NJ/973.518.8547		
Senior Project Engineer (SPE)	Fuad Dahan	Pine Brook, NJ/973.747.9567		
Health and Safety Manager (HSM)	Justin Protasiewicz	Pine Brook, NJ/973.998.1764		
Site Safety Officer (SSO)	Jeffery Lamborn	Pine Brook, NJ/973.809.2079		
Field Supervisor (FS)	Jeffery Lamborn	Pine Brook, NJ/973.809.2079		
Field Personnel	Emily Quach	Pine Brook, NJ/973.738.0950		
	Subcontractors			
Company/Role	Name	Address/Telephone No.		
AARCO/Drilling Contractor	Chuck Blumberg	Lindenhurst, NY/631.586.59020		
Alpha Analytical/ Analytical Lab	Paul Simms	Westborough, MA/580.898.9220		

4.0 PERSONAL PROTECTIVE EQUIPMENT

4.1 Levels of Protection

PPE is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the levels of COCs and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level. A summary of the levels is presented in **Table 2** on page 11.

4.1.1 Level D Protection

The minimum level of protection that will be required of project personnel at the site will be Level D, which will be worn when site conditions or air monitoring indicates no inhalation hazard exists. The following equipment will be used:

- Work clothing as prescribed by weather;
- Steel toe work boots, meeting American National Standards Institute (ANSI) Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Leather work gloves and/or nitrile surgical gloves;
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

4.1.2 Modified Level D Protection

Modified Level D will be used when airborne contaminants are not present at levels of concern, but site activities present an increased potential for skin contact with contaminated materials. Modified Level D consists of:

- Nitrile gloves worn over nitrile surgical gloves;
- Latex/polyvinyl chloride (PVC) overboots when contact with COC-impacted media is anticipated:
- Steel toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;

- Face shield in addition to safety glasses or goggles when projectiles or splash hazards exist (e.g. during Power Washing activities);
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used);
- Tyvek[®] suit (polyethylene coated Tyvek[®] suits for handling liquids) when body contact with COC-impacted media is anticipated; and
- PFD if working on or near the water.

4.1.3 Level C Protection

Level C protection will be required when the airborne concentration of COC reaches one-half of the OSHA Permissible Exposure Limit or ACGIH TLV. The following equipment will be used for Level C protection:

- Full-face, air-purifying respirator with combination organic vapor/HEPA cartridges;
- Polyethylene-coated Tyvek[®] suit, with ankles and cuffs taped to boots and gloves;
- Nitrile gloves worn over nitrile surgical gloves;
- Steel toe work boots, meeting ANSI Z41;
- Chemical-resistant boots with steel toes or latex/PVC overboots over steel toe boots;
- Hard hat, meeting ANSI Z89;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

4.2 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of supervising site personnel and health and safety professionals. The PPE used will be chosen to be effective against the COCs present on the site.

4.3 Site Respiratory Protection Program

Respiratory protection is an integral part of employee health and safety at the site due to potentially hazardous concentrations of airborne COCs. The site respiratory protection program will consist of the following (as a minimum):

- All on-site personnel who may use respiratory protection will have an assigned respirator.
- All on-site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-face air-purifying respirator within the past 12 months.
 Documentation of the fit test must be provided to the SSO prior to commencement of work.
- All on-site personnel who may use respiratory protection must within the past year have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SSO, prior to commencement of site work.
- Only cleaned, maintained, NIOSH-approved respirators will be used.

- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All on-site personnel who may use respiratory protection must be clean-shaven.
 Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe.
 When used, the respirator will be thoroughly cleaned at the end of the work shift.
 The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

4.4 Using PPE

Depending upon the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Modified Level D or Level C PPE is used. All personnel entering the EZ must put on the required PPE in accordance with the requirements of this HASP. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of COCs.

4.4.1 Donning Procedures

These procedures are mandatory only if Modified Level D or Level C PPE is used on the site:

- Remove bulky outerwear. Remove street clothes and store in clean location;
- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape:
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;
- Don the required respirator and perform appropriate fit check (Level C);
- Put hood or head covering over-head and respirator straps and tape hood to facepiece (Level C); and
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

4.4.2 Doffing Procedures

The following procedures are only mandatory if Modified Level D or Level C PPE is required for the site. Whenever a person leaves the work area, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;

- Remove protective garments, equipment, and respirator (Level C). All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels:
- Wash hands, face, and neck (or shower if necessary);
- Proceed to clean area and dress in clean clothing; and
- Clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags, labeled for disposal. See Section 7, Decontamination, for detailed information on decontamination stations.

4.5 Selection Matrix

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the FS and SSO of the potential for skin contact with COCs. The PPE selection matrix is presented in **Table 2** below. This matrix is based on information available at the time this plan was written. The Airborne Contaminant Action Levels in **Table 3** on page 12, Airborne Contaminant Action Levels, should be used to verify that the PPE prescribed in these matrices is appropriate.

Task	Anticipated Level of Protection
Mobilization	Level D
Subsurface Intrusive Activities (Excavation, Drilling)	Modified Level D/Level C
Earthwork/Grading	Level D
Chemical Sampling / Delineation	Modified Level D/Level C
Decontamination	Modified Level D
Demobilization	Level D

Table 2 - PPE Selection Matrix

5.0 AIR AND NOISE MONITORING

5.1 Air Monitoring

Air monitoring, sampling, and testing will be conducted to determine employee exposure to airborne constituents. The monitoring results will dictate work procedures and the selection of PPE. The SESI SSO will be responsible for defining appropriate air monitoring procedures and for utilizing the air monitoring results to determine appropriate procedures and PPE for project personnel. Air monitoring results should be recorded in field notebooks or on an air monitoring log (see Attachment 1 for a copy of the Air Monitoring Log). Any deviations from the procedures listed here should be documented and explained in the Air Monitoring Log.

The monitoring devices to be used are a PDR1000 particulate monitor (or equivalent) and a Rae Systems MultiRAE detector (PID with a 11.7 eV lamp/oxygen/LEL/hydrogen sulfide sensors). Colorimetric detector tubes may be utilized to estimate airborne concentrations of benzene and should be onsite during any activities that may result in elevated PID readings including drilling, excavating, and groundwater sampling.

Air monitoring will be conducted continuously with the LEL/Oxygen meter during drilling in areas where flammable vapors or gases are suspect. All work activity must stop where tests indicate the concentration of flammable vapors exceeds 10% of the LEL at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

5.2 Noise Monitoring

Noise monitoring may be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

5.3 Monitoring Equipment Maintenance and Calibration

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. Instruments must be calibrated before and after use, noting the reading(s) and any adjustments that are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented on a calibration log or in the field notebook. All completed health and safety documentation/forms must be reviewed by the SSO and maintained by the FS.

All air monitoring equipment will be maintained and calibrated in accordance with the specific manufacturer's procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturer's procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the SSO must be responsible for immediately removing the instrument from service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The SSO will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

5.4 Action Levels

Table 3 below presents airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

Table 3 - Airborne Contaminant Action Levels

Parameter	Reading	Action
Total Hydrocarbons	0 ppm to <u><</u> 1 ppm	Normal operations; continue hourly breathing zone monitoring
,	> 1 ppm to 5 ppm	Increase monitoring frequency to every 15 minutes and use benzene detector tube to screen for the presence of benzene
	≥ 5 ppm to ≤ 50 ppm	Upgrade to Level C PPE; continue screening for benzene
	> 50 ppm	Stop work; investigate cause of reading
	At any reading > 5 ppm	Monitor perimeter per CAMP

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Parameter	Reading	Action
Benzene	<u>></u> 1 ppm to 5 ppm	Upgrade to Level C PPE
	> 5 ppm	Stop work; investigate cause of reading
Dust	0 to .05 mg/m3	Normal operations
	0.05 to 0.1 mg/m3	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 0.15 mg/m3	Stop work, fully implement dust control plan
Oxygen	<u><</u> 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	<u>≥</u> 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to <u><</u> 20 ppm	Normal operations
	> 20 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Hydrogen Sulfide	0 ppm to <u><</u> 5 ppm	Normal operations
	> 5 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Flammable Vapors (LEL)	< 10% LEL	Normal operations
	≥ 10% LEL	Stop work, ventilate area, investigate source of vapors

6.0 WORK ZONES AND DECONTAMINATION

6.1 Work Zones

6.1.1 Authorization to Enter

Only personnel with the appropriate training and medical certifications (if respirators are required) will be allowed to work at the project site. The FS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed to enter the site work areas.

6.1.2 Site Orientation and Hazard Briefing

No person will be allowed in the work area during site operations without first being given a site orientation and hazard briefing. This orientation will be presented by the FS or SSO and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Following this initial meeting, daily safety meetings will be held each day before work begins.

All people entering the site work areas, including visitors, must document their attendance at this briefing, as well as the daily safety meetings on the forms included with this plan.

6.1.3 Certification Documents

A training and medical file may be established for the project and kept on site during all site operations. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR)

certificates, as well as current medical clearances for all project field personnel required to wear respirators, will be maintained within that file. All project personnel must provide their training and medical documentation to the SSO prior to starting work.

6.1.4 Entry Log

A log-in/log-out sheet will be maintained at the site by the FS. Personnel must sign in and out on a log sheet as they enter and leave the work area, and the FS may document entry and exit in the field notebook.

6.1.5 Entry Requirements

In addition to the authorization, hazard briefing, and certification requirements listed above, no person will be allowed in any SESI work area unless they are wearing the minimum PPE as described in Section 4.0.

6.1.6 Emergency Entry and Exit

People who must enter the work area on an emergency basis will be briefed of the hazards by the FS or SSO. All activities will cease in the event of an emergency. People exiting the work area because of an emergency will gather in a designated safe area for a head count. The FS is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

6.1.7 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

6.1.8 Exclusion Zone (EZ)

An EZ may consist of a specific work area or may be the entire area of potential contamination. All employees entering an EZ must use the required PPE and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Cones, caution tape, or a posted site diagram will identify the location of each EZ.

6.1.9 Contamination Reduction Zone

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the support zone (SZ) discussed below.

6.1.10 Support Zone (SZ)

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the SZ, subject to site requirements.

6.1.11 Posting

Work areas will be prominently marked and delineated using cones, caution tape, or a posted site diagram.

6.1.12 Site Inspections

The FS will conduct a daily inspection of site activities, equipment, and procedures to verify that the required elements are in place.

6.2 Decontamination

6.2.1 Personnel Decontamination

All personnel wearing Modified Level D or Level C protective equipment in the EZ must undergo personal decontamination prior to entering the SZ. The personnel decontamination area will consist of the following stations at a minimum:

- Station 1: Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.
- Station 2: Personnel will remove their outer garment and gloves and dispose of it in properly labeled containers. Personnel will then decontaminate their hard hats, and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand carried to the next station.
- Station 3: Personnel will thoroughly wash their hands and face before leaving the CRZ. Respirators will be sanitized and then placed in a clean plastic bag.

6.2.2 Equipment Decontamination

All vehicles that have entered the EZ will be decontaminated at the decontamination pad prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

6.2.3 Personal Protective Equipment Decontamination

Where and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers. Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

When removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves, and covers must be thoroughly cleaned at the end of each work shift, and ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water (mixed at 2% bleach by volume), or by using a spray disinfectant

7.0 TRAINING AND MEDICAL SURVEILLANCE

7.1 Training

7.1.1 General

All on-site project personnel who work in areas where they may be exposed to site contaminants must be trained as required by OSHA Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial training more than 12 months prior to the start of the project must have completed an eight-hour refresher course within the past 12 months. The FS must have completed an additional eight hours of supervisory training and must have a current first-aid/CPR certificate (See Attachment 2).

7.1.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour HAZWOPER training course:

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site health and safety;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application, and limitations of PPE;
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment on site;
- Medical surveillance requirements;
- Recognition of symptoms and signs which might indicate overexposure to hazards;
- Worker right-to-know (Hazard Communication OSHA 1910.1200);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a health and safety program and a site-specific HASP;
- Decontamination practices for personnel and equipment;
- · Confined-space entry procedures; and
- General emergency response procedures.

7.1.3 Supervisor Course

Management and supervisors must receive an additional eight hours of training, which typically includes:

- · General site safety and health procedures;
- PPE programs; and
- Air monitoring techniques.

7.1.4 Site-Specific Training

Site-specific training will be accomplished by on-site personnel reading this HASP, and through a thorough site briefing by the PM, FS, or SSO on the contents of this HASP before work begins. The review must include a discussion of the chemical, physical, and biological hazards; the protective equipment and safety procedures; and emergency procedures.

7.1.5 Daily Safety Meetings

Daily safety meetings will be held to cover the work to be accomplished, the hazards anticipated, the PPE and procedures required to minimize site hazards, and emergency procedures. The FS or SSO should present these meetings prior to beginning the day's fieldwork. No work will be performed in an EZ before a daily safety meeting has been held. An additional safety meeting must also be held prior to new tasks, or if new hazards are encountered. The daily safety meetings will be logged in the field notebook.

7.1.6 First Aid and CPR

At least one employee current in first aid/CPR will be assigned to the work crew and will be on the site during operations. Site records will document the presence of this individual. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

7.2 Medical Surveillance

7.2.1 Medical Examination

All personnel who are potentially exposed to site contaminants must participate in a medical surveillance program as defined by OSHA at 29 CFR 1910.120 (f).

7.2.2 Pre-placement Medical Examination

All potentially exposed personnel must have completed a comprehensive medical examination prior to assignment, and periodically thereafter as defined by applicable regulations. The pre-placement and periodic medical examinations typically include the following elements:

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;
- Chest X-ray, at a frequency determined by the physician;
- Pulmonary function test;
- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations, confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the

requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

7.2.3 Other Medical Examinations

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the SSO, HSM, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials.

7.2.4 Periodic Exam

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be 24 months.

7.2.5 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the SSO. The terms of the restriction will be discussed with the employee and the supervisor.

8.0 GENERAL SAFETY PRACTICES

8.1 General Safety Rules

General safety rules for site activities include, but are not limited to, the following:

- At least one copy of this HASP must be in a location at the site that is readily available to personnel, and all project personnel shall review the plan prior to starting work.
- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required and stop work and replace damaged PPE immediately.
- Secure disposable coveralls, boots, and gloves at the wrists and legs and ensure closure of the suit around the neck.
- Upon skin contact with materials that may be impacted by COCs, remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by COCs must be reported to the FS or SSO immediately. If needed, medical attention should be sought.
- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by COCs, such as standing water, mud, or discolored soil. Equipment must be stored on elevated or protected surfaces to reduce the potential for incidental contamination.

- Remove PPE as required in the CRZ to limit the spread of COC-containing materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Removing soil containing site COCs from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited.
- Inspect all non-disposable PPE for contamination in the CRZ. Any PPE found to be contaminated must be decontaminated or disposed of appropriately.
- Recognize emergency signals used for evacuation, injury, fire, etc.
- Report all injuries, illnesses, and unsafe conditions or work practices to the FS or SSO.
- Use the "buddy system" during all operations requiring Level C PPE, and when appropriate, during Modified Level D operations.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.
- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and in accordance with the manufacturer's directions.
- Personnel are to perform only tasks for which they have been properly trained and will advise their supervisor if they have been assigned a task for which they are not trained.
- The presence or consumption of alcoholic beverages or illicit drugs during the workday, including breaks, is strictly prohibited. Notify your supervisor if you must take prescription or over-the-counter drugs that indicate they may cause drowsiness or, that you should not operate heavy equipment.
- Remain upwind during site activities whenever possible.

8.2 Buddy System

On-site personnel must use the buddy system as required by operations. Use of the "buddy system" is required during all operations requiring Level C to Level A PPE, and when appropriate, during Level D operations. Crewmembers must observe each other for signs of chemical exposure, and heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Crewmembers must also be aware of the potential exposure to possible safety hazards, unsafe acts, or non-compliance with safety procedures.

Field personnel must inform their partners or fellow crewmembers of non-visible effects of exposure to toxic materials that they may be experiencing. The symptoms of such exposure may include, but are not limited to:

- · Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

8.3 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat rashes are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended;

moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

8.4 Heat Stress Safety Precautions

Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described in **Table 4** below.

Table 4 - Work/Rest Schedule

Adjusted Temperature ^b	Work/Rest Regimen Normal Work Ensemble ^c	Work/Rest Regimen Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° - 90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° - 87.5°F (28.1° - 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° - 82.5°F (25.3° - 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° - 77.5°F (30.8° - 32.2°C)	After each 150 minutes of work	After each 120 minutes of work

a. For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)

- b. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
- c. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
- d. The information presented above was generated using the information provided in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Handbook.

In order to determine if the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- On-site drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek-type garments.

All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

8.5 Cold Stress

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at 18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in **Table 5** below.

Table 5 – Wind Chill Temperature Chart

	Actua	l Tempe	rature F	Reading (°F)							
Estimated Wind	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
Speed (in mph)												
	Equiv	alent Ch	ill Temp	perature ((°F)							
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds	LITTLE DANGER INCREASING DANGER GREAT DANGER											
greater than 40	Maximum danger of false			Dang	Danger from freezing of		Flesh may freeze within 30					
mph have little	sense of security.			exposed flesh within seconds.								
additional effect.)	one minute.											
	Trench foot and immersion foot may occur at any point on this chart.											

[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents)].

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- Frost Nip or Incipient Frostbite characterized by sudden blanching or whitening of skin.
- Superficial Frostbite skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep Frostbite tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

8.6 Safety Precautions for Cold Stress Prevention

For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.

At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.

If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must ensure that their clothing is not wet as a consequence of sweating. Wet field personnel must change into dry clothes prior to entering the cold area.

If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.

Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

8.7 Safe Work Practices

Direct contact between bare skin and cold surfaces (< 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.

For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed.

Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing. Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

8.8 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, spiders, and other pests.

8.8.1 Tick Borne Diseases

Lyme Disease - The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

Erlichiosis - The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever (RMSF) - This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (Rickettsia rickettsii) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but if identified and treated promptly, death is uncommon.

Control - Tick repellant containing diethyltoluamide (DEET) should be used when working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

8.8.2 Poisonous Plants

Poisonous plants may be present in the work area. Personnel should be alerted to its presence and instructed on methods to prevent exposure.

Control - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water and observed for signs of reddening.

8.8.3 Snakes

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from

local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control - To minimize the threat of snakebites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes, and the need to avoid actions potentiating encounters, such as turning over logs, etc. If a snakebite occurs, an attempt should be made to safely identify the snake via size and markings. The victim must be transported to the nearest hospital within 30 minutes; first aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom.

8.8.4 Spiders

Personnel may encounter spiders during work activities.

Two spiders are of concern, the black widow and the brown recluse. Both prefer dark sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris. The black widow is shiny black, approximately one inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widows body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States. The brown recluse has a distinctive violin shape on the top of its body. The bite of the brown recluse is painful and the bite site ulcerates and takes many weeks to heal completely.

Control - To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs, and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible; first aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

8.9 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on site.

Control - All personnel must wear hearing protection, with a Noise Reduction Rating (NRR) of at least 20, when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 5.2, Noise Monitoring.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

8.10 Spill Control

All personnel must take every precaution to minimize the potential for spills during site operations. All on-site personnel shall immediately report any discharge, no matter how small, to the FS.

Spill control equipment and materials will be located on the site at locations that present the potential for discharge. All sorbent materials used for the cleanup of spills will be containerized and labeled appropriately. In the event of a spill, the FS will follow the provisions in Section 10.0, Emergency Procedures, to contain and control released materials and to prevent their spread to off-site areas.

8.11 Sanitation

Site sanitation will be maintained according to OSHA requirements.

8.11.1 Break Area

Breaks must be taken in the SZ, away from the active work area after site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in any area other than the SZ.

8.11.2 Potable Water

The following rules apply to all field operations:

- An adequate supply of potable water will be provided at each project site. Potable water must be kept away from hazardous materials or media, and contaminated clothing or equipment.
- Portable containers used to dispense drinking water must be capable of being tightly closed and must be equipped with a tap dispenser. Water must not be consumed directly from the container (drinking from the tap is prohibited) nor may it be removed from the container by dipping.
- Containers used for drinking water must be clearly marked and shall not be used for any other purpose.
- Disposable drinking cups must be provided. A sanitary container for dispensing cups and a receptacle for disposing of used cups is required.

8.11.3 Sanitary Facilities

Access to facilities for washing before eating, drinking, or smoking, or alternate methods such as waterless hand-cleaner and paper towels will be provided.

8.11.4 Lavatory

If permanent toilet facilities are not available, an appropriate number of portable chemical toilets will be provided. This requirement does not apply to mobile crews or to normally unattended site locations so long as employees at these locations have transportation immediately available to nearby toilet facilities.

8.12 Emergency Equipment

Adequate emergency equipment for the activities being conducted on site and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 will be on site prior to the commencement of project activities. Personnel will be provided with access to emergency equipment, including, but not limited to, the following:

- Fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 1926;
- Industrial first aid kits of adequate size for the number of personnel on site; and
- Emergency eyewash and/or shower if required by operations being conducted on site.

8.13 Lockout/Tagout Procedures

Only fully qualified and trained personnel will perform maintenance procedures. Before maintenance begins, lockout/tagout procedures per OSHA 29 CFR 1910.147 will be followed.

Lockout is the placement of a device that uses a positive means, such as lock, to hold an energy or material-isolating device such that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system shall be used. Tagout is the placement of a warning tag on an energy or material isolating device indicating that the equipment controls may not be operated until the personnel who attached the tag remove the tag.

8.14 Electrical Safety

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or USCG regulations.
- Portable and semi-portable tools and equipment must be grounded by a multiconductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.

- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- All extension cord outlets must be equipped with ground fault circuit interrupters (GFCI).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

8.15 Lifting Safety

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

8.16 Ladder Safety

When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

Ladders shall be maintained free of oil, grease, and other slipping hazards.

- Ladders shall not be loaded beyond the maximum intended load for which they were built, or beyond their manufacturer's rated capacity.
- Ladders shall be used only for the purpose for which they were designed.
- Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).
- Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.
- Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.
- Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.
- Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces, including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.
- Ladders placed in any location where they can be displaced by workplace activities
 or traffic, such as in passageways, doorways, or driveways, shall be secured to
 prevent accidental displacement, or a barricade shall be used to keep the activities
 or traffic away from the ladder.
- The area around the top and bottom of ladders shall be kept clear.
- The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.
- Ladders shall not be moved, shifted, or extended while occupied.
- Ladders shall have non-conductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment.
- The top, top step, or the step labeled that it or any step above it should not be used as a step.
- Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders shall be inspected by the HSM for visible defects on a daily basis and after any occurrence that could affect their safe use.
- Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; corroded components; or other faulty or defective components shall either be immediately marked in a manner that readily identifies them as defective or be tagged with "Do Not Use" or similar language and shall be withdrawn from service.
- Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; or corroded components; shall be withdrawn from service.
- Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.
- Single-rail ladders shall not be used.
- When ascending or descending a ladder, the user shall face the ladder.

- Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- An employee shall not carry any object or load that could cause the employee to lose balance and fall.

8.17 Traffic Safety

The project site may be located adjacent to a public roadway where exposure to vehicular traffic is likely. Traffic may also be encountered as vehicles enter and exit the area. To minimize the likelihood of project personnel and activities being affected by traffic, the following procedures will be implemented.

Cones must be placed along the shoulder of the roadway starting 100 feet from the work area to alert passing motorists to the presence of personnel and equipment. A "Slow" or "Men Working" sign must be placed at the first cone. Barricades with flashing lights should be placed between the roadway and the work area.

During activities along a roadway, equipment will be aligned parallel to the roadway to the extent feasible, facing into the oncoming traffic so as to place a barrier between the work crew and the oncoming traffic. All crewmembers must remain behind the equipment and the traffic barrier.

All site personnel who are potentially exposed to vehicular traffic must wear an outer layer of orange warning garments, such as vests, jackets, or shirts. If work is performed in hours of dusk or darkness, workers will be outfitted with reflective garments either orange, white (including silver-coated reflective coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.

The flow of traffic into and out of the adjacent business must be assessed, and precautions taken to warn motorists of the presence of workers and equipment. Where possible, vehicles should be aligned to provide physical protection of people and equipment.

9.0 SITE-SPECIFIC HAZARDS AND CONTROL MEASURES

9.1 Evaluation of Hazards

The evaluation of hazards is provided as a quick reference as to the known conditions for the Site, wherein the level of detail for each of the subsections is identified.

9.1.1 Hazard Characteristics

<u>X</u> Detailed	n for Site: Preliminary	None		
Hazardous/Contam X Solid	inated Material Fo X_Liquid	orm(s): Sludge	Gas	<u>X</u> Vapor
Containment Type(: _X_ Drum Pond	s): Tank Lagoon	Pit Other:	Debris	3

	Hazardous Material Characteristics X Volatile Corrosive Ignitable X Toxic	Reactive Radioactive
	Routes of Exposure:XOralXDermal	X Eye X Respiratory
9.1.2	Potential Health and Safety Haza	ords
3.1.2	X Heat X Cold X Confined space entry Oxygen depletion Asphyxiation X Excavation X Cave-ins X Falls, slippage	Congested areas X General Construction X Physical injury X Electrical hazards X Handling and product transfer X Fire X Explosion X Biological Hazards X Plants – Poison Ivy, Poison Oak X Insects – Ticks X Insects – Mosquitoes X Insects – Bees and Wasps
	X Heavy equipment Other: Potential Ignition Haz	X Rats and Mice Non-ionizing Radiation (i.e. UV, IR, etc.)

9.2 Field Activities, Hazards, and Control Procedures

The following task-specific safety analyses identify potential health, safety, and environmental hazards associated with each type of field activity. Because of the complex and changing nature of field projects, supervisors must continually inspect the site to identify hazards that may affect on-site personnel, the community, or the environment. The FS must be aware of these changing conditions and discuss them with the PM whenever these changes impact employee health, safety, the environment, or performance of the project. The FS will keep on-site personnel informed of the changing conditions, and the PM will write and/or approve addenda or revisions to this HASP as necessary.

9.2.1 Mobilization/Construction Stakeout

Description of Tasks

Site mobilization will include establishing drilling locations, determining the location of utilities and other installations, and establishing work areas. Mobilization will also include setting up equipment and establishing a temporary site office. A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ. During this initial phase, project personnel will walk the site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

Hazard Identification

The hazards of this phase of activity are associated with heavy equipment operation, manual materials handling, installation of temporary on-site facilities, and manual site preparation.

Manual materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Installation of temporary field office and support facilities may expose personnel to electrical hazards, underground and overhead utilities, and physical injury due to the manual lifting and moving of materials. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat- or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Controls

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

9.2.2 Demolition/Site Clearing

Description of Tasks

Site clearance will involve manual or mechanical removal of objects impeding access to the construction footprint. These obstructions are both natural and man-made items and will include, but not be limited to, fabricated metal and concrete structures, trees, vegetation, rubble, and miscellaneous trash/debris.

Hazard Identification

Hazards associated with demolition and site clearance include personnel working in and around potentially unstable structures, or locations of potential contact with hazardous chemicals, utilities, and/or falling objects. This task will involve manual, as well as mechanical demolition/clearance efforts so exertion and equipment hazards exist.

Controls

PPE – Personnel shall be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.

Preparatory Operations – Prior to permitting employees to start demolition operations, an engineering survey shall be made, by a licensed Professional Engineer, of the structure to determine the stability of the structure. Any adjacent structure shall where personnel may be exposed shall also be similarly checked. The PO shall have in writing evidence that such a survey has been performed. All structural instabilities shall be shored or braced, under the supervision of a licensed Professional Engineer, prior to access by an FP.

Utilities – All electric, gas, water, steam, sewer, and other service lines shall be shut off, caped, or otherwise controlled, outside the building line before demolition work is started.

In each case, any utility company that is involved shall be notified in advance. If it is necessary to maintain any power, water or other utilities during demolition, such lines shall be temporarily relocated, as necessary.

Hazardous Substances – It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

Falling Debris/Objects – No material shall be dropped to any point lying outside the exterior walls of the structure unless the area is effective protected. Access to the area where falling objects/debris may be encountered must be gated and controlled.

Structural Collapse – Structural or load supporting members on any floor shall not be cut or removed until all stories above such a floor have been demolished and removed. Walls, which are to serve as retaining walls against which debris will be piled, shall not be so used unless capable of safely supporting the imposed load. Mechanical equipment shall not be used on floors or working surfaces unless such floors or surfaces are not of sufficient strength to support the imposed load.

Rollover Guards – All equipment used in site clearing operations shall be equipped with rollover guards meeting the applicable requirements. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the applicable requirements.

Inspections – During demolition, continuing inspections by a licensed Professional Engineer shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, walls, or loosened material. No FP shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

9.2.3 Drilling and Cut/Fill Operations

9.2.3.1 Drilling

Description of Tasks

This task includes the drilling and installing monitoring wells.

Hazard Identification

The hazards of this activity are associated with heavy equipment operation, subsurface intrusion, manual materials handling, stockpiling, and disposal. Subsurface intrusion presents hazards associated with negotiating buried utilities, cave-ins of the excavated areas, and regress methods for personnel working inside the excavated areas. Disruption of contaminated soil also presents a health hazard.

<u>Controls</u>

Underground Utilities – The estimated locations of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during the drilling work, shall be determined prior to drilling. Utility companies or owners shall be contacted ("Call Before You Dig") within

established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual driling.

When drilling operations approach the estimated location of well installations, the exact location of the installations shall be determined by save and acceptable means. While the borehole is open, underground installations shall be protected, supported, or removed, as necessary, to safeguard site personnel.

9.2.3.2 Heavy Equipment Operation

Description of Tasks

Heavy equipment to be used for this task include, but are not limited to, excavators, dozers, dump trucks, and water sprayers (if required).

Hazard Identification

The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and an object gets caught between two moving parts of the equipment. Operation of the heavy construction equipment may produce harmful noise.

Controls

Equipment Inspection – All vehicles in use shall be checked prior to operation to ensure that all parts, equipment, and accessories that affect safe operations are in proper operating condition and free from defects. All defects shall be corrected before the vehicle is placed in service.

Ground Guides – No personnel shall use any motor vehicle, earthmoving, or compacting equipment having an obstructed view to the rear, unless:

- The vehicle has a reverse signal alarm distinguishable from the surrounding noise level; or
- The vehicle is backed up only when an observer signals that it is safe to do so.

Blocking – Heavy machinery, equipment, or parts thereof that are suspended or held aloft shall be substantially blocked to prevent falling or shifting before employees are permitted to work under or between them.

Noise – Control measures for noise are addressed in Section 4.9.

Traffic – Control measures for traffic are addressed in Section 8.17.

9.2.3.3 Disturbance/Handling of Contaminated Material

Description of Tasks

After the drilling operations from below the Site's surface, the material will be stockpiled, dried, and either transported offsite.

Hazard Identification

The hazards associated with materials handling include contact of the contaminated material with project personnel, or cross contamination with other site soil.

Controls

Cross Contamination – Following excavation, soil stockpiles will be placed on a structure constructed to separate the material from the site soil and collect any groundwater leachate. The material shall be covered to prevent storm water erosion or migration of contaminants through storm water.

Air Monitoring – Air and particulate monitoring will be conducted during soil excavation activities to assess the potential for exposure to airborne COCs. If the results of air monitoring indicate the presence of organic vapors or particulates in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. Air monitoring protocols are also presented in the Community Air Monitoring Plan (Appendix F of this RI/IRMWP). A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

Traffic – Control measures for traffic are addressed in Section 8.17.

9.2.4 Drilling/Subsurface Intrusion Activities

Description of Tasks

Site mobilization will include establishing drilling locations, determining the location of utilities and other installations, and establishing work areas. Mobilization will also include setting up equipment and establishing a temporary site office. A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ. During this initial phase, project personnel will walk the site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

Hazard Identification

The primary physical hazards for this activity are associated with the use of well drilling and grouting equipment. The equipment is hydraulically powered and uses static force and dynamic percussion force to advance sampling and penetrating tubes.

Accidents can occur as a result of improperly placing the equipment on uneven or unstable terrain or failing to adequately secure the equipment prior to the start of operations. Overhead utility lines can create hazardous conditions if contacted by the equipment. Underground installations such as electrical lines, conduit, and product lines pose a significant hazard if contacted.

Controls

Geoprobe and Drill Rig Safety Procedures - The operator of the equipment must possess required state or local licenses to perform such work. All members of the crew shall receive site-specific training prior to beginning work.

The operator is responsible for the safe operation of the rig, as well as the crew's adherence to the requirements of this HASP. The operator must ensure that all safety

equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the operator, wear all personal protective equipment, and be aware of all hazards and control procedures. The operator and crew must participate in the Daily Safety Meetings and be aware of all emergency procedures.

Equipment Inspection - Each day, prior to the start of work, the rig and associated equipment must be inspected by the operator. The following items must be inspected:

- Vehicle condition;
- Proper storage of equipment;
- Condition of all hydraulic lines;
- Fire extinguisher; and
- First aid kit.

Equipment Set Up - The drill rig must be properly blocked and leveled prior to raising the derrick. The wheels which remain on the ground must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

All well sites will be inspected by the driller prior to the location of the rig to verify a stable surface exists. This is especially important in areas where soft, unstable terrain is common.

The drill rig must be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur.

When the ground surface is soft or otherwise unstable, wooden blocks, at least 24" by 24" and 4" to 8" thick shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

Rules for Intrusive Activity - Before beginning any intrusive activity, the existence and location of underground pipe, conduit, electrical equipment, and other installations will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. "Call Before You Dig" will verify the potential for encountering subsurface utilities. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line.

Combustible gas readings of the general work area will be made regularly in areas where and/or during operations when the presence of flammable vapors or gases is suspected, such as during intrusive activities (see Section 5.1). Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10% of the LEL in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

Overhead Electrical Clearances - If equipment is operated in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables, can come within the minimum clearances as follows:

Nominal Voltage	System	Minimum Clearance	Required
0-50kV		10 feet	
51-100kV		12 feet	
101-200kV		15 feet	
201-300kV		20 feet	
301-500kV		25 feet	
501-750kV		35 feet	
751-1,000kV		45 feet	

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

Hoisting Operations - Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

Drill pipe, auger strings or casing should be picked up slowly. Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrickman has signaled that he may safely hoist the pipe.

During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor; no one else should be on the rig or derrick.

The brakes on the drawworks of the drill rig should be tested by the driller each day. The brakes should be thoroughly inspected by a competent individual each week.

A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

Workers should never stand near the borehole whenever any wire line device is being run.

Hoisting control stations should be kept clean and controls labeled as to their functions.

Catline Operations - Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline. The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

Personnel should not stand near, step over, or go under a cable or catline which is under tension.

Employees rigging loads on catlines shall:

- Keep out from under the load;
- Keep fingers and feet where they will not be crushed;
- Be sure to signal clearly when the load is being picked;
- Use standard visual signals only and not depend on shouting to coworkers; and
- Make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

Wire Rope - When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or re-socketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

An eye splice made in any wire rope shall have not less that five full tucks.

Wire rope shall not be secured by knots. Wire rope clips shall not be used to splice rope.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

Pipe/Auger Handling - Pipe and auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger or pipe sections without assistance.

Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

Slip handles should be used to lift and move slips. Employees are not permitted to kick slips into position.

When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

Pipe and augers stored in racks, catwalks or on flatbed trucks should be secured to prevent rolling.

9.2.5 Subsurface Chemical Sample Collection/Analysis

Description of Tasks

This sub-task consists of the collection of groundwater samples for subsequent field and laboratory analysis. The physical hazards of groundwater sampling are primarily associated with the sample collection methods, procedures utilized, and the environment itself.

Hazard Identification

Incidental contact with COCs is the primary hazard associated with sampling the stabilized material. This contact may occur through the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. The primary hazards associated with these sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present chemical and physical hazards. The hazards directly associated with sampling procedures are generally limited to strains/sprains and potential eye hazards. Potential chemical hazards may include contact with media containing site COCs and potential contact with chemicals used for equipment decontamination.

Controls

PPE – To control dermal exposure during sampling activities, a minimum of Level D protection will be worn. If necessary, based on field observations and site conditions, air monitoring may be conducted during sediment sampling activities. If the results of air monitoring indicate the presence of airborne contaminants in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. Air monitoring protocols are also presented in the Community Air Monitoring Plan (Appendix F of this RI/IRMWP). A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

9.2.6

9.2.7 Decontamination

All equipment will be decontaminated before leaving the site. Personnel involved in decontamination activities may be inadvertently exposed to skin contact with contaminated materials and chemicals brought from the EZ. Personnel involved in decontamination activities must wear PPE that is, at a minimum, one level below the level worn by personnel working in the EZ.

9.2.8 Demobilization

Demobilization involves the removal of all tools, equipment, supplies, and vehicles brought to the site. The hazards of this phase of activity are associated with heavy equipment operation and manual materials handling.

Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Heavy equipment operation presents noise and vibration hazards, and hot surfaces, to operators. Personnel in the vicinity of heavy equipment operation may be exposed to physical hazards resulting in fractures, contusions, and lacerations and may be exposed to high noise levels. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat-or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

9.3 Chemical Hazards

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site COCs. Concentrations of airborne COCs during site tasks may be measurable and will require air monitoring during certain operations. Air monitoring requirements for site tasks are outlined in Section 5.1. Air monitoring protocols are also presented in the Community Air Monitoring Plan (Appendix F of this RI/IRMWP). COCs at the site include VOCs, SVOCs, metals, and pesticides. The full nature of site contaminants has not yet been determined, as emerging contaminants have not yet been analyzed.

The potential for inhalation of site COCs is low. The potential for dermal contact with soils containing site COCs during remedial operations is moderate. Table 6 lists the primary contaminants that have been identified at the Site and the media in which they are present.

Table 6 – List of Primary Contaminants

Media: Groundwater Maximum **Applicable Monitoring VOCs** Concentration (ug/L) Instrument 740 PID Methyl-Tertiary-Butyl-Ether Maximum **SVOCs** Concentration **Applicable Monitoring** (ug/L) Instrument Benzo(a)anthracene 0.04 Not Applicable Benzo(a)pyrene 0.05 Not Applicable Benzo(b)fluoranthene Not Applicable 0.07 Benzo(k)fluoranthene Not Applicable 0.04 Not Applicable Chrysene 0.07 Not Applicable Indeno(1,2,3-cd)pyrene 0.06 Maximum **Metals** Concentration **Applicable Monitoring** Instrument (ug/L) Arsenic 54.88 Not Applicable Barium 24510 Not Applicable Beryllium 19.52 Not Applicable Cadmium 19.3 Not Applicable Chromium 468.6 Not Applicable 1006 Not Applicable Copper Lead 1162 Not Applicable Mercury 1.97 Not Applicable 5.01 Thallium Not Applicable Maximum **PFAS** Concentration Applicable Monitoring Instrument (ug/L) 57.8 Not Applicable **PFOA PFOS** 78.5 Not Applicable

10.0 EMERGENCY PROCEDURES

10.1 General

Prior to the start of operations, the work area will be evaluated for the potential for fire, contaminant release, or other catastrophic event. Unusual conditions or events, activities, chemicals, and conditions will be reported to the FS/SSO immediately.

The FS/SSO will establish evacuation routes and assembly areas for the site. All personnel entering the site will be informed of this route and the assembly area.

10.2 Emergency Response

If an incident occurs, the following steps will be taken:

- The FS/SSO will evaluate the incident and assess the need for assistance and/or evacuation;
- The FS/SSO will call for outside assistance as needed;
- The FS/SSO will ensure the PM is notified promptly of the incident; and
- The FS/SSO will take appropriate measures to stabilize the incident scene.

10.2.1 Fire

In the case of a fire at the site, the FS/SSO will assess the situation and direct fire-fighting activities. The FS/SSO will ensure that the PM is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that site personnel are unable to safely extinguish with one fire extinguisher, the local fire department will be summoned.

10.2.2 Contaminant Release

In the event of a contaminant release, the following steps will be taken:

- Notify FS/SSO immediately;
- Evacuate immediate area of release:
- Conduct air monitoring to determine needed level of PPE; and
- Don required level of PPE and prepare to implement control procedures.

The FS/SSO has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-site areas.

10.3 Medical Emergency

All employee injuries must be promptly reported to the SSO/FS, who will:

- Ensure that the injured employee receives prompt first aid and medical attention;
- In emergency situations, the worker is to be transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room); and
- If the injured person is a SESI employee, notify SESI at 973-808-9050.

10.3.1 Emergency Care Steps

Survey the scene. Determine if it is safe to proceed. Try to determine if the conditions that caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.

- Do a primary survey of the victim. Check for airway obstruction, breathing, and pulse. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victim's condition, and help being given.
- Maintain airway and perform rescue breathing as necessary.
- Perform CPR as necessary.

• Do a secondary survey of the victim. Check vital signs and do a head-to-toe exam.

Treat other conditions as necessary. If the victim can be moved, take him/her to a location away from the work area where EMS can gain access.

10.4 First Aid - General

All persons must report any injury or illness to their immediate supervisor or the FS. Trained personnel will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The FS and SSO must fill out an accident/incident report as soon as emergency conditions no longer exist and first aid and/or medical treatment has been ensured. The report must be completed and submitted to the PM within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured person(s) should be transported to the medical facility. If the injured person is not ambulatory or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

10.4.1 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Section 4, General Site Safety Procedures, will be removed from the work area and transported to the designated medical facility for examination and treatment.

10.4.2 First Aid - Ingestion

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for treatment information. If the victim is unconscious, keep them on their side and clear the airway if vomiting occurs.

10.4.3 First Aid - Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the CRZ, to the wash area. Personnel will remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The worker should be transported to the medical facility if he/she shows any sign of skin reddening, irritation, or if he/she requests a medical examination.

10.4.4 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the EZ, must immediately proceed to the eyewash station in the CRZ. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

10.5 Reporting Injuries, Illnesses, and Safety Incidents

Injuries and illnesses, however minor, will be reported to the FS immediately. The FS will complete an injury report and submit it to the HSM, and the PM by end of shift.

10.6 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. These agencies are identified in **Table 7** below.

Table 7 – Emergency Contacts

Local Emergency Contacts	Telephone No.
EMERGENCY	911
White Plains Hospital	(914) 681-0600
Police Emergency	911
Fire Emergency	911
Rescue Squad	911
Ambulance	911
Miscellaneous Contacts	Telephone No.
N.Y. Poison Control Center	(800) 222-1222
National Response Center and Terrorist	(800) 424-8802
Hotline	
Center for Disease Control	(800) 311-3435
Utility Mark-Out	(800) 962-7962

10.6.1 Directions to Hospital

White Plains Hospital

41 E Post Road, White Plains, NY (914) 681-0600

Head southwest on Hamilton Ave toward Dr.Martin Luther King Jr Blvd 0.2 mi

Turn left onto N Lexington Ave 0.6 mi

Turn left onto Maple Ave 0.1 mi

Turn left
Destination will be on the right

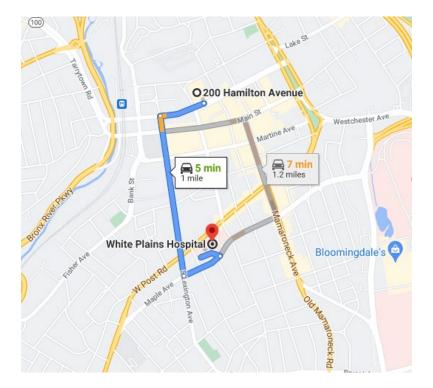


Fig-1: Direction to White Plains Hospital

11.0 LOGS, REPORTS, AND RECORD KEEPING

The following is a summary of required health and safety logs, reports, and record keeping for the operations at the subject site.

11.1 HASP Field Change Request

To be completed for initiating a change to the HASP. PM approval is required. The original will be kept in the project file (See Attachment 3).

11.2 Medical and Training Records

The HSM must obtain and keep a log of personnel meeting appropriate training and medical qualifications for the site work. The log will be kept in the project file. Each company's Human Resources Department will maintain medical records, in accordance with 29 CFR 1910.1020.

11.3 Exposure Records

Any personnel monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR 1910.1020. For SESI employees, the originals will be sent to the Human Resources Manager. For subcontractor employees, the original file will be sent to the subcontractor employer with a copy maintained in the SESI project file.

11.4 Accident/Incident Report

Any accident/incident reports must be completed following procedures given in Section 10.5 of this HASP. The originals will be sent to the HSM for maintenance. A copy of the forms will be kept in the project file. (See Attachment 4)

11.5 OSHA Form 200

An OSHA Form 200 (Log of Occupational Injuries and Illnesses) will be kept at the project site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the Human Resources Manager for maintenance. Subcontractor employees must also meet the requirements of maintaining an OSHA 200 Form. The accident/incident report meets the requirements of the OSHA Form 101 (Supplemental Record), which must be maintained with the OSHA Form 200 for all recordable injuries or illnesses.

11.6 On-Site Health and Safety Field Logbooks

The HSM or designee will maintain an on-site health and safety log book in which daily Site conditions, activities, personnel, and significant events will be recorded. Calibration records and personnel monitoring results, if available, will also be recorded in the field logbook. The original logbook will be kept in the project file.

Whenever any personnel monitoring is conducted onsite, the monitoring results will be noted in the filed logbook. These will become part of the exposure records file and will be maintained by the HSM.

A signatory page is included (See Attachment 5) and is to be signed by those working on and/or visiting the site.

11.7 Material Safety Data Sheets

Material Safety Data Sheets (MSDS) will be obtained and kept on file at the project site for each hazardous chemical brought to, use, or stored at the Site (See Attachment 6).

12.0 COVID-19 RESPONSE ACTION PLAN

SESI is concerned with the safety and well-being of its employees, vendors, subcontractors, and others with access to its offices and job sites, with particular emphasis on the unique challenges posed by COVID-19.

SESI has established the following protocols in keeping with the recommendations of the CDC and other sources including State Governor Executive Orders for work taking place on construction sites.

We request that all SESI employees, vendors, and subcontractors help with our prevention efforts while at work.

In order to minimize the spread of COVID-19, we must all cooperate in doing the following:

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol. Always wash hands that are visibly soiled.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.
- Discourage handshaking, avoid touching your eyes, nose, or mouth with unwashed hands.
- Limit the sharing of tools, machinery, equipment, phones, desks, and computers.
- Wear cloth face coverings on all construction sites.
- Avoid close contact with people who are sick.
- Employees who have symptoms (i.e., fever, cough, or shortness of breath) should notify their supervisor and stay home—DO NOT GO TO WORK.
- Sick employees should follow CDC-recommended steps. Employees should not return to work until the criteria to discontinue home isolation are met, in consultation with healthcare providers and state and local health departments.

The following are the specific jobsite protocols and response actions to be taken in the event someone on site has been in contact with, or has themselves, the COVID-19 virus:

OFFICE/JOBSITE PROTOCOL

- If an employee/worker exhibits COVID-19 symptoms, the employee/worker must remain at home until he or she is symptom free for 72 hours (3 full days) without the use of fever-reducing or other symptom-altering medicines (e.g. acetaminophen, cough suppressants). SESI will similarly require an employee or worker that reports to work with symptoms to return home until they are symptom free for 72 hours (3 full days).
- Limit person to person contact, and when unavoidable, maintain CDC distancing guidelines.

- Avoid eating lunch in groups.
- Avoid in-person meetings if possible. If an in-person meeting is necessary, conduct
 it in a well-ventilated area with enough space for attendees to distance themselves
 from one another. Field jobsite meetings should be conducted in smaller group
 meetings (no more than 5 persons when possible) versus one large meeting.
- Only workers necessary to the execution of the work should be at the jobsites. No non-essential visitors should be permitted at the worksite.

RESPONSE ACTION TRIGGER EVENTS:

- an employee/worker at work has tested positive for COVID-19
- an employee/worker at work has suspected, but unconfirmed, case of COVID-19
- an employee/worker self-reported that they came in contact with someone who had a presumptive positive case of COVID-19
- an employee/worker has been exposed to the virus but only found out after they have interacted with others

RESPONSE ACTIONS:

- Upon occurrence of any of the Trigger Events above, employees/subcontractors shall notify SESI Management about the suspected employee/worker infected with, or exposed to, COVID-19.
- SESI Management will investigate the incident to confirm the report is valid.
- Employees/Subcontractors shall investigate their respective infected employee(s) and report the following to SESI Management and HR:
 - Identify all individuals who worked in proximity (six feet) of the infected employee/worker.
 - Employee(s)/Worker(s) infected with the COVID-19 virus, and employee(s)/worker(s) that came in contact with the infected employee/worker shall be sent home for a period of 14 days.
 - Do not identify the infected employee/worker by name to avoid violation of privacy/confidentiality laws, and,
 - Keep SESI Management informed of progress and updates.
- If an infected person was in the office, SESI will clean and disinfect common areas and surfaces, in accordance with CDC recommendations.
- SESI Management will notify affected employees/workers of the Trigger Event and instruct them to take the response actions above.
- SESI Management policy requires written documentation from a health care professional, that confirmed infected employees can return to work.

Except for circumstances in which SESI is legally required to report workplace occurrences of communicable disease, the confidentiality of all medical conditions will be maintained in accordance with applicable law and to the extent practical under the circumstances. When required, the number of persons who will be informed of an employee's/worker's condition will be kept at the minimum needed to appropriately notify other potentially affected employees/workers of Trigger Events and to attempt to minimize the potential for transmission of the virus.

Attachment 1: Air Monitor Log

Air Monitoring: Sample Collection and Analysis

Date & Time of Monitoring	Task / Operation Being	Substance(s)/ Hazard(s) Being	Monitoring Location	Type/Method of Monitoring	Monitoring Results	Exposure Limits	Required Action

Attachment 2: OSHA Poster

Job Safety and Health It's the law!

OSHA®

Occupational Safety and Health Administration U.S. Department of Labor

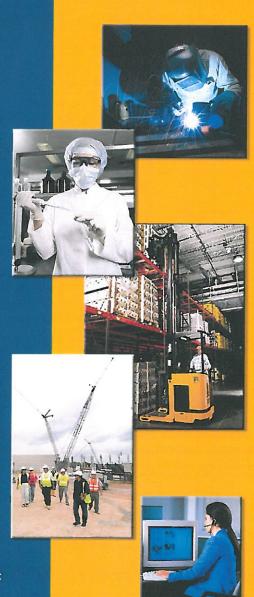
EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the OSH Act.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- · Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the OSH Act that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the OSH Act.

This free poster available from OSHA – The Best Resource for Safety and Health



Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA (6742)

www.osha.gov

OSHA 3166-02 2012R



Attachment 3: Field Change Request Form

HEALTH & SAFETY PLAN CHANGE NOTICE

Pages _____ of ____

Project	:				H&S-CN
1)	HASP VE	RSION:	SECTION:	P	'AGE (s):
	RE:	Addition to Other:	existing HASP existing HASP		sion Date:
					CONT
2)	PROPOSI	ED CHANGE:			
3)	REASON	- Disposition	CHANGE(s): 7 SPEC or Change Order of Deficiency Regulatory or Other Require		CONT
		Operational	Experience		
4)	EXHIBIT	S ATTACHED	NOYES (If YES		CONT
5)	PMK APF		SITE MANAGER:		Date: Date: Date:
	Client App	proval Required:	NO YES (If Y	TES, date submitted)	
6)	_		APPROVED		REJECTED
					CONT.
	Client Rep	resentative:			Date:
7)	DISTRIB	UTION AFTER AP	PROVAL		
	$\overline{\underline{X}}$	IASP UPDATE LIS CLIENT PROJECT FILES	TOTHER:		
8)	PREPARI				Date:

Attachment A: Injury Report Form

OSHA's Form 301 Injury and Illness Incident Report

occupational safety and health purposes. possible while the information is being used for protects the confidentiality of employees to the extent employee health and must be used in a manner that Attention: This form contains information relating to



U.S. Department of Labor Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

accompanying Summary, these forms help the and severity of work-related incidents. employer and OSHA develop a picture of the extent the Log of Work-Related Injuries and Illnesses and the related injury or illness has occurred. Together with first forms you must fill out when a recordable work-This Injury and Illness Incident Report is one of the

substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form. insurance, or other reports may be acceptable equivalent. Some state workers' compensation, illness has occurred, you must fill out this form or an information that a recordable work-related injury or Within 7 calendar days after you receive

this form on file for 5 years following the year to which it pertains 1904, OSHA's recordkeeping rule, you must keep According to Public Law 91-596 and 29 CFR

may photocopy and use as many as you need. If you need additional copies of this form, you

Information about the employee	Information about the case
I) Full name	10) Case number from the Log (Fransfer the case number from the Log after you record the case.)
2) Street	
CityState ZIP	
	Transform Control in think control in the control i
3) Date of birth /	14) What was the employee doing just before the incident occurred? Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. Examples: "climbing a ladder while
5) Male	carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."
Information about the physician or other health care professional	15) What happened? Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."
6) Name of physician or other health care professional	
7) If treatment was given away from the worksite, where was it given?	16) What was the injury or illness? Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." Examples: "strained back"; "chemical burn, hand"; "carpal
, , , , , , , , , , , , , , , , , , , ,	
City State ZIP	
employee treated in an emergency room?	17) What object or substance directly harmed the employee? Examples: "concrete floor", "chlorine", "radial arm saw." If this question does not apply to the incident, leave it blank.
☐ No in	
 9) Was employee hospitalized overnight as an in-patient? I Yes I Yes 	
	18) If the employee died, when did death occur? Date of death

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspects of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Phone (

Date

Completed by

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20

U.S. Department of Labor Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond lirst aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or icioensed health care professional. You must also record work-related injuries and illnesses that maet any of the specific recording criteria listed in 29 CFR Part 1904. B through 1904.12. Feel free to use two litres for a single case if you need to. You must complete an Injury and Illness incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

use two lines for a single case if you need to. You must complete an Injury and Illness Inc. form If you're not sure whether a case is recognished call your local OSHA office for hole.	You must complete an Injury	and Illness Incident Report (OSHA Fo	use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form if you're not sure whether a case is recordable, call you're hold form in you're not sure whether a case is recordable, call you're hold form.	d on this				Establishment name	And County
Identify the person	Desc	Describe the case		Class	Classify the case			ort	Chair
(A) (B) Case Employee's name	_	njury	(F) Describe injury or illness, parts of body affected,	CHECK OF based on that case:	ONLY ONE	CHECK ONLY ONE box for each case based on the most serious outcome for that case:	h case come for	Enter the number of days the injured or ill worker was:	Check the "Injury" column on choose one type of illness:
no.	(e.g., Welder) or onset of illness	(e.g., Loading dock north end)	and object/substance that directly injured or made person ill (e.g., Second degree burns on			Remain	Remained at Work		rder ry
			right forearm from acetylene torch)	Death	Days away from work	Job transfer or restriction	Other recordable cases	Away On job from transfer or work restriction	Injury Skin disor Respirator condition Poisoning Hearing to
				(G)	Ξ	9	(7)		(2) (3) (4) (5)
	month day							days days	
	month/day							days days	
	month/day							days days	
	month/day							days days	
	/ month/day							daysdays	
	month/day							days days	
	month/day							days days	
	month day							days days	
	month/day							daysdays	
	month/day							days days	0 0 0 0 0
	/ month/day							daysdays	00000
	month, day							daysdays	0 0 0 0 0
	month day							daysdays	0 0 1 0 0
			Page totals						
Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently reliaf OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical about these estimates or any other aspects of this data collection,	tion is estimated to average 14 mi and complete and review the colle isplays a currently valid OMB con collection, contact: US Departme	nutes per response, including time to review trion of information. Persons are not require trol number. If you have any comments nt of Labor, OSHA Office of Statistical	Be sure to transfer these totals to the Summary page (Form 300A) before you post it.	ese totals to	the Summary ,	bage (Form 30)A) before you post	in.	Injury Skin disorder Respiratory condition Poisoning Hearing loss All other
Analysis, Room N-3614, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.	W, Washington, DC 20210. Do not	send the completed forms to this office.					9	Page of) (3) (4) (

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses



U.S. Department of Labor Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

to verify that the entries are complete and accurate before completing this summary. All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases	ases		
Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
(G)	(H)	(1)	(1)
Number of Days	ays		
Total number of days away from work		Total number of days of job transfer or restriction	
8	I	(L)	
Injury and Illness Types	ness Types		
Total number of (M) (1) Injuries		(4) Poisonings	
(2) Skin disorders(3) Respiratory conditions	ons	(5) Hearing loss (6) All other illnesses	

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information	1 miorination
Your establishment name Street	same
City	State ZIP
Industry description	Industry description (e.g., Manufacture of motor truck trailers)
Standard Industrial C	Standard Industrial Classification (SIC), if known (e.g., 3715)
OR	
North American Ind	North American Industrial Classification (NAICS), if known (e.g., 336212)
Employment information (If: Worksheet on the back of this page to estimate.)	Employment information (If you don't have these figures, see the Worksheet on the back of this page to estimate.)
Annual average number of employees	ber of employees
fotal hours worked b	Total hours worked by all employees last year
Sign here	
nowingly falsify	Knowingly falsifying this document may result in a fine.
certify that I have nowledge the entr	I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.
Company executive	Title

Attachment 5: Signatory Page

Attachment 5 – Site-Specific Health and Safety Orientation Signatory Page HEALTH AND SAFETY PLAN

Title	Name	Signature
Project Manager:	TBD	
Health and Safety Manager:	TBD	

I have read the attached Health and Safety Plan (HASP) and have received site-specific information and orientation regarding the identified physical, chemical, and biological hazards anticipated at this site. My signature certifies that I understand the procedures, equipment, and restrictions applicable to this project site and agree to abide by them.

Signature	Printed Name	Company	Date

Attachment 5– Health and Safety Orientation Signatory Page (continued)

Signature	Printed Name	Company	Date
	Health and Safety Orientatio	n Cimpotomy Dog-	

Health and Safety Orientation Signatory Page (2 of 2)

Attachment 6: Safety Data Sheets

SAFETY DATA SHEET

Version 4.13 Revision Date 09/12/2018 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657 Brand : Aldrich

Index-No. : 033-001-00-X

CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302 Acute toxicity, Inhalation (Category 3), H331 Carcinogenicity (Category 1B), H350 Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H302 Harmful if swallowed.
H331 Toxic if inhaled.
H350 May cause cancer.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product. P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.

Rinse mouth.

P304 + P340 + P311 IF INHALED: Remove person to fresh air and keep comfortable for

breathing. Call a POISON CENTER/doctor.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage.

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : As

 Molecular weight
 : 74.92 g/mol

 CAS-No.
 : 7440-38-2

 EC-No.
 : 231-148-6

 Index-No.
 : 033-001-00-X

Hazardous components

Component	Classification	Concentration
Arsenic		
	Acute Tox. 4; Acute Tox. 3;	90 - 100 %
	Carc. 1B; Aquatic Acute 1;	
	Aquatic Chronic 1; H302,	
	H331, H350, H410	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Components with workplace control parameters									
Component	CAS-No.	Value	Control	Basis					
			parameters						
Arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values					
				(TLV)					
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices							
		(see BEI® section)							
		numan carcinoger	1						

С	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
Potentia See Ap	ogen	
15 minu		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological	Basis	
				specimen		
	-	inorganic	35µg As/l	Urine	ACGIH - Biological	
		arsenic plus			Exposure Indices	
		methylated			(BEI)	
		metabolites				
	Remarks	End of the workweek (After four or five consecutive working days				
		with exposure)				

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Aldrich - 202657 Page 4 of 8

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder

Colour: light grey, black

b) Odourc) Odour Thresholdd) pHNo data availableNo data available

e) Melting point/freezing

point

Melting point/range: 817 °C (1,503 °F) - lit.

f) Initial boiling point and

boiling range

613 °C (1,135 °F) - lit.

g) Flash point Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available

j) Upper/lower flammability or explosive limits No data available

k) Vapour pressure No data availablel) Vapour density No data available

m) Relative density 5.727 g/mL at 25 °C (77 °F)

n) Water solubility No data availableo) Partition coefficient: n- No data available

octanol/water

Auto-ignition temperature

No data available

q) Decomposition No data available temperature

r) Viscosity No data available
 s) Explosive properties No data available
 t) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Heat Exposure to air may affect product quality.

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Arsenic oxides Other decomposition products - No data available

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11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - 763 mg/kg

Remarks: Behavioral: Ataxia. Diarrhoea

LD50 Oral - Mouse - 145 mg/kg

Remarks: Behavioral: Ataxia. Diarrhoea

Inhalation: No data available Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity Carcinogenicity

No data available

IARC: 1 - Group 1: Carcinogenic to humans (Arsenic)

NTP: Known - Known to be human carcinogen (Arsenic) OSHA:

OSHA specifically regulated carcinogen (Arsenic)

Reproductive toxicity

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: CG0525000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 9.9 mg/l - 96.0 h

Toxicity to daphnia and EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

other aquatic invertebrates

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

Aldrich - 202657 Page 6 of 8

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1558 Class: 6.1 Packing group: II

Proper shipping name: Arsenic

Reportable Quantity (RQ): 1 lbsReportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A

Proper shipping name: ARSENIC

Marine pollutant:yes

IATA

UN number: 1558 Class: 6.1 Packing group: II

Proper shipping name: Arsenic

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No. Revision Date
Arsenic 7440-38-2 2015-11-23

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Reportable Quantity D004 lbs

Massachusetts Right To Know Components

Arsenic CAS-No. Revision Date 7440-38-2 2015-11-23

Pennsylvania Right To Know Components

CAS-No. Revision Date 7440-38-2 2015-11-23

Arsenic CAS-No. Revision Date 7440-38-2 2015-11-23

New Jersey Right To Know Components

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CAS-No. Revision Date Arsenic 7440-38-2 2015-11-23

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. CAS-No. Revision Date 2007-09-28

Arsenic

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity

Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity

Carc. Carcinogenicity
H302 Harmful if swallowed.
H331 Toxic if inhaled.
H350 May cause cancer.
H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 4.13 Revision Date: 09/12/2018 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 6.1 Revision Date 05/28/2017 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Barium

Product Number : 474711 Brand : Aldrich

CAS-No. : 7440-39-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H261 In contact with water releases flammable gases.

Precautionary statement(s)

P223 Do not allow contact with water.

P231 + P232 Handle under inert gas. Protect from moisture.

P280 Wear protective gloves/ eye protection/ face protection.

P335 + P334 Brush off loose particles from skin. Immerse in cool water/ wrap in wet

bandages.

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to

extinguish.

P402 + P404 Store in a dry place. Store in a closed container.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Ba

Molecular weight : 137.33 g/mol CAS-No. : 7440-39-3 EC-No. : 231-149-1

Hazardous components

Component	Classification	Concentration
Barium		
	Water-react. 2; H261	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Dry powder

5.2 Special hazards arising from the substance or mixture

Barium oxide

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

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For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wetbrushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Never allow product to get in contact with water during storage.

Store under inert gas.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control	Basis	
			parameters		
Barium	7440-39-3	TWA	0.500000	USA. ACGIH Threshold Limit Values	
			mg/m3	(TLV)	
	Remarks	Eye, skin, &	Gastrointestinal in	ritation	
		Muscular sti	mulation		
		Not classifia	ble as a human ca	arcinogen	
		TWA	0.500000	USA. Occupational Exposure Limits	
			mg/m3	(OSHA) - Table Z-1 Limits for Air	
				Contaminants	
		TWA	0.500000	USA. ACGIH Threshold Limit Values	
			mg/m3	(TLV)	
		Eye irritation)		
		Muscular sti			
		Skin irritation	n		
		Gastrointest	inal irritation		
		Not classifia	ble as a human ca	arcinogen	
		TWA	0.500000	USA. NIOSH Recommended	
			mg/m3	Exposure Limits	
		TWA	0.5 mg/m3	USA. Occupational Exposure Limits	
				(OSHA) - Table Z-1 Limits for Air	
				Contaminants	
		TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values	
				(TLV)	
		Eye irritation			
		Muscular stimulation			
		Skin irritation			
		Gastrointestinal irritation			
		Not classifia	ble as a human ca	arcinogen	

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TWA	0.5 mg/m3	USA. NIOSH Recommended	1
		Exposure Limits	

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: Pieces

Colour: grey

b) Odourc) Odour Thresholdd) pHNo data availableNo data available

e) Melting point/freezing Melting point/range: 725 °C (1337 °F) - lit.

point

f) Initial boiling point and 1,640 °C (2,984 °F) - lit.

boiling range

g) Flash point ()Not applicableh) Evaporation rate No data available

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i) Flammability (solid, gas) No data available

j) Upper/lower No data available flammability or

explosive limits

k) Vapour pressure No data availablel) Vapour density No data available

m) Relative density 3.6 g/cm3 at 25 °C (77 °F)

n) Water solubility No data available
o) Partition coefficient: n- No data available
octanol/water

p) Auto-ignition No data available temperature

q) Decomposition No data available temperature

r) Viscosity No data available
 s) Explosive properties No data available
 t) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Reacts violently with water.

10.4 Conditions to avoid

Exposure to moisture

10.5 Incompatible materials

Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO2), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Barium oxide

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data availableBarium

Inhalation: No data available(Barium)
Dermal: No data available(Barium)

No data available(Barium)

Skin corrosion/irritation

No data available(Barium)

Serious eye damage/eye irritation

No data available(Barium)

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Respiratory or skin sensitisation

No data available(Barium)

Germ cell mutagenicity

No data available(Barium)

Carcinogenicity

This product is or contains a component that is not classifiable as to its classification. (Barium) (Barium)

(Barium)

Reproductive toxicity

No data available(Barium)

No data available(Barium)

Specific target organ toxicity - single exposure

No data available(Barium)

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available(Barium)

Additional Information

RTECS: CQ8370000

Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.(Barium)

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Barium)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96

h(Barium)

LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96

h(Barium)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Barium)

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1400 Class: 4.3 Packing group: II

Proper shipping name: Barium

Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1400 Class: 4.3 Packing group: II EMS-No: F-G, S-O

Proper shipping name: BARIUM

IATA

UN number: 1400 Class: 4.3 Packing group: II

Proper shipping name: Barium

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313: CAS-No. Revision Date

Barium 7440-39-3 2007-07-01

SARA 311/312 Hazards

Reactivity Hazard

Massachusetts Right To Know Components

 Barium
 CAS-No.
 Revision Date

 2007-07-01
 2007-07-01

Pennsylvania Right To Know Components

CAS-No. Revision Date Barium 7440-39-3 2007-07-01

New Jersey Right To Know Components

CAS-No. Revision Date Barium 7440-39-3 2007-07-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H261 In contact with water releases flammable gases.

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HMIS Rating

Health hazard: 0
Chronic Health Hazard: Flammability: 3
Physical Hazard 1

NFPA Rating

Health hazard: 0
Fire Hazard: 3
Reactivity Hazard: 1
Special hazard.1: W

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 5.8 Revision Date 02/02/2018 Print Date 10/19/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[a]pyrene

Product Number : 48564
Brand : Supelco
Index-No. : 601-032-00-3

CAS-No. : 50-32-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin sensitisation (Category 1), H317

Germ cell mutagenicity (Category 1B), H340

Carcinogenicity (Category 1B), H350

Reproductive toxicity (Category 1B), H360

Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H317 May cause an allergic skin reaction.

H340 May cause genetic defects.

H350 May cause cancer.

H360 May damage fertility or the unborn child.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P272 Contaminated work clothing should not be allowed out of the workplace.

P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.

P363 Wash contaminated clothing before reuse.

P391 Collect spillage. P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 3,4-Benzpyrene

3,4-Benzopyrene Benzo[def]chrysene benzo[pqr]tetraphene

Formula : C₂₀H₁₂

Molecular weight : 252.31 g/mol
CAS-No. : 50-32-8

EC-No. : 200-028-5
Index-No. : 601-032-00-3

Hazardous components

Component	Classification	Concentration
Benzo[a]pyrene		
	Skin Sens. 1; Muta. 1B; Carc.	90 - 100 %
	1B; Repr. 1B; Aquatic Acute 1;	
	Aquatic Chronic 1; H317,	
	H340, H350, H360, H410	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Compensition with weakplace control parameters						
Component	CAS-No.	Value	Control	Basis		
			parameters			
	Remarks	(see BEI® se (PAHs)	ection), see BEI® f	Biological Exposure Index or Indices or Polycyclic Aromatic Hydrocarbons be carefully controlled to levels as low		

		as possible.				
			numan carcinoger	1		
		Cancer		B. J. J. J. B. J.		
		Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible.				
			uman carcinoger			
Benzo[a]pyrene	50-32-8	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants		
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants		
		1910.1002				
				e Z-1), coal tar pitch volatiles include		
		the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard				
			fically regulated of			
		TWA	0.100000	USA. NIOSH Recommended		
		D. G. G. G. J. O.	mg/m3	Exposure Limits		
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal ta				
		products. cyclohexane-extractable fraction See Appendix C See Appendix A				
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants		
		the fused po	olycyclic hydrocarl esidues of coal, pe	e Z-1), coal tar pitch volatiles include bons which volatilize from the etroleum (excluding asphalt), wood, phalt (CAS 8052-42-4, and CAS		
		64742-93-4) standard	is not covered un	nder the 'coal tar pitch volatiles'		
		TWA	fically regulated of	USA. NIOSH Recommended		
		IVVA	0.1 mg/m3	Exposure Limits		
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.				
		cyclohexane-extractable fraction See Appendix C See Appendix A				
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological	Basis	

Supelco - 48564 Page 4 of 9

		S	pecimen	
-	1- Hydroxypyren e	L	Jrine	ACGIH - Biological Exposure Indices (BEI)
Remarks	End of shift at en	nd of workwe	ek	
	1- Hydroxypyren e	L	Jrine	ACGIH - Biological Exposure Indices (BEI)
	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: solid

b) Odour No data available

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No data available Odour Threshold c) d) рΗ No data available

Melting point/freezing e)

point

Melting point/range: 177 - 180 °C (351 - 356 °F)

Initial boiling point and f)

boiling range

495 °C (923 °F)

Flash point No data available No data available h) Evaporation rate Flammability (solid, gas) No data available

Upper/lower flammability or explosive limits No data available

k) Vapour pressure No data available I) No data available Vapour density m) Relative density 1.35 g/cm3

n) Water solubility No data available Partition coefficient: nlog Pow: 5.97

octanol/water

Auto-ignition temperature

No data available

Decomposition temperature

No data available

Viscosity No data available r) No data available s) Explosive properties Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

Conditions to avoid 10.4

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 **Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Supelco - 48564 Page 6 of 9 Inhalation: No data available

Dermal: No data available

LD50 Subcutaneous - Rat - 50 mg/kg

Skin corrosion/irritation

Skin - Mouse

Result: Mild skin irritation

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

Chronic exposure may cause dermatitis.

Germ cell mutagenicity

May alter genetic material.

In vivo tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC: 1 - Group 1: Carcinogenic to humans (Benzo[a]pyrene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benzo[a]pyrene)

OSHA: OSHA specifically regulated carcinogen (Benzo[a]pyrene)

Reproductive toxicity

May cause congenital malformation in the fetus.

Presumed human reproductive toxicant

May cause reproductive disorders.

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and

EC50 - Daphnia magna (Water flea) - 0.25 mg/l - 48 h

other aquatic invertebrates

Toxicity to algae

EC50 - Pseudokirchneriella subcapitata (green algae) - 0.02 mg/l - 72 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation Lepomis macrochirus (Bluegill) - 48 h

- 0.0005 mg/l

Bioconcentration factor (BCF): 3,208

12.4 Mobility in soil

No data available

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12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Benzo[a]pyrene)

Reportable Quantity (RQ): 1 lbs Poison Inhalation Hazard: No

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[a]pyrene)

Marine pollutant:yes

IATA

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[a]pyrene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

 CAS-No.
 Revision Date

 Benzo[a]pyrene
 50-32-8
 2007-03-01

SARA 311/312 Hazards

Acute Health Hazard. Chronic Health Hazard

Massachusetts Right To Know Components

Benzo[a]pyrene CAS-No. Revision Date 50-32-8 2007-03-01

Pennsylvania Right To Know Components

Benzo[a]pyrene CAS-No. Revision Date 50-32-8 2007-03-01

Benzo[a]pyrene CAS-No. Revision Date 50-32-8 2007-03-01

New Jersey Right To Know Components

CAS-No. Revision Date

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Benzo[a]pyrene 50-32-8 2007-03-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. CAS-No. Revision Date 50-32-8 1990-01-01

Benzo[a]pyrene

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity

Carc. Carcinogenicity

H317 May cause an allergic skin reaction.

H340 May cause genetic defects.

H350 May cause cancer.

H360 May damage fertility or the unborn child.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Muta. Germ cell mutagenicity

HMIS Rating

Health hazard: 3
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 3
Fire Hazard: 0
Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 5.8 Revision Date: 02/02/2018 Print Date: 10/19/2018

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SAFETY DATA SHEET

Version 6.1 Revision Date 07/17/2018 Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[<l>b</>|fluoranthene

Product Number : 48490 Brand : Supelco Index-No. : 601-034-00-4

CAS-No. : 205-99-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H350 May cause cancer.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P273 Avoid release to the environment.

P281 Use personal protective equipment as required.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage. P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 3,4-Benzofluoranthene

Formula : C<SB>20</>H<SB>12</>

Molecular weight : 252.31 g/mol CAS-No. : 205-99-2 EC-No. : 205-911-9 Index-No. : 601-034-00-4

Hazardous components

Component	Classification	Concentration
Benz[e]acephenanthrylene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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5.2 Special hazards arising from the substance or mixture

Carbon oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Remarks	Cancer
	Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons
	(PAHs)
	Exposure by all routes should be carefully controlled to levels as low as possible.
	Suspected human carcinogen

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benz[e]acephenant hrylene	205-99-2	1- Hydroxypyren e		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

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8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: solid

b) Odourc) Odour Thresholdd) pHNo data availableNo data available

e) Melting point/freezing Melting point/range: 163 - 165 °C (325 - 329 °F) - lit.

point

f) Initial boiling point and No data available

boiling range

g) Flash point No data available
h) Evaporation rate No data available

i) Flammability (solid, gas) No data available

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j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
0)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

TDLo Oral - Mouse - 7.57 mg/kg

Remarks: Liver:Changes in liver weight. Endocrine:Changes in thymus weight.

Inhalation: No data available Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

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Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[e]acephenanthrylene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[e]acephenanthrylene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

Reproductive toxicity

No data available No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic lmmobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h(Benz[e]acephenanthrylene)

invertebrates

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Benz[e]acephenanthrylene)

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life.

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13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

Not dangerous goods

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

(Benz[e]acephenanthrylene)

Marine pollutant : yes

IATA

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[e]acephenanthrylene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No. Revision Date

Benz[e]acephenanthrylene 205-99-2 2007-03-01

SARA 311/312 Hazards

Chronic Health Hazard

Massachusetts Right To Know Components

Benz[e]acephenanthrylene CAS-No. Revision Date 205-99-2 2007-03-01

Pennsylvania Right To Know Components

Benz[e]acephenanthrylene CAS-No. Revision Date 205-99-2 2007-03-01

California Prop. 65 Components

, which is/are known to the State of California to cause cancer. CAS-No. Revision Date For more information go to www.P65Warnings.ca.gov. 205-99-2 2007-09-28

Benz[e]acephenanthrylene

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350 May cause cancer.

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H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

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SAFETY DATA SHEET

Version 6.1 Revision Date 07/16/2018 Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[<l>k</>]fluoranthene

Product Number : 48492 Brand : Supelco Index-No. : 601-036-00-5

CAS-No. : 207-08-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H350 May cause cancer.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P273 Avoid release to the environment.

P281 Use personal protective equipment as required.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage. P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : C<SB>20</>H<SB>12</>

Molecular weight : 252.31 g/mol CAS-No. : 207-08-9 EC-No. : 205-916-6 Index-No. : 601-036-00-5

Hazardous components

Component	Classification	Concentration
Benzo[k]fluoranthene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Supelco- 48492 Page 2 of 8

5.2 Special hazards arising from the substance or mixture

Carbon oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Biological occupational exposure limits

Zielegieur eeeupunenar expecure minic					
Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzo[k]fluoranthen e	207-08-9	1- Hydroxypyren e		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Supelco- 48492 Page 3 of 8

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber Minimum laver thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Form: crystalline a) Appearance

Colour: yellow

b) Odour No data available Odour Threshold No data available d) На No data available

Melting point/freezing

point

Melting point/range: 215 - 217 °C (419 - 423 °F) - lit.

Initial boiling point and

boiling range

No data available

Flash point No data available

h) Evaporation rate No data available Flammability (solid, gas) No data available

Upper/lower

flammability or explosive limits No data available

No data available Vapour pressure No data available Vapour density

Supelco- 48492 Page 4 of 8 m) Relative density No data available Water solubility No data available Partition coefficient: n-No data available octanol/water

Auto-ignition temperature

No data available

q) Decomposition temperature

No data available

Viscosity No data available r) **Explosive properties** No data available s) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 **Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

Carcinogenicity- Rat- Implant

Supelco- 48492 Page 5 of 8 This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benzo[k]fluoranthene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benzo[k]fluoranthene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

Reproductive toxicity

No data available No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: DF6350000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Benzo[k]fluoranthene)

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

Supelco- 48492

Reportable Quantity (RQ) 5000 lbs

nο

Poison Inhalation Hazard: No

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A. S-F

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[k]fluoranthene)

Marine pollutant : yes

IATA

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzo[k]fluoranthene	207-08-9	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[k]fluoranthene	207-08-9	1994-04-01

California Prop. 65 Components

, which is/are known to the State of California to cause cancer.	CAS-No.	Revision Date
For more information go to www.P65Warnings.ca.gov.	207-08-9	2007-09-28
Renzo[k]fluoranthene		

Benzolkjiluorantnene

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350 May cause cancer. H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.1 Revision Date: 07/16/2018 Print Date: 01/21/2019

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SAFETY DATA SHEET

Version 6.1 Revision Date 07/17/2018 Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benz[a]anthracene

Product Number : 48563 Brand : Supelco Index-No. : 601-033-00-9

CAS-No. : 56-55-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H350 May cause cancer.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P273 Avoid release to the environment.

P281 Use personal protective equipment as required.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage. P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 1,2-Benzanthracene

Tetraphene

Formula : C<SB>18</>H<SB>12</>

 Molecular weight
 : 228.29 g/mol

 CAS-No.
 : 56-55-3

 EC-No.
 : 200-280-6

 Index-No.
 : 601-033-00-9

Hazardous components

Component	Classification	Concentration
Benz[a]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

Supelco- 48563 Page 2 of 8

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact Material: Nitrile rubber

Minimum laver thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Form: solid a) Appearance

b) Odour No data available Odour Threshold No data available c) d) pН No data available

Melting point/freezing Melting point/range: 157 - 159 °C (315 - 318 °F)

Initial boiling point and 437.6 °C (819.7 °F)

boiling range

point

No data available Flash point h) Evaporation rate No data available Flammability (solid, gas) No data available Upper/lower

flammability or explosive limits No data available

k) Vapour pressure No data available Vapour density No data available m) Relative density No data available

Supelco- 48563 Page 4 of 8 n) Water solubilityNo data availableo) Partition coefficient: n-No data available

octanol/water

No data available

q) Decomposition temperature

Explosive properties

Auto-ignition

temperature

No data available

No data available

r) Viscosity No data available

t) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

s)

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available Dermal: No data available

LD50 Intravenous - Rat - > 200 mg/kg

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

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IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

No component of this product present at levels greater than or egual to 0.1% is on OSHA's

list of regulated carcinogens.

Reproductive toxicity

No data available No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Benz[a]anthracene)

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

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14. TRANSPORT INFORMATION

DOT (US)

Not dangerous goods

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)

Marine pollutant : yes

IATA

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Chronic Health Hazard

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24
Pennsylvania Right To Know Components		
	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24
	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24
New Jersey Right To Know Components		
	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24
California Prop. 65 Components		
WARNING! This product contains a chemical known to the	CAS-No.	Revision Date
State of California to cause cancer.	56-55-3	2007-09-28
Benz[a]anthracene		
WARNING! This product contains a chemical known to the	CAS-No.	Revision Date
State of California to cause cancer.	56-55-3	2007-09-28
Benz[a]anthracene		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350 May cause cancer. H400 Very toxic to aquatic life.

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H410 Very toxic to aquatic life with long lasting effects.

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

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SAFETY DATA SHEET

Version 4.8 Revision Date 01/11/2018 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Beryllium

Product Number : 378135 Brand : Aldrich

CAS-No. : 7440-41-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301

Acute toxicity, Inhalation (Category 2), H330

Skin irritation (Category 2), H315 Eye irritation (Category 2A), H319

Skin sensitisation (Category 1), H317

Carcinogenicity (Category 1B), H350

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

Specific target organ toxicity - repeated exposure (Category 1), H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301 Toxic if swallowed. H315 Causes skin irritation.

H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

H330 Fatal if inhaled.

H335 May cause respiratory irritation.

H350 May cause cancer.

H372 Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.

P272 Contaminated work clothing should not be allowed out of the workplace.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P284 Wear respiratory protection.

P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse

mouth.

P302 + P352 IF ON SKIN: Wash with plenty of soap and water.

P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for

breathing. Immediately call a POISON CENTER/doctor.

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove

contact lenses, if present and easy to do. Continue rinsing. IF exposed or concerned: Get medical advice/ attention. If skin irritation or rash occurs: Get medical advice/ attention.

P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

P308 + P313

Formula : Be

Molecular weight : 9.01 g/mol CAS-No. : 7440-41-7 EC-No. : 231-150-7

Hazardous components

Component	Classification	Concentration
Berylium foil		
	Acute Tox. 3; Acute Tox. 2;	90 - 100 %
	Skin Irrit. 2; Eye Irrit. 2A; Skin	
	Sens. 1; Carc. 1B; STOT SE	
	3; STOT RE 1; H301, H315,	
	H317, H319, H330, H335,	
	H350, H372	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

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In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.

Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control	Basis	
	0,10,110,	1 3.10.0	parameters		
Berylium foil	7440-41-7	TWA	2.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		CEIL	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Peak	25.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		TWA	2.000000microg ram per cubic	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
	Remarks	Z27.29-1970	meter		
	Remarks	CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)	
		Confirmed h	nsitization rllium disease (bery uman carcinogen utaneous absorptio	,	
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits	
		Potential Occ See Append See Table Z		gen	
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970)		
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970)		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970	·		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)	
			eryllium sensitization hronic beryllium disease (berylliosis)		

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•					
	Adopted values or notations enclosed are those for which changes				
	are proposed in the NIC				
See Notic	See Notice of Intended Changes (NIC)				
Confirmed	Confirmed human carcinogen				
Danger of	Danger of cutaneous absorption				
Sensitizer	Sensitizer				
С	0.000500	USA. NIOSH Recommended			
	mg/m3	Exposure Limits			
Potential	Occupational Carcino	ogen			
See Appe					
See Table					
TWA	2microgram per	USA. Occupational Exposure Limits			
	cubic meter	(OSHA) - Table Z-2			
Z27.29-19	Z27.29-1970				
CEIL	5microgram per	USA. Occupational Exposure Limits			
	cubic meter	(OSHA) - Table Z-2			
Z27.29-19	970				
Peak	25microgram	USA. Occupational Exposure Limits			
	per cubic meter	(OSHA) - Table Z-2			
Z27.29-19	970	, , , , , , , , , , , , , , , , , , ,			
С	0.0005 mg/m3	USA. NIOSH Recommended			
		Exposure Limits			
Potential	Occupational Carcino				
See Appe					
PEL	0.0002 mg/m3	California permissible exposure			
		limits for chemical contaminants			
		(Title 8, Article 107)			
С	0.025 mg/m3	California permissible exposure			
	3. 3.	limits for chemical contaminants			
		(Title 8, Article 107)			

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an

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industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder

Colour: grey

Odour odourless b)

Odour Threshold No data available c) No data available d) pН

Melting point/freezing e)

point

Melting point/range: 1,278 °C (2,332 °F) - lit.

Initial boiling point and

boiling range

2.970 °C (5.378 °F) - lit.

Flash point No data available Evaporation rate No data available

Flammability (solid, gas) No data available i)

Upper/lower flammability or explosive limits No data available

Vapour pressure No data available Vapour density No data available

1.85 g/cm3 at 25 °C (77 °F) m) Relative density

n) Water solubility No data available Partition coefficient: n-No data available

octanol/water

p) Auto-ignition No data available temperature

Decomposition No data available temperature

r) Viscosity No data available No data available s) Explosive properties Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

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10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Alkali metals

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Beryllium oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - 0.496 mg/kg

Remarks: Liver: Hepatitis (hepatocellular necrosis), zonal.

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

Hamster Lungs

Result: negative

Carcinogenicity

Carcinogenicity - Rat - Intratracheal

Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Lungs, Thorax, or Respiration:Bronchiogenic carcinoma.

Carcinogenicity - Rabbit - Intravenous

Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Musculoskeletal:Tumors.

Possible human carcinogen

IARC: 1 - Group 1: Carcinogenic to humans (Berylium foil)

NTP: Known - Known to be human carcinogen (Berylium foil)

Known - Known to be human carcinogenThe reference note has been added by TD based on

the background information of the NTP. (Berylium foil)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

Reproductive toxicity

No data available

No data available

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Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: DS1750000

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1567 Class: 6.1 (4.1) Packing group: II

Proper shipping name: Beryllium, powder

Reportable Quantity (RQ): 10 lbs Poison Inhalation Hazard: No

IMDG

UN number: 1567 Class: 6.1 (4.1) Packing group: II EMS-No: F-G, S-G

Proper shipping name: BERYLLIUM POWDER

IATA

UN number: 1567 Class: 6.1 (4.1) Packing group: II

Proper shipping name: Beryllium powder

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

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The following components are subject to reporting levels established by SARA Title III, Section 313:

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

Pennsylvania Right To Know Components

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

New Jersey Right To Know Components

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the CAS-No. Revision Date State of California to cause cancer. 7440-41-7 2008-10-10 Berylium foil

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity
Carc. Carcinogenicity
Eye Irrit. Eye irritation
H301 Toxic if swallowed.
H315 Causes skin irritation.

H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

LICON Fatal if in a last

H330 Fatal if inhaled.

H335 May cause respiratory irritation.

H350 May cause cancer.

H372 Causes damage to organs through prolonged or repeated exposure.

Skin Irrit. Skin irritation
Skin Sens. Skin sensitisation

HMIS Rating

Health hazard: 4
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 4
Fire Hazard: 3
Reactivity Hazard: 3

Further information

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Preparation Information Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Revision Date: 01/11/2018 Print Date: 06/28/2019 Version: 4.8

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SAFETY DATA SHEET

Version 4.8 Revision Date 01/11/2018 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Beryllium

Product Number : 378135 Brand : Aldrich

CAS-No. : 7440-41-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301

Acute toxicity, Inhalation (Category 2), H330

Skin irritation (Category 2), H315 Eye irritation (Category 2A), H319

Skin sensitisation (Category 1), H317

Carcinogenicity (Category 1B), H350

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

Specific target organ toxicity - repeated exposure (Category 1), H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301 Toxic if swallowed. H315 Causes skin irritation.

H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

H330 Fatal if inhaled.

H335 May cause respiratory irritation.

H350 May cause cancer.

H372 Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.

P272 Contaminated work clothing should not be allowed out of the workplace.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P284 Wear respiratory protection.

P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse

mouth.

P302 + P352 IF ON SKIN: Wash with plenty of soap and water.

P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for

breathing. Immediately call a POISON CENTER/doctor.

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove

contact lenses, if present and easy to do. Continue rinsing. IF exposed or concerned: Get medical advice/ attention. If skin irritation or rash occurs: Get medical advice/ attention.

P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

P308 + P313

Formula : Be

Molecular weight : 9.01 g/mol CAS-No. : 7440-41-7 EC-No. : 231-150-7

Hazardous components

Component	Classification	Concentration
Berylium foil		
	Acute Tox. 3; Acute Tox. 2;	90 - 100 %
	Skin Irrit. 2; Eye Irrit. 2A; Skin	
	Sens. 1; Carc. 1B; STOT SE	
	3; STOT RE 1; H301, H315,	
	H317, H319, H330, H335,	
	H350, H372	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

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In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.

Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control	Basis	
	0,10,110,	1 3.10.0	parameters		
Berylium foil	7440-41-7	TWA	2.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		CEIL	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Peak	25.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		TWA	2.000000microg ram per cubic	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
	Remarks	Z27.29-1970	meter		
	Remarks	CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)	
		Confirmed h	nsitization rllium disease (bery uman carcinogen utaneous absorptio	,	
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits	
		Potential Occ See Append See Table Z		gen	
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970)		
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970)		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970	·		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		Z27.29-1970			
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)	
			eryllium sensitization hronic beryllium disease (berylliosis)		

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•					
	Adopted values or notations enclosed are those for which changes				
	are proposed in the NIC				
See Notic	See Notice of Intended Changes (NIC)				
Confirmed	Confirmed human carcinogen				
Danger of	Danger of cutaneous absorption				
Sensitizer	Sensitizer				
С	0.000500	USA. NIOSH Recommended			
	mg/m3	Exposure Limits			
Potential	Occupational Carcino	ogen			
See Appe					
See Table					
TWA	2microgram per	USA. Occupational Exposure Limits			
	cubic meter	(OSHA) - Table Z-2			
Z27.29-19	Z27.29-1970				
CEIL	5microgram per	USA. Occupational Exposure Limits			
	cubic meter	(OSHA) - Table Z-2			
Z27.29-19	970				
Peak	25microgram	USA. Occupational Exposure Limits			
	per cubic meter	(OSHA) - Table Z-2			
Z27.29-19	970	, , , , , , , , , , , , , , , , , , ,			
С	0.0005 mg/m3	USA. NIOSH Recommended			
		Exposure Limits			
Potential	Occupational Carcino				
See Appe					
PEL	0.0002 mg/m3	California permissible exposure			
		limits for chemical contaminants			
		(Title 8, Article 107)			
С	0.025 mg/m3	California permissible exposure			
	3. 3.	limits for chemical contaminants			
		(Title 8, Article 107)			

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an

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industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder

Colour: grey

Odour odourless b)

Odour Threshold No data available c) No data available d) pН

Melting point/freezing e)

point

Melting point/range: 1,278 °C (2,332 °F) - lit.

Initial boiling point and

boiling range

2.970 °C (5.378 °F) - lit.

Flash point No data available Evaporation rate No data available

Flammability (solid, gas) No data available i)

Upper/lower flammability or explosive limits No data available

Vapour pressure No data available Vapour density No data available

1.85 g/cm3 at 25 °C (77 °F) m) Relative density

n) Water solubility No data available Partition coefficient: n-No data available

octanol/water

p) Auto-ignition No data available temperature

Decomposition No data available temperature

r) Viscosity No data available No data available s) Explosive properties Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

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10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Alkali metals

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Beryllium oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - 0.496 mg/kg

Remarks: Liver: Hepatitis (hepatocellular necrosis), zonal.

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

Hamster Lungs

Result: negative

Carcinogenicity

Carcinogenicity - Rat - Intratracheal

Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Lungs, Thorax, or Respiration:Bronchiogenic carcinoma.

Carcinogenicity - Rabbit - Intravenous

Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Musculoskeletal:Tumors.

Possible human carcinogen

IARC: 1 - Group 1: Carcinogenic to humans (Berylium foil)

NTP: Known - Known to be human carcinogen (Berylium foil)

Known - Known to be human carcinogenThe reference note has been added by TD based on

the background information of the NTP. (Berylium foil)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

Reproductive toxicity

No data available

No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: DS1750000

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1567 Class: 6.1 (4.1) Packing group: II

Proper shipping name: Beryllium, powder

Reportable Quantity (RQ): 10 lbs Poison Inhalation Hazard: No

IMDG

UN number: 1567 Class: 6.1 (4.1) Packing group: II EMS-No: F-G, S-G

Proper shipping name: BERYLLIUM POWDER

IATA

UN number: 1567 Class: 6.1 (4.1) Packing group: II

Proper shipping name: Beryllium powder

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

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The following components are subject to reporting levels established by SARA Title III, Section 313:

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

Pennsylvania Right To Know Components

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

New Jersey Right To Know Components

Berylium foil CAS-No. Revision Date 7440-41-7 1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the CAS-No. Revision Date State of California to cause cancer. 7440-41-7 2008-10-10 Berylium foil

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity
Carc. Carcinogenicity
Eye Irrit. Eye irritation
H301 Toxic if swallowed.
H315 Causes skin irritation.

H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

LICON Fatal if in a last

H330 Fatal if inhaled.

H335 May cause respiratory irritation.

H350 May cause cancer.

H372 Causes damage to organs through prolonged or repeated exposure.

Skin Irrit. Skin irritation
Skin Sens. Skin sensitisation

HMIS Rating

Health hazard: 4
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 4
Fire Hazard: 3
Reactivity Hazard: 3

Further information

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Preparation Information Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Revision Date: 01/11/2018 Print Date: 06/28/2019 Version: 4.8

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Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 13-Sep-2013 Revision Date 21-Jul-2015 Revision Number 2

1. Identification

Product Name Chromium

Cat No.: C318-500

Synonyms Chrome

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company Emergency Telephone Number

Fisher Scientific CHEMTREC®, Inside the USA: 800-424-9300
One Reagent Lane CHEMTREC®, Outside the USA: 001-703-527-3887

Fair Lawn, NJ 07410 Tel: (201) 796-7100

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Specific target organ toxicity (single exposure)

Target Organs - Respiratory system.

Category 3

Label Elements

Signal Word

Warning

Hazard Statements

May cause respiratory irritation



Precautionary Statements

Prevention

Avoid breathing dust/fume/gas/mist/vapors/spray Use only outdoors or in a well-ventilated area

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Call a POISON CENTER or doctor/physician if you feel unwell

Storage

Store in a well-ventilated place. Keep container tightly closed

Store locked up

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Very toxic to aquatic life

3. Composition / information on ingredients

Component	CAS-No	Weight %
Chromium	7440-47-3	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects

None reasonably foreseeable.

Notes to Physician

Treat symptomatically

Not applicable

5. Fire-fighting measures

Unsuitable Extinguishing Media Carbon dioxide (CO2)

Flash Point Not applicable

Method - No information available

Autoignition Temperature

Explosion Limits

Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Dust can form an explosive mixture in air. Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products

Chromium oxide

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

<u>NFPA</u>

HealthFlammabilityInstabilityPhysical hazards211N/A

6. Accidental release measures

Personal Precautions Environmental Precautions

Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation. Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for **Up** disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Avoid dust formation. Wear personal protective equipment. Ensure adequate ventilation. Do

not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Store under an inert

atmosphere.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Chromium	TWA: 0.5 mg/m ³	(Vacated) TWA: 1 mg/m ³	IDLH: 250 mg/m ³
	_	TWA: 1 mg/m ³	TWA: 0.5 mg/m ³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Chromium	TWA: 0.5 mg/m ³	TWA: 0.5 mg/m ³	TWA: 0.5 mg/m ³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations

and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by

OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard

EN166.

Skin and body protectionWear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard

EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical StatePowderAppearanceSilverOdorOdorless

Odor ThresholdNo information availablepHNo information availableMelting Point/Range1857.2 °C / 3375 °F

Boiling Point/Range2640 °C / 4784 °FFlash PointNot applicableEvaporation RateNot applicable

Flammability (solid,gas) No information available

Flammability or explosive limits

UpperNo data availableLowerNo data availableVapor PressureNo information available

Vapor Density Not applicable

Relative Density 7.2

Solubility Insoluble in water Partition coefficient; n-octanol/water No data available Autoignition Temperature Not applicable

Decomposition Temperature No information available

Viscosity Not applicable

Molecular Formula Cr Molecular Weight 51.996

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Sensitive to air.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation.

Incompatible Materials Strong oxidizing agents, Strong acids

Hazardous Decomposition Products Chromium oxide

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous ReactionsNone under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic No information available

Products

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation May cause irritation of respiratory tract

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Chromium	7440-47-3	Not listed				

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and No information available

delayed

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for

complete information.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms.

	Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea	
Г	Chromium	Not listed	LC50: 14.3 mg/l/96 H	Not listed	EC50: 0.07 mg/l/48 H	
			(Pimephales promelas)			

Persistence and Degradability Bioaccumulation/ Accumulation

Insoluble in water

No information available.

Mobility

Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3077

Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.

Proper technical name Chromium

Hazard Class 9
Packing Group III

racking Group

TDG Not regulated

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.

Hazard Class 9
Packing Group III

Packing Group IATA

UN-No UN3077

Proper Shipping Name Environmentally hazardous substance, solid, n.o.s

Hazard Class 9
Packing Group III

IMDG/IMO

UN-No UN3077

Proper Shipping Name Environmentally hazardous substance, solid, n.o.s

Hazard Class 9
Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Chromium	Х	Х	-	231-157-5	-		Χ	-	Χ	Χ	Х

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

- F Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
- N Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
- P Indicates a commenced PMN substance
- R Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
- S Indicates a substance that is identified in a proposed or final Significant New Use Rule
- T Indicates a substance that is the subject of a Section 4 test rule under TSCA.
- XU Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
- Y1 Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
- Y2 Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Chromium	7440-47-3	>95	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard Yes
Chronic Health Hazard No
Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Water Act

Component	Component CWA - Hazardous Substances		CWA - Toxic Pollutants	CWA - Priority Pollutants
Chromium	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Chromium	X		-

OSHA Occupational Safety and Health Administration

Not applicable

CERCLA

Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs	
Chromium	5000 lb 10 lb	-	

California Proposition 65

This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island	
Chromium	X	X	X	X	X	

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2B Toxic materials



16. Other information

Prepared By Regulatory Affairs

Thermo Fisher Scientific

Email: EMSDS.RA@thermofisher.com

 Creation Date
 13-Sep-2013

 Revision Date
 21-Jul-2015

 Print Date
 21-Jul-2015

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard

replacing the current legislation under 29 CFR 1910.1200 to align with the Globally

Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 5.5 Revision Date 01/10/2018 Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Chrysene

Product Number : 35754

Brand : Sigma-Aldrich Index-No. : 601-048-00-0

CAS-No. : 218-01-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Germ cell mutagenicity (Category 2), H341 Carcinogenicity (Category 1B), H350 Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H341 Suspected of causing genetic defects.

H350 May cause cancer.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P273 Avoid release to the environment.

P281 Use personal protective equipment as required.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage. P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : C₁₈H₁₂

Molecular weight : 228.29 g/mol
CAS-No. : 218-01-9
EC-No. : 205-923-4
Index-No. : 601-048-00-0

Hazardous components

Component	Classification	Concentration
Chrysene		
	Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, H350, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

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6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis				
	Remarks	Cancer	T P on on the control					
			Substances for which there is a Biological Exposure Index or India					
		,	ection), see BEI® f	or Polycyclic Aromatic Hydrocarbons				
		(PAHs)						
			all routes should b	be carefully controlled to levels as low				
		as possible.		20				
		Confirmed animal carcinogen with unknown relevance to hu						
Chrysene	218-01-9	TWA	0.200000	USA. Occupational Exposure Limits				
			mg/m3	(OSHA) - Table Z-1 Limits for Air				
				Contaminants				
		TWA	0.200000	USA. Occupational Exposure Limits				
			mg/m3	(OSHA) - Table Z-1 Limits for Air				
				Contaminants				
		1910.1002						
				Z-1), coal tar pitch volatiles include				
				ons which volatilize from the				
				roleum (excluding asphalt), wood,				
				nalt (CAS 8052-42-4, and CAS				
			is not covered und	der the 'coal tar pitch volatiles'				
		standard						
		OSHA specifically regulated carcinogen						
		TWA	0.100000	USA. NIOSH Recommended				
		mg/m3 Exposure Limits						
		Potential Oc	cupational Carcino	gen				

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products.	-extractable fractic	tar pitch, and creosote to be coal tar
PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis	
	-	1- Hydroxypyren e		Urine	ACGIH - Biological Exposure Indices (BEI)	
	Remarks	End of shift at end of workweek				

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

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9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance Form: solid

b) Odour No data available Odour Threshold No data available c) рН No data available d)

e) Melting point/freezing

point

Melting point/range: 252 - 254 °C (486 - 489 °F) - lit.

Initial boiling point and f)

boiling range

448 °C (838 °F) - lit.

No data available g) Flash point h) Evaporation rate No data available i) Flammability (solid, gas) No data available i)

Upper/lower flammability or explosive limits No data available

Vapour pressure No data available No data available Vapour density m) Relative density No data available

n) Water solubility Partition coefficient: ninsoluble

octanol/water

log Pow: 5.73

Auto-ignition temperature

No data available

Decomposition temperature

No data available

No data available Viscosity r) **Explosive properties** No data available Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions 10.3

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 **Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

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11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available Dermal: No data available

LD50 Intraperitoneal - Mouse - > 320 mg/kg

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

Laboratory experiments have shown mutagenic effects.

In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Chrysene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: OSHA specifically regulated carcinogen (Chrysene)

Reproductive toxicity

No data available

No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: GC0700000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h other aquatic invertebrates

12.2 Persistence and degradability

No data available

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12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)

Reportable Quantity (RQ): 100 lbs Poison Inhalation Hazard: No

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)

Marine pollutant:yes

IATA

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No. Revision Date Chrysene 218-01-9 1994-04-01

SARA 311/312 Hazards

Chronic Health Hazard

Massachusetts Right To Know Components

CAS-No. Revision Date Chrysene 218-01-9 1994-04-01

Pennsylvania Right To Know Components

Chrysene CAS-No. Revision Date 218-01-9 1994-04-01

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	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01
New Jersey Right To Know Components		
	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01
California Prop. 65 Components		
WARNING! This product contains a chemical known to the	CAS-No.	Revision Date
State of California to cause cancer.	218-01-9	2007-09-28
Chrysene		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity

Carc. Carcinogenicity

H341 Suspected of causing genetic defects.

H350 May cause cancer. H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard: 0
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 0
Fire Hazard: 0
Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 5.5 Revision Date: 01/10/2018 Print Date: 01/21/2019

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SAFETY DATA SHEET

Version 5.6 Revision Date 12/11/2017 Print Date 11/10/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Indeno[1,2,3-cd]pyrene

Product Number : 48499 Brand : Supelco

CAS-No. : 193-39-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 2), H351

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H351 Suspected of causing cancer.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P281 Use personal protective equipment as required.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

Supelco - 48499 Page 1 of 7

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : C₂₂H₁₂

Molecular weight : 276.33 g/mol
CAS-No. : 193-39-5

EC-No. : 205-893-2

Hazardous components

Component	Classification	Concentration
Indeno[1,2,3-cd]pyrene		
	Carc. 2; H351	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

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6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.

Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Hazardous components without workplace control parameters

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Indeno[1,2,3- cd]pyrene	193-39-5	1- Hydroxypyren e (1-HP)		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at	end of worky	week	

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection

Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the

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sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Form: solid Appearance Odour No data available b) Odour Threshold No data available d) рН No data available Melting point/freezing 163.6 °C (326.5 °F) point

f) Initial boiling point and boiling range

536.0 °C (996.8 °F)

Flash point No data available g) h) Evaporation rate No data available Flammability (solid, gas) No data available j)

Upper/lower flammability or explosive limits No data available

k) Vapour pressure No data available Vapour density No data available m) Relative density No data available No data available n) Water solubility Partition coefficient: n-No data available

octanol/water

Auto-ignition temperature

No data available

Decomposition temperature

No data available

No data available r) Viscosity s) Explosive properties No data available Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions 10.3

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No data available

No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

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12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

Not dangerous goods

IMDG

Not dangerous goods

IATA

Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24
Pennsylvania Right To Know Components		
	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24
	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24
New Jersey Right To Know Components		
	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

California Prop. 65 Components

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CAS-No. 193-39-5

Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc. Carcinogenicity

H351 Suspected of causing cancer.

HMIS Rating

Health hazard: 0
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 1
Fire Hazard: 0
Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 5.6 Revision Date: 12/11/2017 Print Date: 11/10/2018

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SAFETY DATA SHEET

Version 4.11 Revision Date 10/12/2018 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Lead

Product Number : 391352 Brand : Aldrich

CAS-No. : 7439-92-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302 Carcinogenicity (Category 2), H351 Reproductive toxicity (Category 2), H361

Specific target organ toxicity - repeated exposure (Category 2), H373

Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H302 Harmful if swallowed.

H351 Suspected of causing cancer.

H361 Suspected of damaging fertility or the unborn child.

H373 May cause damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.

Rinse mouth.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage. P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Pb

 Molecular weight
 : 207.20 g/mol

 CAS-No.
 : 7439-92-1

 EC-No.
 : 231-100-4

Hazardous components

Component	Classification	Concentration
Lead		
	Acute Tox. 4; Carc. 2; STOT	90 - 100 %
	RE 1; Aquatic Acute 1; Aquatic	
	Chronic 1; H302, H351, H372,	
	H410	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

	ir workplace con			
Component	CAS-No.	Value	Control	Basis
			parameters	
	Remarks	See 1910.10	025	
Lead	7439-92-1	TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values
				(TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values
				(TLV)
		Central Nerv	vous System impa	irment
		Hematologic	effects	
		Peripheral N	lervous System im	pairment
		Substances for which there is a Biological Exposure Index or Indices		
		(see BEI® section)		
		Confirmed animal carcinogen with unknown relevance to humans		

	TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
	See Appen	dix C	

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	Lead	200 μg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder

b) Odour No data available

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c) Odour Threshold No data availabled) pH No data available

e) Melting point/freezing Melting point/range: 327.4 °C (621.3 °F) - lit.

point

f) Initial boiling point and 1,740 °C (3,164 °F) - lit.

boiling range

g) Flash point Not applicableh) Evaporation rate No data available

i) Flammability (solid, gas) No data available

j) Upper/lower flammability or explosive limits No data available

k) Vapour pressure
l) Vapour density
m) Relative density
n) Water solubility
No data available
No data available
No data available

o) Partition coefficient: noctanol/water No data available

p) Auto-ignition temperature

No data available

q) Decomposition temperature

No data available

r) Viscosity No data available
 s) Explosive properties No data available
 t) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong acids

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Lead oxides Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

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Inhalation: No data available Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

Rat

Cytogenetic analysis

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Lead)

NTP: RAHC - Reasonably anticipated to be a human carcinogenThe reference note has been

added by TD based on the background information of the NTP. (Lead)

OSHA: OSHA specifically regulated carcinogen (Lead)

Reproductive toxicity

Reproductive toxicity - Rat - Inhalation

Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral Effects on Newborn: Behavioral.

Reproductive toxicity - Mouse - Oral

Effects on Fertility: Female fertility index (e.g., # females pregnant per females mated). Effects on Fertility: Pre-implantation mortality (e.g., reduction in numbe corpora lutea).

May damage fertility. May damage the unborn child.

Developmental Toxicity - Rat - Inhalation

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Developmental Toxicity - Rat - Oral

Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Developmental Toxicity - Rat - Oral

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Mouse - Oral

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

No data available

Additional Information

RTECS: OF7525000

anemia

Stomach - Irregularities - Based on Human Evidence

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12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 1.19 mg/l - 96.0 h

LC50 - Micropterus dolomieui - 2.2 mg/l - 96.0 h

mortality NOEC - Salvelinus fontinalis - 1.7 mg/l - 10.0 d

Toxicity to daphnia and

mortality LOEC - Daphnia (water flea) - 0.17 mg/l - 24 h

other aquatic invertebrates

mortality NOEC - Daphnia (water flea) - 0.099 mg/l - 24 h

Toxicity to algae mortality EC50 - Skeletonema costatum - 7.94 mg/l - 10 d

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation Oncorhynchus kisutch - 2 Weeks

- 150 µg/l

Bioconcentration factor (BCF): 12

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)

Reportable Quantity (RQ): 10 lbs Poison Inhalation Hazard: No

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead)

Marine pollutant:yes

IATA

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)

Further information

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EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No. **Revision Date** Lead 7439-92-1 2015-11-23

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

Massachusetts Right to Know Components		
	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23
	00 0= .	
Pennsylvania Right To Know Components		
, c	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23
2000	7 100 02 1	2010 11 20
	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23
Load	7400 02 1	2010 11 20
New Jersey Right To Know Components		
, ,	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23
Leau	7439-92-1	2015-11-25
California Prop. 65 Components		

California Prop. 65 Components

WARNING! This product contains a chemical known to the	CAS-No.	Revision Date
State of California to cause cancer.	7439-92-1	2009-02-01
Lead		

WARNING: This product contains a chemical known to the CAS-No. **Revision Date** State of California to cause birth defects or other reproductive 7439-92-1 2009-02-01

harm. Lead

H351

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity Aquatic Acute Acute aquatic toxicity Aquatic Chronic Chronic aquatic toxicity Carc. Carcinogenicity Harmful if swallowed. H302

Suspected of causing cancer. H361 Suspected of damaging fertility or the unborn child.

Causes damage to organs through prolonged or repeated exposure. H372 May cause damage to organs through prolonged or repeated exposure. H373

Further information

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Preparation Information Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 4.11 Revision Date: 10/12/2018 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 6.0 Revision Date 01/31/2017 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Magnesium

Product Number : 200905
Brand : Sigma-Aldrich
Index-No. : 012-002-00-9

CAS-No. : 7439-95-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 1), H228

Self-heating substances and mixtures (Category 1), H251

Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H228 Flammable solid.

H251 Self-heating: may catch fire.

H261 In contact with water releases flammable gases.

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking. P223 Keep away from any possible contact with water, because of violent

Sigma-Aldrich- 200905 Page 1 of 8

reaction and possible flash fire.

P231 + P232 Handle under inert gas. Protect from moisture.

P235 + P410 Keep cool. Protect from sunlight.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.

P280 Wear protective gloves/ eye protection/ face protection.

P335 + P334 Brush off loose particles from skin. Immerse in cool water/ wrap in wet

bandages.

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for

extinction.

P402 + P404 Store in a dry place. Store in a closed container.

P407 Maintain air gap between stacks/ pallets.

P413 Store bulk masses greater than .? kg/ .? lbs at temperatures not

exceeding .? °C/ .? °F.

P420 Store away from other materials.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Mg

Molecular weight : 24.31 g/mol CAS-No. : 7439-95-4 EC-No. : 231-104-6 Index-No. : 012-002-00-9

Hazardous components

Component	Classification	Concentration
Magnesium (non pyrophoric)		
	Flam. Sol. 1; Self-heat. 1; Water-react. 2; H228, H251, H261	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

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5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Dry powder

5.2 Special hazards arising from the substance or mixture

Magnesium oxide

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Never allow product to get in contact with water during storage.

Store under inert gas. Air and moisture sensitive.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: Turnings
b) Odour No data available
c) Odour Threshold No data available
d) pH No data available

e) Melting point/freezing Melting point/range: 648 °C (1198 °F) - lit.

point

f) Initial boiling point and 1,090 °C (1,994 °F) - lit.

boiling range

g) Flash point ()No data availableh) Evaporation rate No data available

i) Flammability (solid, gas) May form combustible dust concentrations in air.

j) Upper/lower No data available

flammability or explosive limits

k) Vapour pressure 1 hPa at 621 °C (1150 °F)

I) Vapour density No data available

m) Relative density 1.74 g/mL at 25 °C (77 °F)

n) Water solubility No data available

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o) Partition coefficient: n-

octanol/water

No data available

p) Auto-ignition temperature

1

The substance or mixture is classified as self heating with the category 1.

q) Decomposition temperature No data available

r) Viscosity No data available
s) Explosive properties No data available
t) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Reacts violently with water.

10.4 Conditions to avoid

Heat, flames and sparks. Exposure to moisture

10.5 Incompatible materials

Acids, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Magnesium oxide

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data availableMagnesium (non pyrophoric)

Inhalation: No data available(Magnesium (non pyrophoric))

Dermal: No data available(Magnesium (non pyrophoric))

No data available(Magnesium (non pyrophoric))

Skin corrosion/irritation

No data available(Magnesium (non pyrophoric))

Serious eye damage/eye irritation

No data available(Magnesium (non pyrophoric))

Respiratory or skin sensitisation

No data available(Magnesium (non pyrophoric))

Germ cell mutagenicity

No data available(Magnesium (non pyrophoric))

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

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No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

ACGIH:

No data available(Magnesium (non pyrophoric))

No data available(Magnesium (non pyrophoric))

Specific target organ toxicity - single exposure

No data available(Magnesium (non pyrophoric))

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available(Magnesium (non pyrophoric))

Additional Information

RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, chills, Fever, fatigue, muscle pain, joint pain, rash, Anorexia.(Magnesium (non pyrophoric))

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Magnesium (non pyrophoric))

Liver - Irregularities - Based on Human Evidence

Liver - Irregularities - Based on Human Evidence(Magnesium (non pyrophoric))

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Magnesium (non pyrophoric))

Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

Other adverse effects 12.6

No data available

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13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1869 Class: 4.1 Packing group: III

Proper shipping name: Magnesium Poison Inhalation Hazard: No

IMDG

UN number: 1869 Class: 4.1 Packing group: III EMS-No: F-G, S-G

Proper shipping name: MAGNESIUM

IATA

UN number: 1869 Class: 4.1 Packing group: III

Proper shipping name: Magnesium

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

CAS-No. Revision Date Magnesium (non pyrophoric) 7439-95-4 1993-04-24

Pennsylvania Right To Know Components

Magnesium (non pyrophoric)

CAS-No. Revision Date
7439-95-4
1993-04-24

New Jersey Right To Know Components

CAS-No. Revision Date Magnesium (non pyrophoric) 7439-95-4 1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

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H228 Flammable solid.

H251 Self-heating: may catch fire.

H261 In contact with water releases flammable gases.

HMIS Rating

Health hazard: 0
Chronic Health Hazard: *
Flammability: 3
Physical Hazard 2

NFPA Rating

Health hazard: 0
Fire Hazard: 0
Reactivity Hazard: 2

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.0 Revision Date: 01/31/2017 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 6.1 Revision Date 05/28/2017 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Manganese

Product Number : 463728 Brand : Aldrich

CAS-No. : 7439-96-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260 Acute aquatic toxicity (Category 3), H402 Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H260 In contact with water releases flammable gases which may ignite

spontaneously.

H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P223 Keep away from any possible contact with water, because of violent

reaction and possible flash fire.

P231 + P232 Handle under inert gas. Protect from moisture.

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P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P335 + P334 Brush off loose particles from skin. Immerse in cool water/ wrap in wet

bandages.

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for

extinction.

P402 + P404 Store in a dry place. Store in a closed container.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Mn

Molecular weight : 54.94 g/mol CAS-No. : 7439-96-5 EC-No. : 231-105-1

Hazardous components

Component	Classification	Concentration
Manganese		
	Water-react. 1; Aquatic Acute 3; Aquatic Chronic 3; H260, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Dry powder Carbon dioxide (CO2)

Unsuitable extinguishing media

Water

5.2 Special hazards arising from the substance or mixture

Manganese/manganese oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wetbrushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Never allow product to get in contact with water during storage.

Moisture sensitive. Keep in a dry place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Components trial to				Б .	
Component	CAS-No.	Value	Control	Basis	
			parameters		
Manganese	7439-96-5	TWA	0.200000	USA. ACGIH Threshold Limit Values	
			mg/m3	(TLV)	
	Remarks	Central Nervous System impairment			
		Adopted values or notations enclosed are those for which changes			
		are proposed in the NIC			
		See Notice of Intended Changes (NIC)			
		С	5.000000	USA. Occupational Exposure Limits	
			mg/m3	(OSHA) - Table Z-1 Limits for Air	
				Contaminants	
		Ceiling limit is to be determined from breathing-zone air samples.			
		С	5 mg/m3	USA. Occupational Exposure Limits	
				(OSHA) - Table Z-1 Limits for Air	
				Contaminants	
		Ceiling limit is to be determined from breathing-zone air samples.			

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TWA	1.000000	USA. NIOSH Recommended		
	mg/m3	Exposure Limits		
ST	3.000000	USA. NIOSH Recommended		
	mg/m3	Exposure Limits		
TWA	1.000000	USA. NIOSH Recommended		
	mg/m3	Exposure Limits		
ST	3.000000	USA. NIOSH Recommended		
	mg/m3	Exposure Limits		
С	5.000000	USA. Occupational Exposure Limits		
	mg/m3	(OSHA) - Table Z-1 Limits for Air		
		Contaminants		
Ceiling lim	Ceiling limit is to be determined from breathing-zone air samples.			
TWA	1.000000	USA. NIOSH Recommended		
	mg/m3	Exposure Limits		
ST	3.000000	USA. NIOSH Recommended		
	mg/m3	Exposure Limits		
TWA	0.200000	USA. ACGIH Threshold Limit Values		
1	mg/m3	(TLV)		
Central No	ervous System imp			
	Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC)			
varies				
TWA	0.100000	USA. ACGIH Threshold Limit Values		
	mg/m3	(TLV)		
Central No	Central Nervous System impairment			
	2015 Adoption			
varies	·			
TWA	0.020000	USA. ACGIH Threshold Limit Values		
	mg/m3	(TLV)		
Central No	Central Nervous System impairment 2015 Adoption			
varies				
TWA	1 mg/m3	USA. NIOSH Recommended		
	35	Exposure Limits		
ST	3 mg/m3	USA. NIOSH Recommended		
	5g,	Exposure Limits		
TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values		
	3.1g/1110	(TLV)		
Central No	ervous System imn			
	Central Nervous System impairment Not classifiable as a human carcinogen varies			
varies				
TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values		
	0.02g/0	(TLV)		
Central No	Central Nervous System impairment			
	Not classifiable as a human carcinogen			
varies				
741100				

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

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Body Protection

Impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder

Colour: grey

b) Odourc) Odour Thresholdd) pHNo data availableNo data available

e) Melting point/freezing

point

Melting point/range: 1,244 °C (2,271 °F) - lit.

f) Initial boiling point and

boiling range

1,962 °C (3,564 °F) - lit.

g) Flash point ()Not applicable
h) Evaporation rate No data available
i) Flammability (solid, gas) No data available
i) Head (solid)

j) Upper/lower flammability or explosive limits No data available

k) Vapour pressure No data availablel) Vapour density No data available

m) Relative density 7.3 g/mL at 25 °C (77 °F)

n) Water solubility No data available
b) Partition coefficient: n- No data available

octanol/water

o) Auto-ignition

No data available

temperature

p) Decomposition

temperature

No data available

r) Viscosity No data available s) Explosive properties No data available

t) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

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10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Reacts violently with water.

10.4 Conditions to avoid

Exposure to moisture

10.5 Incompatible materials

acids, Halogens, Bases, Phosphorus, Sulphur oxides, Peroxides

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Manganese/manganese oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - 9,000 mg/kg(Manganese) Inhalation: No data available(Manganese)

Dermal: No data available(Manganese)

No data available(Manganese)

Skin corrosion/irritation

Skin - Rabbit(Manganese)
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation

Eyes - Rabbit(Manganese) Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation

No data available(Manganese)

Germ cell mutagenicity

No data available(Manganese)

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No data available(Manganese)

May cause reproductive disorders. (Manganese)

Specific target organ toxicity - single exposure

No data available(Manganese)

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Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available(Manganese)

Additional Information

RTECS: OO9275000

Men exposed to manganese dusts showed a decrease in fertility. Chronic man system. Early symptoms include languor, sleepiness and weakness in the le disturbances such as uncontrollable laughter and a spastic gait with tend cases. High incidence of pneumonia has been found in workers exposed to t(Manganese)

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence(Manganese)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and EC50 - Daphnia magna (Water flea) - 40 mg/l - 48 h(Manganese) other aquatic invertebrates

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Manganese)

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3208 Class: 4.3 Packing group: I

Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)

Poison Inhalation Hazard: No

IMDG

UN number: 3208 Class: 4.3 Packing group: I EMS-No: F-G, S-N Proper shipping name: METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. (Manganese)

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IATA

UN number: 3208 Class: 4.3 Packing group: I

Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)

IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

Manganese CAS-No. Revision Date 2007-07-01

SARA 311/312 Hazards

Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

Manganese CAS-No. Revision Date 2007-07-01

Pennsylvania Right To Know Components

 Manganese
 CAS-No.
 Revision Date

 2007-07-01
 2007-07-01

New Jersey Right To Know Components

 Manganese
 CAS-No.
 Revision Date

 2007-07-01
 2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H260 In contact with water releases flammable gases which may ignite spontaneously.

H402 Harmful to aquatic life.

H412 Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard: 0
Chronic Health Hazard: *
Flammability: 3
Physical Hazard 2

NFPA Rating

Health hazard: 0
Fire Hazard: 0
Reactivity Hazard: 2
Special hazard.1: W

Further information

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or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 3.15 Revision Date 03/05/2018 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Mercury

Product Number : 215457

Brand : Sigma-Aldrich Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Inhalation (Category 2), H330 Reproductive toxicity (Category 1B), H360

Specific target organ toxicity - repeated exposure (Category 1), H372

Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H330 Fatal if inhaled.

H360 May damage fertility or the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product. P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P284 Wear respiratory protection.

P304 + P310 IF INHALED: Remove person to fresh air and keep comfortable for

breathing. Immediately call a POISON CENTER/doctor.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage.

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Hg

 Molecular weight
 : 200.59 g/mol

 CAS-No.
 : 7439-97-6

 EC-No.
 : 231-106-7

 Index-No.
 : 080-001-00-0

Hazardous components

Component	Classification	Concentration
Mercury		
	Acute Tox. 2; Repr. 1B; STOT	90 - 100 %
	RE 1; Aquatic Acute 1; Aquatic	
	Chronic 1; H330, H360, H372,	
	H410	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

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5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method. Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.

Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Components with workplace control parameters					
Component	CAS-No.	Value	Control	Basis	
			parameters		
Mercury	7439-97-6	С	0.1 mg/m3	USA. NIOSH Recommended	
				Exposure Limits	
	Remarks	Potential for	dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2	
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000	
		Skin notation	า	_	

TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Kidney dama Substances (see BEI® se	for which there is a ection)	a Biological Exposure Index or Indices
Not classifiable as a human carcinogen Danger of cutaneous absorption		
TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
Potential for dermal absorption		

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: liquid

Colour: silver, white

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Odour odourless b)

Odour Threshold No data available No data available d) рΗ

Melting point/freezing Melting point/range: -38.87 °C (-37.97 °F) - lit. e)

point

Initial boiling point and f)

boiling range

356.6 °C (673.9 °F) - lit.

Flash point Not applicable h) Evaporation rate No data available

i) Flammability (solid, gas) No data available Upper/lower No data available j)

flammability or explosive limits

< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) Vapour pressure k) 1 hPa (1 mmHg) at 126 °C (259 °F)

I) Vapour density 6.93 - (Air = 1.0)

m) Relative density 13.55 g/cm3 at 25 °C (77 °F) n) Water solubility 0.00006 g/l at 25 °C (77 °F)

o) Partition coefficient: noctanol/water

No data available

Auto-ignition p) temperature

No data available

Decomposition temperature

No data available

No data available r) Viscosity Explosive properties No data available s) No data available Oxidizing properties

9.2 Other safety information

> 6.93 - (Air = 1.0)Relative vapour density

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

Conditions to avoid 10.4

No data available

10.5 Incompatible materials

Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 **Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.

Other decomposition products - No data available

In the event of fire: see section 5

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11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

Reproductive toxicity

Presumed human reproductive toxicant

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

No data available

Additional Information

RTECS: OV4550000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation Carassius auratus (goldfish) - 1,789 d

- 0.25 µg/l

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Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Packing group: III

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2809 Class: 8 (6.1)
Proper shipping name: A. W. Mercury
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG

IATA

UN number: 2809 Class: 8 (6.1) Packing group: III

Proper shipping name: Mercury

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

CAS-No.

Revision Date

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

Mercury	7439-97-6	2015-11-23
Pennsylvania Right To Know Components		
	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23
	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

California Prop. 65 Components

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WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

CAS-No. 7439-97-6 Revision Date 2013-12-20

Mercury

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity

Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity

H330 Fatal if inhaled.

H360 May damage fertility or the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Repr. Reproductive toxicity

HMIS Rating

Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 2
Fire Hazard: 0
Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 3.15 Revision Date: 03/05/2018 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 5.8 Revision Date 10/03/2017 Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Methyl tert-butyl ether solution

Product Number : CRM48483
Brand : Supelco
Index-No. : 603-001-00-X

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225 Acute toxicity, Oral (Category 3), H301 Acute toxicity, Inhalation (Category 3), H331 Acute toxicity, Dermal (Category 3), H311

Specific target organ toxicity - single exposure (Category 1), H370

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.

H301 + H311 + H331 Toxic if swallowed, in contact with skin or if inhaled.

H370 Causes damage to organs.

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233 Keep container tightly closed.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.

P242 Use only non-sparking tools.

P243 Take precautionary measures against static discharge.

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P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P307 + P311	IF exposed: Call a POISON CENTER or doctor/ physician.
P322	Specific measures (see supplemental first aid instructions on this label).
P330	Rinse mouth.
P361	Remove/Take off immediately all contaminated clothing.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Hazardous components

Component		Classification	Concentration
Methanol			
CAS-No.	67-56-1	Flam. Liq. 2; Acute Tox. 3;	90 - 100 %
EC-No.	200-659-6	STOT SE 1; H225, H301 +	
Index-No.	603-001-00-X	H311 + H331, H370	
Registration number	01-2119433307-44-XXXX		

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

Supelco - CRM48483 Page 2 of 9

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store at room temperature.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Components with	Components with workplace control parameters					
Component	CAS-No.	Value	Control parameters	Basis		
Methanol	67-56-1	TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)		
	Remarks	Headache Nausea Dizziness Eye damage	•			

	Substances	for which there is	a Biological Exposure Index or Indices
	(see BEI® se	ection)	
		taneous absorption	
	STEL	250.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Headache		
	Nausea Dizziness		
	Eye damage	!	
			a Biological Exposure Index or Indices
	(see BEI® se		
		taneous absorption	
	TWA	200.000000	USA. NIOSH Recommended
		ppm	Exposure Limits
		260.000000 mg/m3	
	Potential for	dermal absorption	
	ST	250.000000	USA. NIOSH Recommended
		ppm	Exposure Limits
		325.000000	
		mg/m3	
		dermal absorption	
	TWA	200.000000	USA. Occupational Exposure Limits
		ppm	(OSHA) - Table Z-1 Limits for Air
		260.000000	Contaminants
	The value in	mg/m3 mg/m3 is approxi	mate
	TWA	200 ppm	USA. ACGIH Threshold Limit Values
	IVVA	200 ρρπ	(TLV)
	Headache		
	Nausea		
	Dizziness		
	Eye damage		a Biological Exposure Index or Indices
	(see BEI® se		a biological exposure mack of malocs
		itaneous absorptio	on
		250 ppm	
II II			USA. ACGIH Threshold Limit Values
			(TLV)
	Headache		
	Nausea	<u> </u>	
	Nausea Dizziness		
	Nausea Dizziness Eye damage		(TLV)
	Nausea Dizziness Eye damage Substances	for which there is a	
	Nausea Dizziness Eye damage Substances (see BEI® se	for which there is a	(TLV) a Biological Exposure Index or Indices
	Nausea Dizziness Eye damage Substances (see BEI® se	for which there is a	(TLV) a Biological Exposure Index or Indices
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of co	for which there is a section) utaneous absorption 200 ppm 260 mg/m3	a Biological Exposure Index or Indices on USA. NIOSH Recommended Exposure Limits
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of cu TWA Potential for	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption	(TLV) a Biological Exposure Index or Indices on USA. NIOSH Recommended Exposure Limits
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of co	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 250 ppm	a Biological Exposure Index or Indices on USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of cu TWA Potential for ST	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 250 ppm 325 mg/m3	a Biological Exposure Index or Indices on USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended Exposure Limits
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of co TWA Potential for ST Potential for	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 250 ppm 325 mg/m3 dermal absorption	(TLV) a Biological Exposure Index or Indices on USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended Exposure Limits
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of cu TWA Potential for ST	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 250 ppm 325 mg/m3 dermal absorption 200 ppm	a Biological Exposure Index or Indices on USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended Exposure Limits USA. Occupational Exposure Limits
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of co TWA Potential for ST Potential for	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 250 ppm 325 mg/m3 dermal absorption	a Biological Exposure Index or Indices on USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended Exposure Limits USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of cu TWA Potential for ST Potential for TWA	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 325 mg/m3 dermal absorption 200 ppm 200 ppm 260 mg/m3	a Biological Exposure Index or Indices On USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended Exposure Limits USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of cu TWA Potential for ST Potential for TWA	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 250 ppm 325 mg/m3 dermal absorption 200 ppm	a Biological Exposure Index or Indices On USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended Exposure Limits USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Nausea Dizziness Eye damage Substances (see BEI® so Danger of cu TWA Potential for ST Potential for TWA The value in	for which there is a section) Itaneous absorption 200 ppm 260 mg/m3 dermal absorption 250 ppm 325 mg/m3 dermal absorption 200 ppm 260 mg/m3	a Biological Exposure Index or Indices On USA. NIOSH Recommended Exposure Limits USA. NIOSH Recommended Exposure Limits USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants mate.

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TWA	200 ppm 260 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
Skin nota	tion	
С	1,000 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
Skin		
PEL	200 ppm 260 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
Skin		
STEL	250 ppm 325 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
Skin	•	

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Methanol	67-56-1	Methanol	15.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (A	s soon as p	ossible after expo	osure ceases)
		Methanol	15 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (A	End of shift (As soon as possible after exposure ceases)		

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: butyl-rubber

Minimum layer thickness: 0.3 mm Break through time: 480 min

Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact Material: Nitrile rubber

Minimum layer thickness: 0.4 mm Break through time: 30 min

Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

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Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance Form: liquid

Colour: colourless

Odour b) pungent

Odour Threshold No data available c) d) рН No data available

Melting point/freezing

point

Melting point/range: -98.0 °C (-144.4 °F)

Initial boiling point and

boiling range

64.0 - 65.0 °C (147.2 - 149.0 °F) at 1,013 hPa (760 mmHg)

9.7 °C (49.5 °F) - closed cup Flash point g)

Evaporation rate No data available i) Flammability (solid, gas) No data available

Upper/lower Upper explosion limit: 36 %(V) flammability or Lower explosion limit: 6 %(V)

explosive limits

Vapour pressure 546.6 hPa (410.0 mmHg) at 50.0 °C (122.0 °F)

130.3 hPa (97.7 mmHg) at 20.0 °C (68.0 °F)

I) Vapour density No data available

m) Relative density 0.79 g/cm3 at 20 °C (68 °F)

n) Water solubility completely miscible Partition coefficient: n-No data available

octanol/water

No data available p) Auto-ignition temperature

Decomposition temperature

No data available

r) Viscosity No data available **Explosive properties** No data available No data available Oxidizing properties

9.2 Other safety information

> Dissociation constant 15.3

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10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air. Vapours may form explosive mixture with air.

10.4 Conditions to avoid

Heat, flames and sparks.

Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials

Acid chlorides, Acid anhydrides, Oxidizing agents, Alkali metals, Reducing agents, Acids

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

Reproductive toxicity

No data available

No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: Not available

Methyl alcohol may be fatal or cause blindness if swallowed., Cannot be made non-poisonous., Effects due to ingestion may include:, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Dizziness, Weakness, Confusion., Drowsiness, Unconsciousness, May cause convulsions.

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Stomach - Irregularities - Based on Human Evidence Stomach - Irregularities - Based on Human Evidence Central nervous system - (tert-Butyl methyl ether)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

2.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1230 Class: 3 Packing group: II

Proper shipping name: Methanol, solution

Reportable Quantity (RQ): Poison Inhalation Hazard: No

IMDG

UN number: 1230 Class: 3 (6.1) Packing group: II EMS-No: F-E, S-D

Proper shipping name: METHANOL, SOLUTION

IATA

UN number: 1230 Class: 3 (6.1) Packing group: II

Proper shipping name: Methanol, solution

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No. Revision Date 67-56-1 2007-07-01

SARA 311/312 Hazards

Methanol

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

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Methanol CAS-No. Revision Date 67-56-1 2007-07-01

Pennsylvania Right To Know Components

 Methanol
 CAS-No.
 Revision Date

 Methanol
 67-56-1
 2007-07-01

 tert-Butyl methyl ether
 1634-04-4
 2007-07-01

New Jersey Right To Know Components

 Methanol
 CAS-No.
 Revision Date

 47-56-1
 2007-07-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity
Flam. Liq. Flammable liquids

H225 Highly flammable liquid and vapour.

H301 Toxic if swallowed.

H301 + H311 + Toxic if swallowed, in contact with skin or if inhaled.

H331

H311 Toxic in contact with skin.

H331 Toxic if inhaled.

H370 Causes damage to organs.

STOT SE Specific target organ toxicity - single exposure

HMIS Rating

Health hazard: 2
Chronic Health Hazard: *
Flammability: 3
Physical Hazard 0

NFPA Rating

Health hazard: 2
Fire Hazard: 3
Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 5.8 Revision Date: 10/03/2017 Print Date: 01/21/2019

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SAFETY DATA SHEET

Version 3.15 Revision Date 03/05/2018 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Mercury

Product Number : 215457

Brand : Sigma-Aldrich Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Inhalation (Category 2), H330 Reproductive toxicity (Category 1B), H360

Specific target organ toxicity - repeated exposure (Category 1), H372

Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H330 Fatal if inhaled.

H360 May damage fertility or the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and

understood.

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product. P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P284 Wear respiratory protection.

P304 + P310 IF INHALED: Remove person to fresh air and keep comfortable for

breathing. Immediately call a POISON CENTER/doctor.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391 Collect spillage.

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Hg

 Molecular weight
 : 200.59 g/mol

 CAS-No.
 : 7439-97-6

 EC-No.
 : 231-106-7

 Index-No.
 : 080-001-00-0

Hazardous components

Component	Classification	Concentration
Mercury		
	Acute Tox. 2; Repr. 1B; STOT	90 - 100 %
	RE 1; Aquatic Acute 1; Aquatic	
	Chronic 1; H330, H360, H372,	
	H410	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

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5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method. Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.

Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Componente with well-place control parameters				
Component	CAS-No.	Value	Control	Basis
			parameters	
Mercury	7439-97-6	С	0.1 mg/m3	USA. NIOSH Recommended
				Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		

TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Kidney dama Substances (see BEI® se	for which there is a ection)	a Biological Exposure Index or Indices
Not classifiable as a human carcinogen Danger of cutaneous absorption		
TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
Potential for dermal absorption		

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: liquid

Colour: silver, white

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Odour odourless b)

Odour Threshold No data available No data available d) рΗ

Melting point/freezing Melting point/range: -38.87 °C (-37.97 °F) - lit. e)

point

Initial boiling point and f)

boiling range

356.6 °C (673.9 °F) - lit.

Flash point Not applicable h) Evaporation rate No data available

i) Flammability (solid, gas) No data available Upper/lower No data available j)

flammability or explosive limits

< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) Vapour pressure k) 1 hPa (1 mmHg) at 126 °C (259 °F)

I) Vapour density 6.93 - (Air = 1.0)

m) Relative density 13.55 g/cm3 at 25 °C (77 °F) n) Water solubility 0.00006 g/l at 25 °C (77 °F)

o) Partition coefficient: noctanol/water

No data available

Auto-ignition p) temperature

No data available

Decomposition temperature

No data available

No data available r) Viscosity Explosive properties No data available s) No data available Oxidizing properties

9.2 Other safety information

> 6.93 - (Air = 1.0)Relative vapour density

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

Conditions to avoid 10.4

No data available

10.5 Incompatible materials

Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 **Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.

Other decomposition products - No data available

In the event of fire: see section 5

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11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

Reproductive toxicity

Presumed human reproductive toxicant

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

No data available

Additional Information

RTECS: OV4550000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation Carassius auratus (goldfish) - 1,789 d

- 0.25 µg/l

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Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Packing group: III

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2809 Class: 8 (6.1)
Proper shipping name: A. W. Mercury
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG

IATA

UN number: 2809 Class: 8 (6.1) Packing group: III

Proper shipping name: Mercury

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

CAS-No.

Revision Date

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

Mercury	7439-97-6	2015-11-23
Pennsylvania Right To Know Components		
	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23
	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

California Prop. 65 Components

Sigma-Aldrich - 215457 Page 7 of 8

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

CAS-No. 7439-97-6 Revision Date 2013-12-20

Mercury

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity

Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity

H330 Fatal if inhaled.

H360 May damage fertility or the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Repr. Reproductive toxicity

HMIS Rating

Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 2
Fire Hazard: 0
Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 3.15 Revision Date: 03/05/2018 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 3.4 Revision Date 06/27/2014 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Heptadecafluorooctanesulfonic acid solution

Product Number : 77283 Brand : Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich

3050 Spruce Street

SAINT LOUIS MO 63103

USA

Telephone : +1 800-325-5832 Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1

Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302 Acute toxicity, Inhalation (Category 3), H331 Skin corrosion (Category 1B), H314

Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360

Effects on or via lactation, H362

Specific target organ toxicity - repeated exposure (Category 1), H372

Acute aquatic toxicity (Category 2), H401 Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H302 Harmful if swallowed.

H314 Causes severe skin burns and eye damage.

H331 Toxic if inhaled.

H351 Suspected of causing cancer.

H360 May damage fertility or the unborn child. H362 May cause harm to breast-fed children.

H372 Causes damage to organs through prolonged or repeated exposure.

Aldrich - 77283

H411	Toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P321	Specific treatment (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

P501

Formula : $C_8HF_{17}O_3S$ Molecular Weight : 500.13 g/mol

Hazardous components

Component		Classification	Concentration	
Heptadecafluorooctane-1-sulphonic acid				
CAS-No.	1763-23-1	Acute Tox. 4; Skin Corr. 1B;	30 - 60 %	
EC-No.	217-179-8	Eye Dam. 1; Carc. 2; Repr.		
Index-No.	607-624-00-8	1B; Lact. ; STOT RE 1; Aguatic Acute 2; Aguatic		
		Chronic 2; H302 + H332,		
		H314, H351, H360, H362,		
		H372, H411		

Dispose of contents/ container to an approved waste disposal plant.

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

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In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides, Sulphur oxides, Hydrogen fluoride

5.3 Advice for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information

no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

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8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Farmer alaga Barrial

a)	Appearance	Form: clear, liquid Colour: light red
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	рН	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	no data available
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
I)	Vapour density	no data available
m)	Relative density	1.250 g/cm3
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available

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q) Decomposition no data available

temperature

r) Viscosity no data available
 s) Explosive properties no data available
 t) Oxidizing properties no data available

9.2 Other safety information

no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

no data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

no data available

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - no data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

no data available

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation

no data available

Serious eye damage/eye irritation

no data available

Respiratory or skin sensitisation

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

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carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available no data available

Specific target organ toxicity - single exposure

no data available

Specific target organ toxicity - repeated exposure

no data available

Aspiration hazard

no data available

Additional Information

RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

no data available

12.2 Persistence and degradability

no data available

12.3 Bioaccumulative potential

no data available

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3265 Class: 8 Packing group: II

Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Heptadecafluorooctane-1-sulphonic acid)

Marine pollutant: No

Poison Inhalation Hazard: No

IMDG

UN number: 3265 Class: 8 Packing group: II EMS-No: F-A, S-B

Proper shipping name: CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (Heptadecafluorooctane-1-sulphonic acid)

Marine pollutant: No

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IATA

UN number: 3265 Class: 8 Packing group: II

Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Heptadecafluorooctane-1-sulphonic acid)

15. REGULATORY INFORMATION

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard

Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Water CAS-No. Revision Date 7732-18-5
Heptadecafluorooctane-1-sulphonic acid 1763-23-1 2009-07-17

New Jersey Right To Know Components

Water CAS-No. Revision Date 7732-18-5
Heptadecafluorooctane-1-sulphonic acid 1763-23-1 2009-07-17

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity

Aquatic Acute Acute aquatic toxicity
Aquatic Chronic Chronic aquatic toxicity

Carc. Carcinogenicity
Eye Dam. Serious eye damage
H302 Harmful if swallowed.

H302 + H332 Harmful if swallowed or if inhaled

H314 Causes severe skin burns and eye damage.

H318 Causes serious eye damage.

H331 Toxic if inhaled.

H351 Suspected of causing cancer.

H360 May damage fertility or the unborn child. H362 May cause harm to breast-fed children.

H372 Causes damage to organs through prolonged or repeated exposure.

H401 Toxic to aquatic life.

H411 Toxic to aquatic life with long lasting effects.

Lact. Effects on or via lactation

HMIS Rating

Health hazard: 3
Chronic Health Hazard:
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 3 Fire Hazard: 0

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Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 3.4 Revision Date: 06/27/2014 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 6.1 Revision Date 03/12/2019 Print Date 06/28/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorooctanoic acid

Product Number : 171468
Brand : Aldrich
CAS-No. : 335-67-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103

UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302 Acute toxicity, Inhalation (Category 4), H332

Serious eye damage (Category 1), H318

Carcinogenicity (Category 2), H351 Reproductive toxicity (Category 1B), H360

Effects on or via lactation, H362

Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

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Hazard statement(s) H302 + H332 H318 H351 H360 H362 H372	Harmful if swallowed or if inhaled. Causes serious eye damage. Suspected of causing cancer. May damage fertility or the unborn child. May cause harm to breast-fed children. Causes damage to organs (Liver) through prolonged or repeated exposure.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313 P405	IF exposed or concerned: Get medical advice/ attention. Store locked up.

Dispose of contents/ container to an approved waste disposal

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

plant.

SECTION 3: Composition/information on ingredients

3.1 Substances

P501

Synonyms : Pentadecafluorooctanoic acid

Perfluorocaprylic acid Perfluorooctanoic acid

Formula : $C_8HF_{15}O_2$ Molecular weight : 414.07 g/mol CAS-No. : 335-67-1 EC-No. : 206-397-9

Component	Classification	Concentration
Pentadecafluorooctanoic acid		
	Acute Tox. 4; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H332, H318, H351, H360, H362, H372	<= 100 %

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SECTION 4: First aid measures

4.1 Description of first aid measures

General advice

Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Continue rinsing eyes during transport to hospital. Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides, Hydrogen fluoride

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available



SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: > 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: > 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail

sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

1 Information on basic physical and chemical properties

a) Appearance Form: flakes

Colour: colourless

b) Odourc) Odour Thresholddata available

d) pH 2.6 at 1 g/l

e) Melting point/range: 55 - 56 °C (131 - 133 °F) - lit.

point/freezing point

f) Initial boiling point 189 °C 372 °F at 981 hPa - lit.

and boiling range

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g) Flash point ()No data available h) Evaporation rate No data available Flammability (solid, No data available gas) Upper/lower No data available j) flammability or explosive limits 0.69 hPa at 25 °C (77 °F) k) Vapour pressure I) Vapour density No data available m) Relative density 0.900 g/cm3 n) Water solubility No data available o) Partition coefficient: No data available n-octanol/water p) Auto-ignition No data available temperature q) Decomposition No data available temperature r) Viscosity No data available s) Explosive properties No data available

No data available

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

Oxidizing properties

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Bases, Oxidizing agents, Reducing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride

Other decomposition products - No data available

In the event of fire: see section 5

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation: No data available Dermal: No data available

LD50 Intraperitoneal - Rat - 189 mg/kg

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

Rat

DNA damage

Rat

DNA damage

Carcinogenicity

Suspected human carcinogens

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Pentadecafluorooctanoic acid)

NTP: No component of this product present at levels greater than or equal to 0.1% is

identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is

on OSHA's list of regulated carcinogens.

Reproductive toxicity

Effects on or via lactation Presumed human reproductive toxicant No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure. - Liver

Aspiration hazard

No data available

Additional Information

RTECS: RH0781000

Cough, Shortness of breath, Headache, Nausea, Vomiting

Stomach - Irregularities - Based on Human Evidence Stomach - Irregularities - Based on Human Evidence

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SECTION 12: Ecological information

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

SECTION 14: Transport information

DOT (US)

UN number: 3261 Class: 8 Packing group: III

Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Pentadecafluorooctanoic

acid)

Reportable Quantity (RQ): Poison Inhalation Hazard: No

IMDG

UN number: 3261 Class: 8 Packing group: III EMS-No: F-A, S-B

Proper shipping name: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.

(Pentadecafluorooctanoic acid)

IATA

UN number: 3261 Class: 8 Packing group: III

Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Pentadecafluorooctanoic

acid)

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SECTION 15: Regulatory information

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Pentadecafluorooctanoic acid CAS-No. Revision Date 335-67-1

Pentadecafluorooctanoic acid CAS-No. Revision Date

335-67-1

New Jersey Right To Know Components

Pentadecafluorooctanoic acid CAS-No. Revision Date 335-67-1

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.1 Revision Date: 03/12/2019 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 6.2 Revision Date 05/28/2017 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Sodium

Product Number : 483745 Brand : Aldrich

CAS-No. : 7440-23-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260 Skin corrosion (Category 1B), H314

Serious eye damage (Category 1), H318

Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H260 In contact with water releases flammable gases which may ignite

spontaneously.

H314 Causes severe skin burns and eye damage.

H318 Causes serious eye damage.

H350 May cause cancer.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P260	Do not breathe dust or mist.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P281	Use personal protective equipment as required.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Na

Molecular weight : 22.99 g/mol

Hazardous components

Component		Classification	Concentration
Sodium			
CAS-No. EC-No. Index-No.	7440-23-5 231-132-9 011-001-00-0	Water-react. 1; Skin Corr. 1B; Eye Dam. 1; H260, H314	>= 90 - <= 100 %
Paraffin oils			
CAS-No. EC-No.	8012-95-1 232-384-2	Asp. Tox. 1; H304, H304	>= 90 - <= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Dry powder

5.2 Special hazards arising from the substance or mixture

Carbon oxides, Sodium oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wetbrushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

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For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Never allow product to get in contact with water during storage.

Handle and store under inert gas. Air sensitive.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control	Basis						
			parameters							
Paraffin oils	8012-95-1	STEL	10.000000	USA. ACGIH Threshold Limit Values						
			mg/m3	(TLV)						
		TWA	5.000000	USA. Occupational Exposure Limits						
			mg/m3	(OSHA) - Table Z-1 Limits for Air						
				Contaminants						
		TWA	5.000000	USA. NIOSH Recommended						
			mg/m3	Exposure Limits						
		ST	10.000000	USA. NIOSH Recommended						
			mg/m3	Exposure Limits						
		TWA	5.000000	USA. Occupational Exposure Limits						
			mg/m3	(OSHA) - Table Z-1 Limits for Air						
				Contaminants						
		TWA	5.000000	USA. ACGIH Threshold Limit Values						
			mg/m3	(TLV)						
	Remarks	Upper Res	spiratory Tract irrit							
			2015 Adoption							
			fiable as a human	carcinogen						
			spiratory Tract irrit							
				auon						
			2015 Adoption Exposure by all routes should be carefully controlled t							
		as possible	•							
			d human carcinoge	en						
		TWA	5.000000	USA. Occupational Exposure Limits						
		' ' ' ' '	mg/m3	(OSHA) - Table Z-1 Limits for Air						
			mg/mo	Contaminants						
		TWA	5.000000	USA. Occupational Exposure Limits						
			mg/m3	(OSHA) - Table Z-1 Limits for Air						
			J	Contaminants						
		Upper Res	spiratory Tract irrit							
				ld be carefully controlled to levels as low						
		as possible		,						
			human carcinoge	en						
		TWA	5.000000	USA. ACGIH Threshold Limit Values						
			mg/m3	(TLV)						
		Upper Res	spiratory Tract irrit							
			fiable as a human							
		TWA	5.000000	USA. NIOSH Recommended						
			mg/m3	Exposure Limits						
		ST	10.000000	USA. NIOSH Recommended						
			mg/m3	Exposure Limits						
		Unner Rec	spiratory Tract irrita							
				ld be carefully controlled to levels as low						
		as possible	a bo carorany controlled to levels as low							
			e. I human carcinoge	an						
		Juspeciel	a numan carcinoge	<u> </u>						

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TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants			
TWA	5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)			
Upper Respiratory Tract irritation Not classifiable as a human carcinogen					
TWA	5 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000			
TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits			
ST	10 mg/m3	USA. NIOSH Recommended Exposure Limits			

Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: Pieces

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b) Odourc) Odour Thresholdd) pHNo data availableNo data availableNo data available

e) Melting point/freezing Melting point/range: 97.8 °C (208.0 °F) - lit.

point

f) Initial boiling point and 883 °C (1621 °F) - lit. boiling range

g) Flash point 82 °C (180 °F) h) Evaporation rate No data available

i) Flammability (solid, gas) No data available

j) Upper/lower flammability or explosive limits No data available

k) Vapour pressure No data available

l) Vapour density No data available

m) Relative density 0.97 g/cm3

n) Water solubility No data available
 o) Partition coefficient: n- No data available octanol/water

p) Auto-ignition temperature

No data available

q) Decomposition temperature

No data available

r) Viscosity No data availables) Explosive properties No data availablet) Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Reacts violently with water.

10.4 Conditions to avoid

Air Do not allow water to enter container.

Exposure to moisture

10.5 Incompatible materials

Oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sodium oxides In the event of fire: see section 5

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11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No data available No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Aspiration may lead to:, lipid pneumonia, Effects due to ingestion may include:, laxative effect, Gastrointestinal disturbance, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chem scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1428 Class: 4.3 Packing group: I

Proper shipping name: Sodium

Reportable Quantity (RQ) : 10 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1428 Class: 4.3 Packing group: I EMS-No: F-G, S-N

Proper shipping name: SODIUM

IATA

UN number: 1428 Class: 4.3 Packing group: I

Proper shipping name: Sodium

IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Reactivity Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

New Jersey Right To Know Components

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 CAS-No.
 Revision Date

 Sodium
 7440-23-5
 1993-04-24

 Paraffin oils
 8012-95-1
 2007-03-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Asp. Tox. Aspiration hazard Eye Dam. Serious eye damage

H260 In contact with water releases flammable gases which may ignite spontaneously.

H304 May be fatal if swallowed and enters airways. H314 Causes severe skin burns and eye damage.

H318 Causes serious eye damage.

H350 May cause cancer. Skin Corr. Skin corrosion

Water-react. Substances and mixtures, which in contact with water, emit flammable gases

HMIS Rating

Health hazard: 3
Chronic Health Hazard: *
Flammability: 4
Physical Hazard 2

NFPA Rating

Health hazard: 3
Fire Hazard: 4
Reactivity Hazard: 2
Special hazard.1: W

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.2 Revision Date: 05/28/2017 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 6.1 Revision Date 05/28/2017 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Thallium

Product Number : 277932
Brand : Aldrich
Index-No. : 081-001-00-3

CAS-No. : 7440-28-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 2), H300 Acute toxicity, Inhalation (Category 2), H330 Acute aquatic toxicity (Category 3), H402 Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H300 + H330 Fatal if swallowed or if inhaled

H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment. P284 Wear respiratory protection.

P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse

mouth.

P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for

breathing. Immediately call a POISON CENTER/doctor.

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : TI

 Molecular weight
 : 204.38 g/mol

 CAS-No.
 : 7440-28-0

 EC-No.
 : 231-138-1

 Index-No.
 : 081-001-00-3

Hazardous components

Component	Classification	Concentration
Thallium		
	Acute Tox. 2; Aquatic Acute 3; Aquatic Chronic 3; H300 +	<= 100 %
	H330, H412	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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5.2 Special hazards arising from the substance or mixture

thallium oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control	Basis					
			parameters						
Thallium	7440-28-0	TWA	0.100000	USA. ACGIH Threshold Limit Values					
			mg/m3	(TLV)					
	Remarks	Alopecia							
		Adopted val	ues or notations e	nclosed are those for which changes					
	are proposed in the NIC								
		2010 Revision or addition to the notice of intended changes							
		See Notice of Intended Changes (NIC)							
		Danger of cutaneous absorption							
		TWA	0.020000	USA. ACGIH Threshold Limit Values					
			mg/m3	(TLV)					
		Peripheral neuropathy							
		Gastrointestinal damage							
		2015 Adopti							
		Danger of cutaneous absorption							
		TWA	0.020000	USA. ACGIH Threshold Limit Values					
			mg/m3	(TLV)					
		Peripheral n							
		Gastrointest							

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Danger of cutaneous absorption varies								
TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants						
Skin desi	Skin designation							
TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)						
Gastroint	al neuropathy estinal damage f cutaneous absorp	otion						
TWA	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits						
Potential for dermal absorption								

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: granular

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Colour: light grey

b) Odour No data available Odour Threshold No data available d) рH No data available

Melting point/freezing e)

point

Melting point/range: 303 °C (577 °F) - lit.

Initial boiling point and f)

boiling range

1,457 °C (2,655 °F) - lit.

Flash point ()Not applicable g) h) Evaporation rate No data available i) Flammability (solid, gas) No data available

Upper/lower flammability or explosive limits No data available

k) Vapour pressure No data available Vapour density No data available m) Relative density No data available Water solubility No data available Partition coefficient: n-No data available

octanol/water

Auto-ignition temperature

No data available

Decomposition temperature

No data available

r) Viscosity No data available Explosive properties No data available Oxidizing properties No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions 10.3

No data available

10.4 Conditions to avoid

Air sensitive.

10.5 Incompatible materials

Strong acids, Strong oxidizing agents

Hazardous decomposition products 10.6

Hazardous decomposition products formed under fire conditions. - thallium oxides Other decomposition products - No data available

In the event of fire: see section 5

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11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data availableThallium

Dermal: No data available(Thallium)

No data available(Thallium)

Skin corrosion/irritation

No data available(Thallium)

Serious eye damage/eye irritation

No data available(Thallium)

Respiratory or skin sensitisation

No data available(Thallium)

Germ cell mutagenicity

No data available(Thallium)

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Possible risk of congenital malformation in the fetus.(Thallium)

No data available(Thallium)

Specific target organ toxicity - single exposure

No data available(Thallium)

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available(Thallium)

Additional Information

RTECS: XG3425000

The most characteristic symptom of thallium exposure is alopecia (loss of impairment of nail growth often resulting in the appearance of crescent-s Other symptoms in acute poisoning relate chiefly to the gastrointestinal system. Acute poisoning results in swelling of the feet and legs, arthral the hands and feet, mental confusion, polyneuritis with severe pain in thangina-like pains, nephritis, wasting and weakness, and lymphocytosis and peripheral nervous system abnormalities may persist including ataxia, tre disorders, memory loss, and psychoses may develop., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Thallium)

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Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence(Thallium)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish LC50 - Cyprinodon variegatus (sheepshead minnow) - 21.0 mg/l - 96.0

h(Thallium)

mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 14.0 mg/l -

96.0 h(Thallium)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Thallium)

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chem scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3288 Class: 6.1 Packing group: II Proper shipping name: Toxic solid, inorganic, n.o.s. (Thallium)

Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 3288 Class: 6.1 Packing group: II EMS-No: F-A, S-A

Proper shipping name: TOXIC SOLID, INORGANIC, N.O.S. (Thallium)

IATA

UN number: 3288 Class: 6.1 Packing group: II Proper shipping name: Toxic solid, inorganic, n.o.s. (Thallium)

15. REGULATORY INFORMATION

SARA 302 Components

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No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No. Revision Date

Thallium 7440-28-0 2007-07-01

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

CAS-No. Revision Date 7440-28-0 2007-07-01

Pennsylvania Right To Know Components

CAS-No. Revision Date

Thallium 7440-28-0 2007-07-01

New Jersey Right To Know Components

CAS-No. Revision Date

Thallium 7440-28-0 2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H300 Fatal if swallowed.

H300 + H330 Fatal if swallowed or if inhaled

H330 Fatal if inhaled.

H402 Harmful to aquatic life.

H412 Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard: 4
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating

Health hazard: 4
Fire Hazard: 0
Reactivity Hazard: 0

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 6.0 Revision Date 05/28/2017 Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Zinc

Product Number : 324930 Brand : Aldrich Index-No. : 030-001-00-1

CAS-No. : 7440-66-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.

3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES

Telephone : +1 314 771-5765 Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Pyrophoric solids (Category 1), H250

Self-heating substances and mixtures (Category 1), H251

Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260

Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H250 Catches fire spontaneously if exposed to air.

H251 Self-heating: may catch fire.

H260 In contact with water releases flammable gases which may ignite

spontaneously.

H410 Very toxic to aquatic life with long lasting effects.

Aldrich- 324930

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P222 Do not allow contact with air.
P223 Do not allow contact with water.

P231 + P232 Handle under inert gas. Protect from moisture.

P235 + P410 Keep cool. Protect from sunlight. P273 Avoid release to the environment.

P280 Wear protective gloves/ eye protection/ face protection.

P335 + P334 Brush off loose particles from skin. Immerse in cool water/ wrap in wet

bandages.

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to

extinguish.

P391 Collect spillage.

P402 + P404 Store in a dry place. Store in a closed container.

P407 Maintain air gap between stacks/ pallets.

P413 Store bulk masses greater than .? kg/ .? lbs at temperatures not

exceeding .? °C/ .? °F.

P420 Store away from other materials. P422 Store contents under inert gas.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Zn

 Molecular weight
 : 65.39 g/mol

 CAS-No.
 : 7440-66-6

 EC-No.
 : 231-175-3

 Index-No.
 : 030-001-00-1

Hazardous components

Component	Classification	Concentration
Zinc powder (pyrophoric)		
	Pyr. Sol. 1; Self-heat. 1; Water-react. 1; Aquatic Acute 1; Aquatic Chronic 1; H250,	<= 100 %
	H251, H260, H410	

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Dry powder

5.2 Special hazards arising from the substance or mixture

Zinc/zinc oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Never allow product to get in contact with water during storage.

Keep in a dry place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Protective gloves against thermal risks

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method:

EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: powder

Colour: grey

b) Odourc) Odour Thresholdd) pHNo data availableNo data available

e) Melting point/freezing

point

Melting point/range: 420 °C (788 °F) - lit.

f) Initial boiling point and

boiling range

907 °C (1665 °F) - lit.

g) Flash point ()No data available

h) Evaporation rate No data available

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i) Flammability (solid, gas) May form combustible dust concentrations in air.

j) Upper/lower flammability or No data available

explosive limits

1 hPa at 487 °C (909 °F) Vapour pressure k)

Vapour density No data available

7.133 g/mL at 25 °C (77 °F) m) Relative density

Water solubility No data available

Partition coefficient: n-

octanol/water

log Pow: 5

Auto-ignition The substance or mixture is classified as self heating with the category 1... temperature

The substance or mixture is pyrophoric with the category 1.

Decomposition

No data available

temperature r)

Viscosity No data available s) Explosive properties No data available No data available Oxidizing properties

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

Reacts violently with water.

10.4 Conditions to avoid

Exposure to moisture

10.5 Incompatible materials

Strong acids and oxidizing agents

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Zinc/zinc oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

No data availableZinc powder (pyrophoric)

Inhalation: No data available(Zinc powder (pyrophoric))

Dermal: No data available(Zinc powder (pyrophoric))

No data available(Zinc powder (pyrophoric))

Skin corrosion/irritation

No data available(Zinc powder (pyrophoric))

Serious eye damage/eye irritation

No data available(Zinc powder (pyrophoric))

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Respiratory or skin sensitisation

Did not cause sensitisation on laboratory animals.(Zinc powder (pyrophoric))

Germ cell mutagenicity

No data available(Zinc powder (pyrophoric))

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No data available(Zinc powder (pyrophoric))

No data available(Zinc powder (pyrophoric))

Specific target organ toxicity - single exposure

No data available(Zinc powder (pyrophoric))

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available(Zinc powder (pyrophoric))

Additional Information

RTECS: ZG8600000

chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness(Zinc powder (pyrophoric)) To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Zinc powder (pyrophoric))

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish LC50 - Cyprinus carpio (Carp) - 450.0 µg/l - 96.0 h(Zinc powder (pyrophoric))

Toxicity to daphnia and

other aquatic invertebrates

LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h(Zinc powder

(pyrophoric))

mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d(Zinc powder

(pyrophoric))

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation Algae - 7 d

at 16 °C - 5 µg/l(Zinc powder (pyrophoric))

Bioconcentration factor (BCF): 466

12.4 Mobility in soil

No data available(Zinc powder (pyrophoric))

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

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12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1436 Class: 4.3 (4.2) Packing group: II

Proper shipping name: Zinc powder

Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1436 Class: 4.3 (4.2) Packing group: II EMS-No: F-G, S-O

Proper shipping name: ZINC POWDER

Marine pollutant : yes

IATA

UN number: 1436 Class: 4.3 (4.2) Packing group: II

Proper shipping name: Zinc powder

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

Zinc powder (pyrophoric)

CAS-No. Revision Date
7440-66-6
1993-04-24

SARA 311/312 Hazards

Reactivity Hazard

Massachusetts Right To Know Components

Zinc powder (pyrophoric)

CAS-No. Revision Date
7440-66-6
1993-04-24

Pennsylvania Right To Know Components

Zinc powder (pyrophoric)

CAS-No. Revision Date
7440-66-6

1993-04-24

New Jersey Right To Know Components

Zinc powder (pyrophoric)

CAS-No. Revision Date
7440-66-6
1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H250 Catches fire spontaneously if exposed to air.

H251 Self-heating: may catch fire.

H260 In contact with water releases flammable gases which may ignite spontaneously.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard: 0
Chronic Health Hazard:
Flammability: 3
Physical Hazard 1

NFPA Rating

Health hazard: 0
Fire Hazard: 3
Reactivity Hazard: 1
Special hazard.1: W

Further information

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Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 6.0 Revision Date: 05/28/2017 Print Date: 06/28/2019

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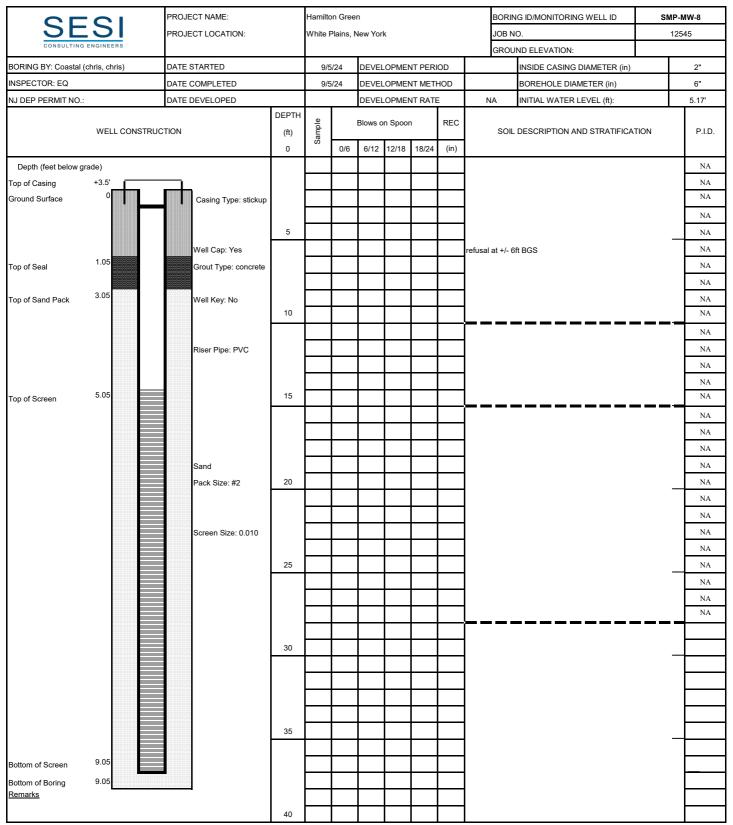


Monitoring Well Construction Diagrams

	<u> </u>		PROJECT NAME:		Hamilte	on Gree	n				E	BORING ID/MONITORING WELL ID	SMP-N	MW-7
SE	SI		PROJECT LOCATION:		White Plains, New York							OB NO.	125	
CONSULTING EN	NGINEERS										ROUND ELEVATION:			
BORING BY: Coastal (chi	ris, chris)		DATE STARTED		9/5/24 DEVELOPMENT PERIOD			IOD		INSIDE CASING DIAMETER (in)		2"		
INSPECTOR: EQ			DATE COMPLETED		9/5/24		DEVELOPMENT METHOD					BOREHOLE DIAMETER (in)		6"
NJ DEP PERMIT NO.: DATE DEVELOPED					DEVEL	.OPMEN	IT RATE		NA			0		
			<u>.</u>	DEPTH	0								I.	
	WELL CO	NSTRUC	TION	(ft)	Sample		Blows o	n Spoor	1	REC		SOIL DESCRIPTION AND STRATIFICA	TION	P.I.D.
				0	Š	0/6	6/12	12/18	18/24	(in)				
Depth (feet below grad	de)													NA
Top of Casing	+3.7'		_											NA
Ground Surface	0		Casing Type: stickup											NA
														NA
				5							Refusal a	at +/- 4' BGS		NA
			Well Cap: Yes								1			NA
Top of Seal	0.34		Grout Type: concrete											NA
											1			NA
Top of Sand Pack	1.34		Well Key: No											NA
				10							L			NA
														NA
			Riser Pipe: PVC											NA
														NA
														NA
Top of Screen	3.34			15										NA
														NA
														NA
														NA
			Sand											NA
			Pack Size: #2	20										NA
														NA
														NA
			Screen Size: 0.010											NA
														NA
				25										NA
														NA
l														NA
											<u>L</u> _			NA
				30]		_	
]			
]			
				35										
Bottom of Screen	7.04													
Bottom of Boring	7.04													
<u>Remarks</u>														
				40										

Approximate Change in Strata: _____ Inferred Change in Strata: _____

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted. Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.



Approximate Change in Strata: _____ Inferred Change in Strata: _____

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted. Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

0.5		_	PROJECT NAME:		Hamilto	on Gree	า				ВОР	RING ID/MONITORING WELL ID	SMP-	MW-9
SESI PROJECT LOCATION:			White Plains, New York			JOB NO.		125	545					
CONSULTIN	G ENGINEE	RS									GRO	OUND ELEVATION:		
BORING BY: Coastal	l (chris, ch	ıris)	DATE STARTED		9/5	5/24	DEVEL	OPMEN	IT PERI	IOD		INSIDE CASING DIAMETER (in)	2"
INSPECTOR: EQ			DATE COMPLETED		9/5	5/24	DEVEL	OPMEN	IT METI	HOD		BOREHOLE DIAMETER (in)		6"
NJ DEP PERMIT NO	ı.:		DATE DEVELOPED				DEVEL	OPMEN	IT RATE	E	NA	INITIAL WATER LEVEL (ft):		5.65
				DEPTH	Φ			n Spoor		REC		,,	<u> </u>	
	WEL	L CONSTRU	CTION	(ft)	Sample						SOIL DESCRIPTION AND STRATIFICATION		ATION	P.I.D.
Depth (feet below	arade)			0		0/6	6/12	12/18	18/24	(in)				NA
Top of Casing	+4.27'		 ,											NA
Ground Surface	0		Casing Type: Stickup											NA
			Gabing Type: Gabicap											NA
				5							1			NA
			Well Cap: Yes								1		_	NA
Top of Seal	3.57		Grout Type: NA								1			NA
1.5p or Sear			Grout Type. NA								†			NA
Top of Sand Pack	5.57		Well Key: No								1			NA
100 OI OAIN FACK			Well Ney. NO	10							Borina com	pleted at 9' BGS		NA
											9 55111			NA
			Riser Pipe: PVC								1			NA
I			INISEI FIPE. FVO											NA
					 						1			NA NA
Top of Screen	7.57			15	 						†			NA NA
Top of Screen											 			NA
											1			NA NA
														NA
			Sand											NA
			Pack Size: #2	20							1			NA
			Fack Size. #2	20	1						1		_	NA
														NA
			Screen Size: 0.010								1			NA
			Screen Size: 0.010	1	\vdash	1				1	1			NA NA
				25	 						1			NA NA
					1						†		_	NA NA
				1	\vdash	1				1	1			NA NA
					 						†			NA NA
					 						├			+
				30							1			-
				30							1		_	+
				1	\vdash	-				-	1			-
					-						1			-
				1	<u> </u>						1			<u> </u>
				25	-						1			-
				35	 						4		_	
5 65	12.57										4			
Bottom of Screen											4			
Bottom of Boring Remarks	12.57										4			
Komarks					<u> </u>						4			<u> </u>
				40										

Approximate Change in Strata: _____ Inferred Change in Strata: _____

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted. Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

Appendix G:

SMP Forms



NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION



Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is:

Have Ecological Resources been identified?

Is this soil originating from the site?

How many cubic yards of soil will be imported/reused?

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone?

Does it contain less than 10%, by weight, material that passes a size 100 sieve?

Is this virgin material from a permitted mine or quarry?

Is this material recycled concrete or brick from a DEC registered processing facility?

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING
Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):
Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.
If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.
SECTION 4 – SOURCE OF FILL
Name of person providing fill and relationship to the source:
Traine of person providing fin and retained single to the source.
Location where fill was obtained:
Identification of any state or local approvals as a fill source:
If no approvals are available, provide a brief history of the use of the property that is the fill source:
Provide a list of supporting documentation included with this request:
The first of supporting documentation metaded with this request.

The information provided on this form is	s accurate and complete.
Signature	Date
Print Name	-
Firm	-

INSPECTION CHECKLIST

Hamilton Green Site WHITE PLAINS, NEW YORK NYSDEC BCP No. _C360177

SESI CONSULTING ENGINEERS Inspection Date:

MONITORING WELL NETWORK

-	Are all the on-Site monitoring wells accessible for annual compliance sampling (i.e., they are not covered by soil, dumpsters, etc.)?	Yes	No
-	Is the integrity of the flush-mount/stickup manhole covers And associated concrete pads intact?	Yes	No
-	Are the monitoring wells locked and the locks functioning?	Yes	No

LOW-FLOW GROUNDWATER SAMPLING LOG

Location:				Job Number:					
Personnel:				Date:					
•				PID:	0		CONSULTING ENGINEERS		
Stickup? Yes Distance ground to Stickup Rim/PVC	Distance From Rim to PVC	Total Depth of Well Rim/PVC	Depth to Product Rim/PVC	Depth to Water (Rim/PVC)	Standing Water Column (feet)	Middle of Saturated Zone (feet)	Depth to Sample Tube (feet)	TOV @ Well Head (ppmv)	Pump Peristaltic or Bladder
Turbidity at co	ollection (NTU):		(Less than	5 NTU is desirable)	Dupli	cate Collected	? Y/N	Filtered Y/	
Stabilization	n Parameters	+/- 0.5 deg C.	+/- 0.1 Unit	+/- 10 umhos/cm or within 3% if >300umho	1 ppm	+/- 10 mV	No Limit	<.3 feet drawdown desirable	No Limit
		1	1				1	-	
Volume Purged (gallons)	Time (actual Time) 5 minute Intervals	TEMP. (Deg. C)	рН	Specific Conductivity uS/cm	Dissolved Oxygen (mg/L)	ORP mV millivolts	Turbidity NTUs	DTW (feet)	Odors Y/N
			We	ell Condition Summa	iry				
Cover: Y / N		Bolts: Y / N		Concrete Pad OK: Y		Gripper: Y / N			
			Samp	le Collection Inform	ation		7		
Sample Time:		Appearance:		Filtered Sample Tur	•		OTHER:		
stabilization. Notes/ Calculations:	(slow drip) & turbidity <10 if possible. If t ing; 1"=0.041 gal. 2"= 0.163		id unfiltered samples. No	otify PM of high turbidity and collection	on of filtered samples prior to	lab submittal.		Minimum 20 minute p	urge to establish
				ABSORBENT SOCK					
Sock Length (ft) =		Capacity	(Qt.) =		Present:	Y/N	Product Measu	red (Inches) :	<u> </u>
Sock Instal				Sock Chai	nged :	Y/N			
Sock Depti	h (Depth to sock mid p	oint):							

SMP Template: May 2023

Summary of Green Remediation Metrics for Site Management

Site Name:		Site Code:	
		City:	
State:		County:	
Initial Report Period Start Date:	` -	covered by the Initial Report submit	tal)
Current Reporting I	Period		
Reporting Period From	n:	To:	
Contact Information	l		
		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 onsite.

	Current Reporting Period (tons)	Total (tons)	to	Date
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:
CONTRACTOR CERTIFICATION
I, (Name) do hereby certify that I am
(Title) of(Contractor Name), which
is responsible for the work documented on this form. According to my knowledge and
belief, all of the information provided in this form is accurate and the site management
program complies with the DER-10, DER-31, and CP-49 policies.
Date Contractor

Appendix H:

Field Sampling Plan

Hamilton Green Site WHITE PLAINS, NEW YORK

FIELD SAMPLING PLAN

NYSDEC BCP Site Number: C360177

Prepared for:

S-WD/WP LLC c/o Law Offices of Denise J. D'Ambrosio 2 Westchester Park Drive, Suite 418 White Plains, New York 10604

Prepared by: SESI CONSULTING ENGINEERS, D.P.C. 959 Route 46E, Floor 3, Suite 300 Parsippany, NJ 07054

JULY 2024

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1.0 INTRODUCTION

This document comprises a Field Sampling Plan to be conducted at the Hamilton Green Site (the "Site"), as part of the Site Management Plan (SMP). It includes a description of the planned field sampling including sampling methodology (groundwater), analytical methodology (analytical methods and analytes), and quality assurance procedures. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C360177 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Hamilton Green I Partners LLC (the "Volunteer") entered into a Brownfield Cleanup Agreement (BCA) with the NYSDEC in April 2022, to investigate and remediate a 1.94-acre property located in the City of White Plains, New York. A figure showing the Site location and boundaries is provided in Figure 1.2 of the SMP. The boundaries of the Site are more fully described in the metes and bounds description that is part of the Environmental Easement provided in Appendix A of the SMP.

The Site was remediated to conditional Track 1 unrestricted use cleanup objectives and will be used for residential apartment buildings with ground floor retail and restaurants. The Site soils have been remediated to unrestricted use soil clean-up objectives (USCOs). The groundwater will require monitoring for residual contaminants after the certificate of completion (COC) in 2024. The groundwater contamination is expected to reach the applicable ambient water quality standards (AWQS) or asymptotic levels within five (5) years post COC.

2.0 GROUNDWATER SAMPLING PLAN

2.1 Groundwater Sample Locations

SESI will collect ground water samples from nine (9) groundwater monitoring wells, as shown in Figure 2.2B of the SMP. The monitoring well locations, required analytical parameters, and the sampling schedule for groundwater sampling are provided in **Table 2.1** below – Groundwater Post Remediation Sampling Requirements and Schedule. All samples will be sent to an ELAP-certified laboratory for volatile organic compounds (VOCs), semi-VOCs (SVOCs), Target Analyte List (TAL) Metals, and Per- and polyfluoroalkyl substances (PFAS) as listed on Table 6.8 of Part 375.6 by EPA Method 8260C for VOCs, by EPA Method 8270D for SVOCs, TAL metals by EPA Methods 6010/7471, and by EPA Method 1633 for PFAS.

Table 2.1: Groundwater Post Remediation Sampling Requirements and Schedule.

Monitoring Well I.D	Location	Sample Analysis	Schedule
SMP-MW1	South/downgradient of Historical Gas Station	VOCs, SVOCs, TAL Metals, PFAS	
SMP-MW2	South/downgradient	VOCs, SVOCs, TAL Metals, PFAS	Quarterly
SMP-MW3	South/downgradient	VOCs, SVOCs, TAL Metals, PFAS	
SMP-MW4	Central/upgradient	VOCs, SVOCs, TAL Metals, PFAS	
SMP-MW5	North/upgradient	VOCs, SVOCs, TAL Metals, PFAS	

2.2 Groundwater Sampling Protocol

Prior to sampling, the monitoring wells will be gauged for depth to water and groundwater elevation data will be calculated from the top of casing elevations. The wells will be sampled using the low flow purging technique. A flow rate of 100 ml to 250 ml per minute will be used to purge the wells. Drawdown should not exceed 0.3 feet if possible. QED bladder pumps or peristaltic pumps will be used for this method. The pump intake will be lowered to the mid-point of the water column. At the initiation of low flow purging, depth to water will be recorded as well as field parameters. Field parameters and depth to water will then be monitored using a flow through cell and water level indicator every five minutes during low flow purging. When three consecutive measurements of pH differ by 0.1 units or less and ORP within 10 mv or less, turbidity varies 10 percent or less,

conductivity differs by 3 percent or less and dissolved oxygen by 10 percent or less, sampling may begin. Flow through cells are used so continuous real time readings are made. When the parameters stabilize the flow through cell is disconnected and sample bottles are filled directly from the tubing. All field readings will be recorded on the applicable forms provided in Appendix H of the SMP.

PFAS sampling will be conducted in accordance with the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (April 2023) as specified in the Quality Assurance Project Plan (Appendix D of the SMP).

In addition to the groundwater samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of 40 ml VOA vials, as follows:

A trip blank will be prepared by the laboratory and sent with each sample bottle shipment. The trip blank consists of two 40 mil sample bottles filled with distilled, deionized water which accompany the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for target compound list (TCL) VOCs is planned (water matrix only). The trip blank will be analyzed for TCL VOCs to determine whether the volatile sample results could have been affected by external contamination such as exhaust fumes or background conditions at the Site. In addition to the laboratory analytical data, field measurements will be collected as described above during low flow purging.



Environmental Footprint Analysis



Geotechnical Environmental Site Civil

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Parsippany, NJ 07054
973.808.9050
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SMP ENVIRONMENTAL FOOTPRINT ANALYSIS

For

Hamilton Green Site BCP No. 360177 200 Hamilton Avenue White Plains, Westchester County, NY

Prepared for:

S-WD/WP LLC

c/o Law Offices of Denise J. D'Ambrosio

December 2024

SESI Project No:

12545

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1.0 PURPOSE

The purpose of this environmental footprint analysis (EFA) analysis is to conduct a quantitative assessment of the potential environmental impact and social impact (accident risks) of the Site Management Plan (SMP). The sustainability analysis was performed using SiteWise version 3.2 (NAVFAC 2018) for the SMP.

SiteWise is a series of Excel sheets and provides a detailed baseline assessment of several quantifiable sustainability metrics including greenhouse gases (GHGs), energy usage, electricity usage from renewable and non-renewable sources, criteria air pollutants that include sulfur oxides (SOx), oxides of nitrogen (NOx), and particulate matter (PM), water usage, resource consumption, and accident risk. The inputs that were considered include: (1) production of material required by the activity in the SMP; (2) transportation of the required materials, equipment and personnel to and from the site for each activity; (3) all on-site activities to be performed such as equipment operation; and (4) management of the waste produced by the activity.

SiteWise uses various emission factors from governmental and non-governmental research sources to quantify the environmental impact of each activity. The quantitative metrics calculated by the tool include Greenhouse Gases (GHGs) reported as metric tons of carbon dioxide equivalents (CO_2e), consisting of carbon dioxide (CO_2), methane (CO_4), and nitrous oxide (N_2O_3); Water usage (gallons of water); Energy usage (expressed as millions of British thermal units [MMBTU]); Air emissions of criteria pollutants consisting of metric tons of nitrogen (NO_x), sulfur oxides (SO_x), and particulate matter (PM_{10}); and Accident risk (risk of injury and risk of fatality).

To estimate the sustainability footprint (quantified emissions) for the SMP, only the elements that possess important sustainability impacts were included in the assessment. A lower footprint indicates lower negative impacts to environmental and social metrics.

The major activities evaluated are listed below:

Material production

Transportation of personnel and equipment (contractors)

Transportation of personnel (SESI)

Equipment use for the installation of the monitoring wells

Groundwater monitoring

On-site labor hours for estimate of accident risks during monitoring well installation and groundwater monitoring.

The assumptions used for the SiteWise evaluation are as follows:



- The environmental footprint for production of the equipment used, or the production of vehicles used for transportation, is not considered.
- Water use for consumable manufacturing is not included in this analysis. Therefore, the water use for the SMP activities may be underestimated.
- Groundwater monitoring will be performed quarterly to assess the performance of the remedy. Sampling will occur until the results for all parameters show a bulk reduction in groundwater contamination to asymptotic levels to the Department's satisfaction per 6 NYCRR Part 375-3.8(e)(1)(iii)(b). Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. For the purposes of this EFA, a 5-year sampling period was assumed.
- There will be minimal waste generated during well monitoring (well tubing, bailers, etc. water purged from wells during groundwater sampling will be drummed for off-Site disposal).
- Small amounts of clean deionized water (less than two [2] gallons per quarter) may be used for cleaning dedicated sampling equipment.
- Site monitoring will not disturb the land and/or ecosystems.
- The network of monitoring wells to monitor groundwater conditions at the Site will be installed prior to sampling activities. Therefore, material production associated with monitoring well materials was considered in this analysis.

Note that SiteWise calculates environmental and risk footprints based on industry averages, published emissions factors and generalized data sources. The footprint results may not be representative of actual emissions and may only be used for comparative purposes only.

2.0 RESULTS AND CONCLUSIONS

The quantitative assessment of the potential environmental impact and social impact (accident risks) of SMP activities is summarized in Table 1 and Figures 1 through 13.

Table 1 presents the environmental footprint summary of sampling activities. Green House Gas (GHG) emissions are mainly from equipment use and miscellaneous (analytical testing, on-site labor and activities) at 95%. The energy used in the project was mostly from equipment use and miscellaneous (69.3%). Onsite NOx emissions (0.00155 metric tons) were from equipment use and miscellaneous. Onsite SOx emissions (0.000158 metric ton) were from equipment use and miscellaneous. Onsite PM₁₀ emissions (0.000139 metric ton) are from equipment use and miscellaneous. Total NOx emissions (2.98 metric tons) are from equipment use and miscellaneous. Total SOx emissions (2.24 metric tons) are from equipment use and miscellaneous. Total PM₁₀ emissions (0.0252 metric tons) are from equipment use and miscellaneous. Accident Risk (fatality) is mainly from personnel transportation (89.7%). Accident Risk (injury) is mainly from personnel transportation and equipment use.



The results indicate that equipment use and miscellaneous (analytical testing, on-site labor and activities) has the biggest environmental footprint on the project (GHG, energy used, NOx, SOx, PM₁₀). Accident risk is mainly from personnel transportation.

Groundwater monitoring activities to assess the effect of the remedial excavation on groundwater contamination mitigation will continue, as determined by the NYSDEC project manager in consultation with the NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, treatment and/or control measures will be evaluated and further groundwater remedial measures of the residual contamination may be considered. Therefore, an EFA of the additional groundwater remedial alternatives may be conducted once the evaluation of the attenuation of groundwater contamination is completed. The environmental footprint of the remedial alternatives would also be evaluated to explore opportunities to further optimize the environmental footprint of the project and integrate sustainable remediation best practices in the operation of the additional remedial actions.

Table 1: Environmental Footprint Summary

Phase	Activities	GHG Emissions metric ton	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions metric ton	Onsite SOx Emissions metric ton	Onsite PM10 Emissions metric ton	Total NOx Emissions metric ton	Total SOx Emissions metric ton	Total PM10 Emissions metric ton	Accident Risk Fatality	Accident Risk Injury
		metric ton	MINIDIO	gallolis	mvv.:	metric ton	metric ton	metric ton	metric ton	metric ton	medic ton		
-	Consumables	1.36	3.6E+02	NA	NA	NA	NA	NA	2.3E-03	3.1E-03	3.9E-04	NA	NA
	Transportation-Personnel	1.61	2.0E+01	NA NA	NA	NA	NA	NA	6.0E-04	2.1E-05	1.2E-04	3.4E-05	2.7E-03
e .	Transportation-Equipment	0.06	7.7E-01	NA NA	NA	NA	NA	NA	1.9E-05	3.3E-07	1.7E-06	3.1E-07	2.5E-05
Component	Equipment Use and Misc	61.40	8.8E+02	8.1E+02	0.0E+00	1.5E-03	1.6E-04	1.4E-04	3.0E-01	2.2E-01	2.5E-02	3.2E-06	2.3E-03
ĕ	Residual Handling	0.14	1.9E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	4.5E-05	1.9E-06	3.7E-06	7.8E-07	6.3E-05
· ·	Sub-Total	64.57	1.27E+03	8.10E+02	0.00E+00	1.55E-03	1.58E-04	1.39E-04	2.98E-01	2.24E-01	2.52E-02	3.79E-05	5.06E-03
8	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
omponent 2	Transportation-Personnel	0.00	0.0E+00	NA NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
and a	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
<u>ă</u>	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Con	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
· ·	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
m	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
Ĕ	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Component	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
흍	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ō	Residual Handling	0.00	0.0E+00	NA NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
									,				
4	Consumables	0.00	0.0E+00	NA NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
Component 4	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ĕ	Transportation-Equipment	0.00	0.0E+00	NA NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
훕	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Cor	Residual Handling	0.00	0.0E+00	NA NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		6.5E+01	1.3E+03	8.1E+02	0.0E+00	1.5E-03	1.6E-04	1.4E-04	3.0E-01	2.2E-01	2.5E-02	3.8E-05	5.1E-03



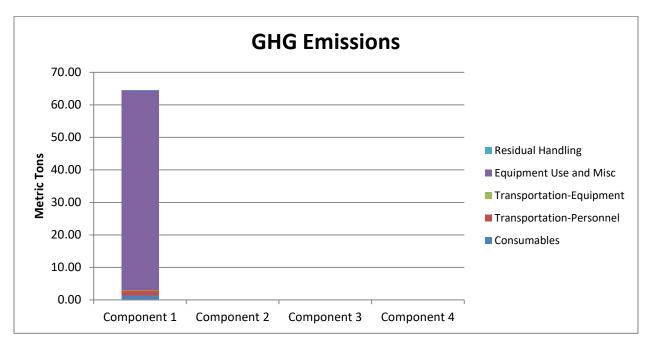


Figure 1: GHG Emissions

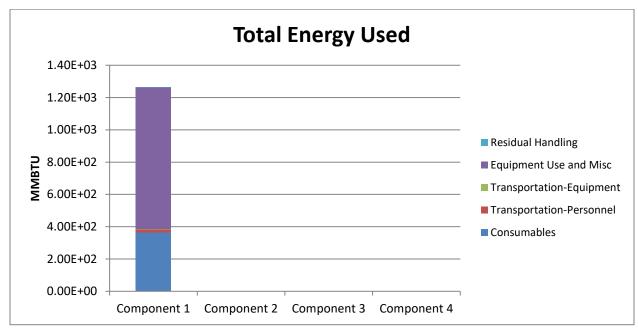


Figure 2: Total Energy Used



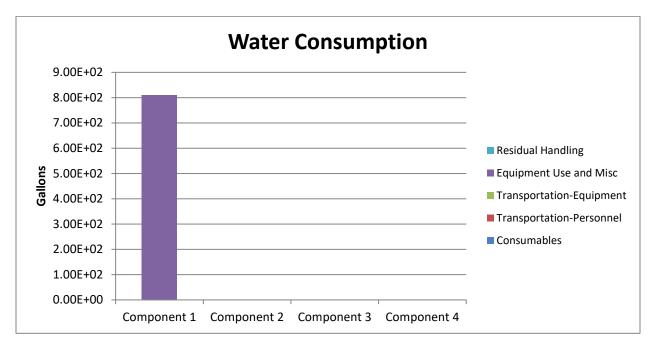


Figure 3: Water Consumption

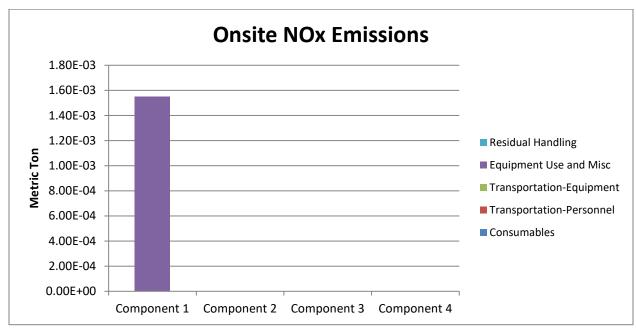


Figure 4: Onsite NOx Emissions



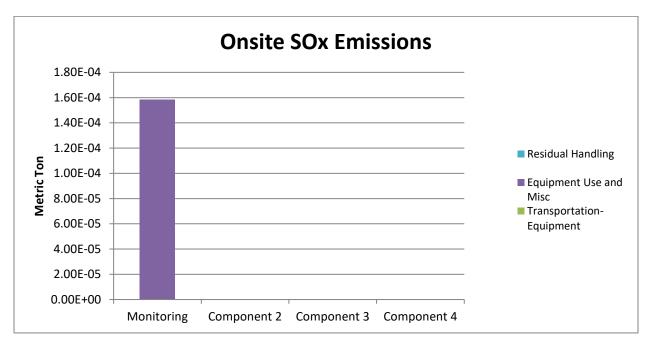


Figure 5: Onsite SOx Emissions

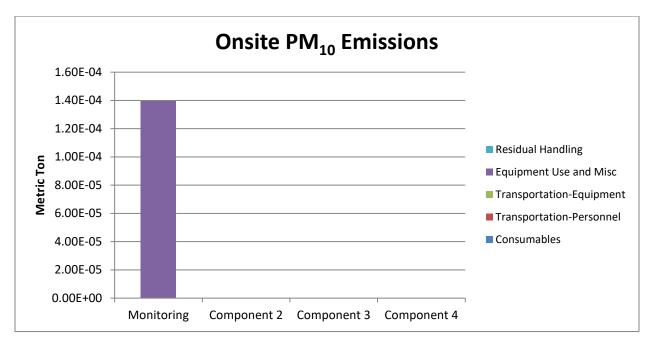


Figure 6: On-Site PM₁₀ Emissions



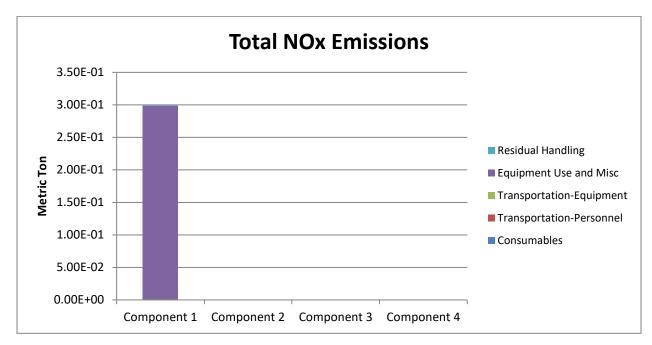


Figure 7: Total NOx Emissions

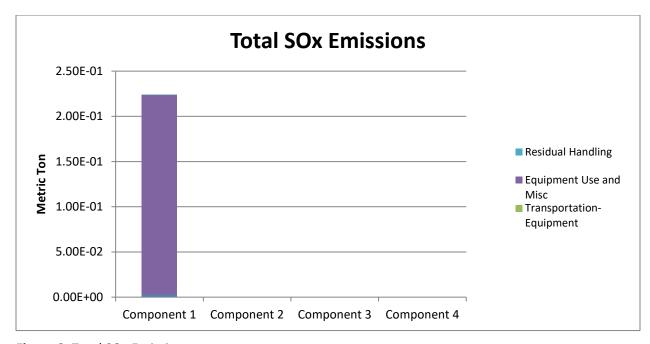


Figure 8: Total SOx Emissions



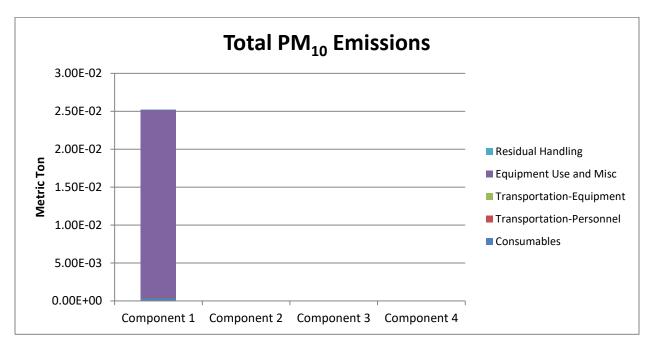


Figure 9: Total PM₁₀ Emissions

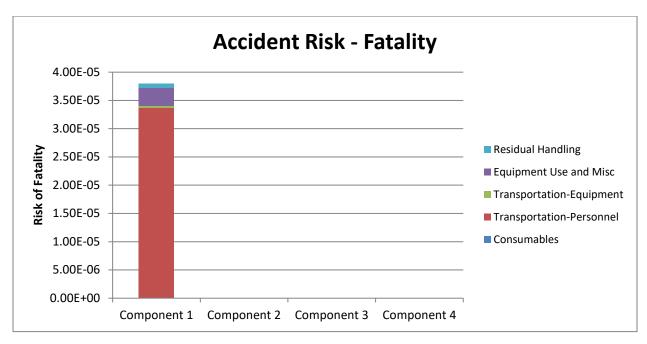


Figure 10: Accident Risk – Fatality



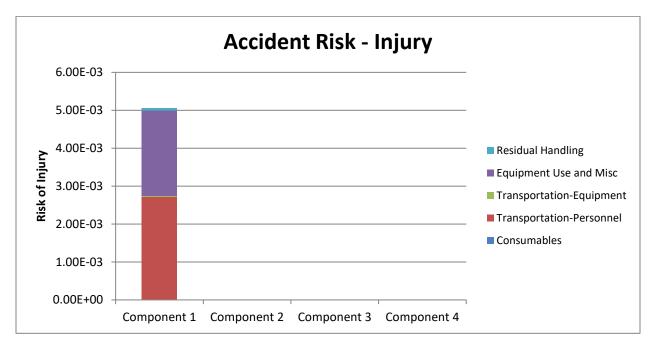


Figure 11: Accident Risk – Injury

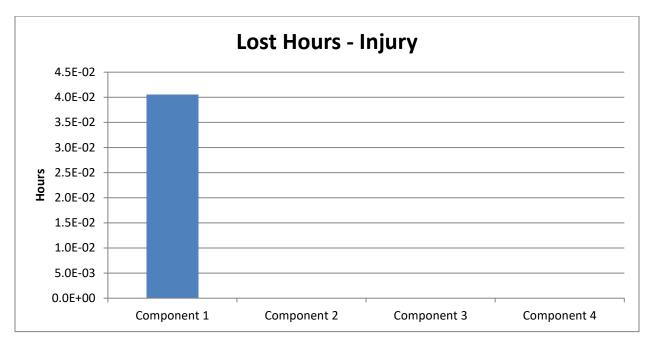
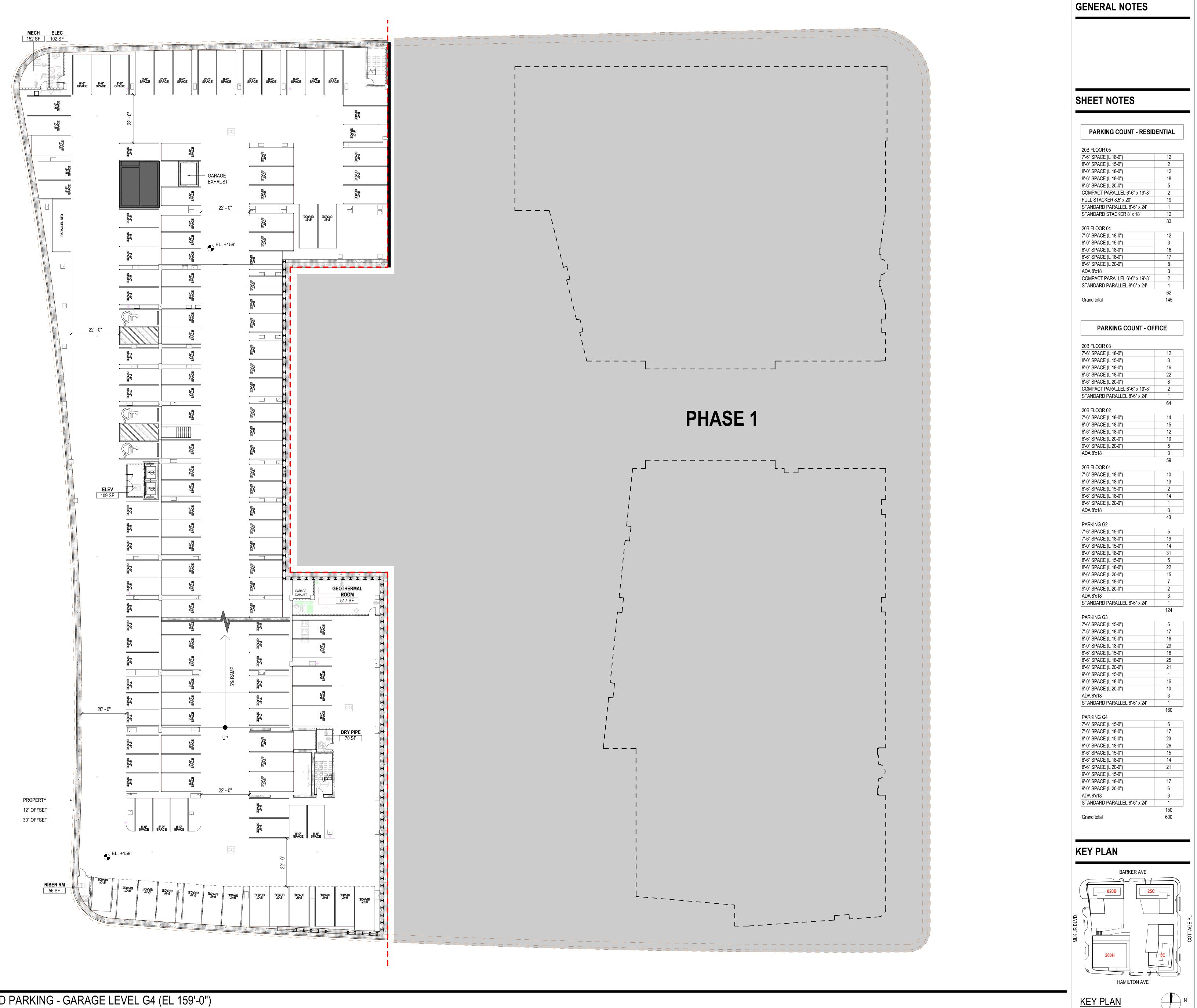


Figure 12: Lost Hours – Injury

Appendix J:

Proposed Building Foundation and Subgrade Level Plans



HAMILTON GREEN NYPA HQ

200 Hamilton Avenue, White Plains NY 10601

Gensler 1700 Broadway

Suite 400 New York, NY 10019 **United States**

> CAPPELLI **RXR**

CAPPELLI ORGANIZATION RXR REALTY 5 Renaissance Square 75 Rockefeller Plaza

White Plains, NY 10601 New York, NY 10019 Tel 914.769.6500 Tel 212.797.1330 me engineers

Suite 1050

Tel 212.492.1400

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TADJER COHEN EDELSON ME ENGINEERS ASSOC., INC. 29 W 38th St 1501 Farm Credit Drive New York, NY 10018 Suite #2300

Tel 212.447.6770 McLean,VA. 22102 Tel 301.587.1820

AKRF ENGINEERING KIMLEY HORN **ENGINEERING** 34 South Broadway 1 N Lexington Ave Suite 300 Suite 505 White Plains, NY 10601 White Plains, NY 10601 Tel 914.949.7336 Tel 914.368.9200

ERIC RAINS LANDSCAPE ARCHITECTURE 11 North Main Street South Norwalk, CT 06854 Tel 203.354.6500

629 5th Avenue Suite 204 Pelham, NY 10803 Tel 914.693.0221

GOLDSTICK LIGHTING

DESIGN

52 FORTUNE SHEPLER SAILING 8752 Forrest Drive

Tel 862.400.6382

Highlands Ranch, CO 80126

∑ Date Description

12.20.2024 DESIGN DEVELOPMENT 08.16.2024 SCHEMATIC DESIGN

Seal / Signature

PROGRESS SET NOT FOR CONSTRUCTION

Project Name HG | NYPA HQ

Project Number 06.4936.000

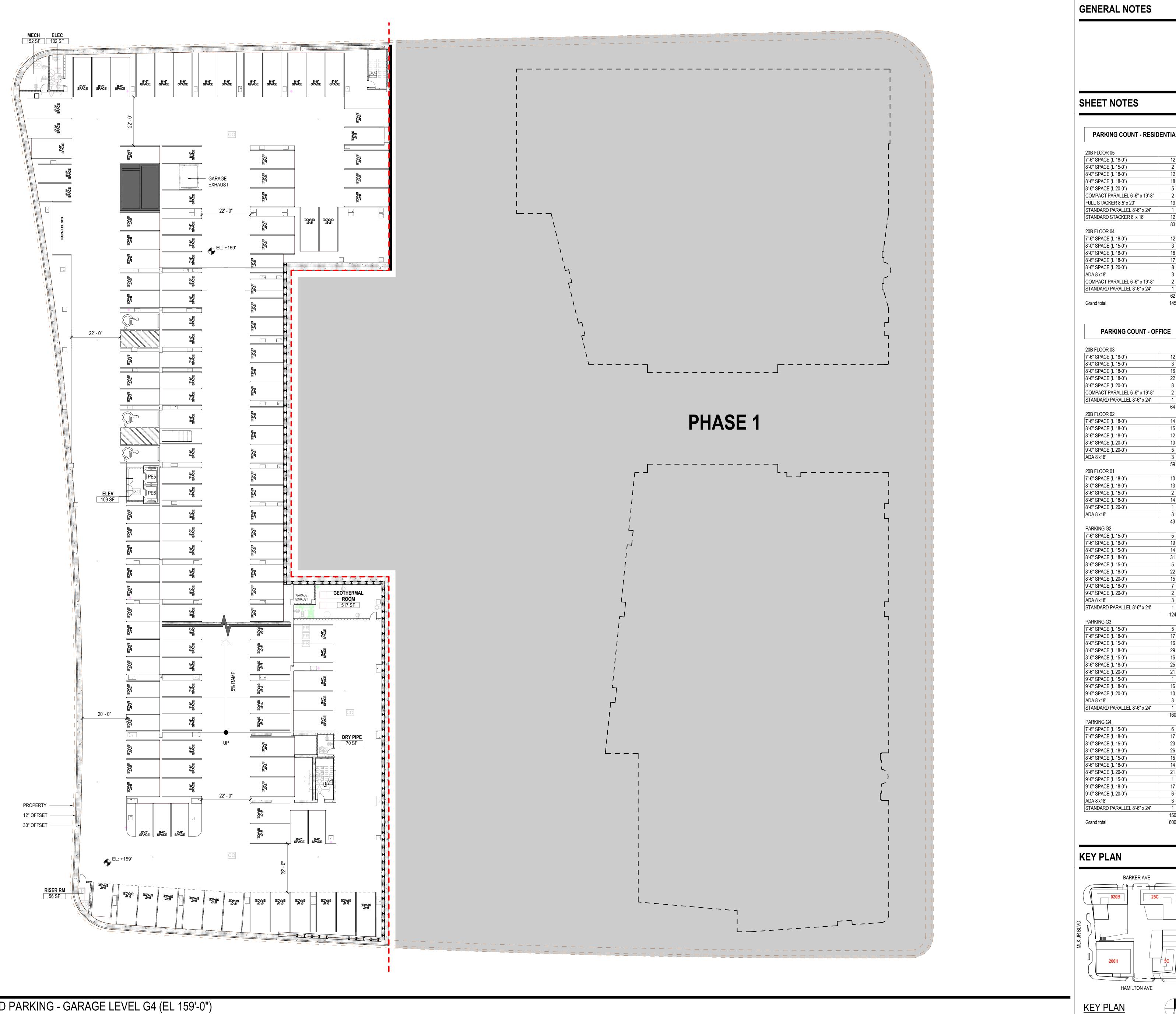
GARAGE PLAN - LEVEL G4

As indicated

A0.097

Ref North

01 SD PARKING - GARAGE LEVEL G4 (EL 159'-0")
SCALE: 1/16" = 1'-0"

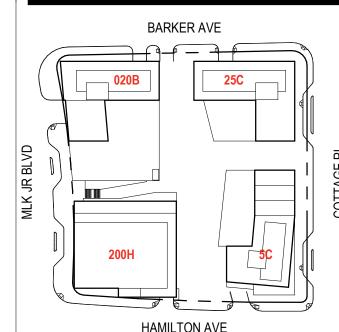


HAMILTON GREEN NYPA HQ

200 Hamilton Avenue, White Plains NY 10601

PARKING COUNT - RESIDENTIAL

1 17



Gensler

42nd Floor

White Plains, NY 10601

1700 Broadway Suite 400 New York, NY 10019 **United States**



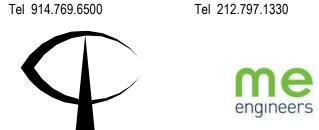
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HG | NYPA HQ

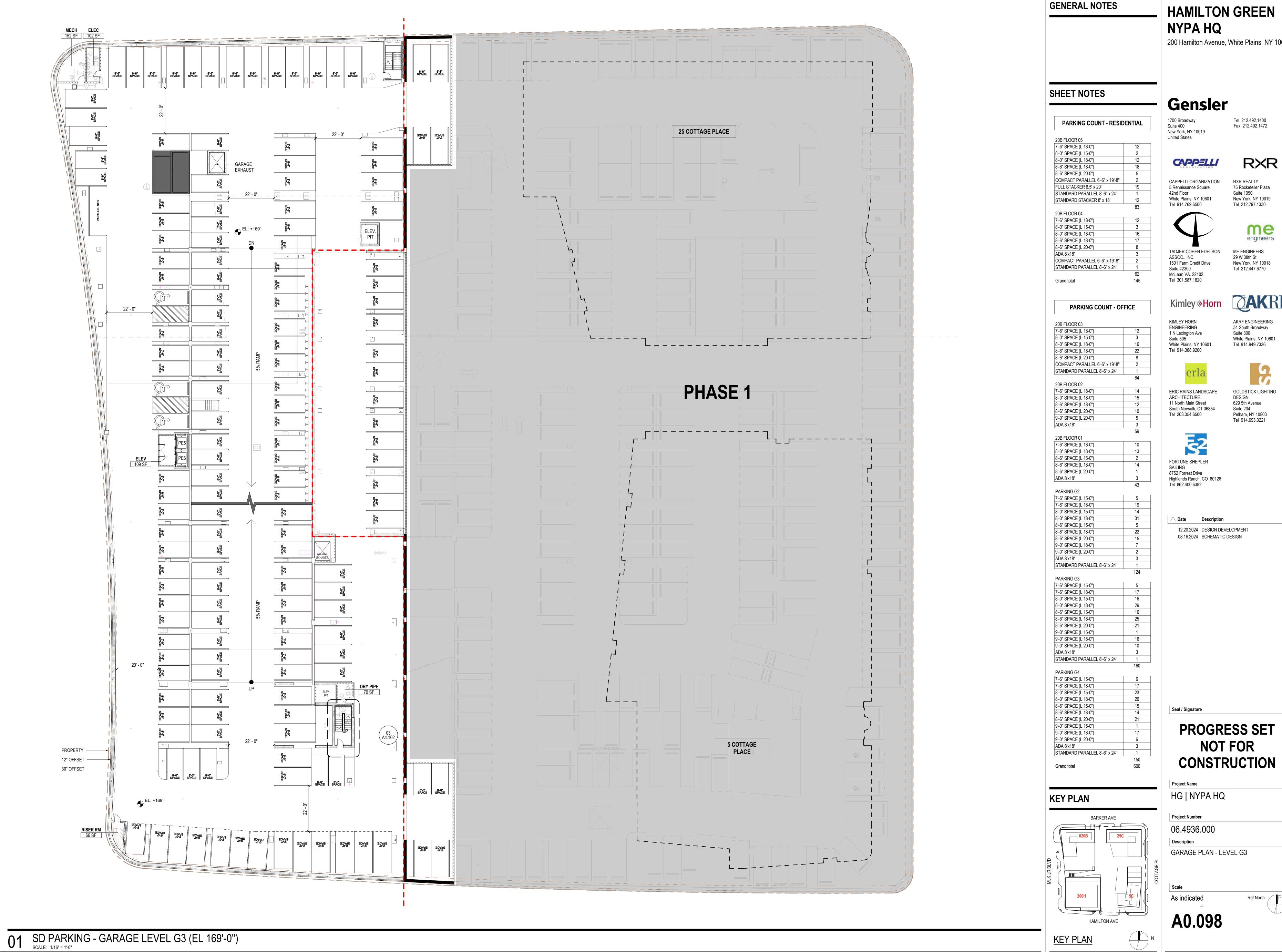
Project Number 06.4936.000

GARAGE PLAN - LEVEL G4

A0.097

Ref North

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SCALE: 1/16" = 1'-0"



HAMILTON GREEN

200 Hamilton Avenue, White Plains NY 10601

RXR

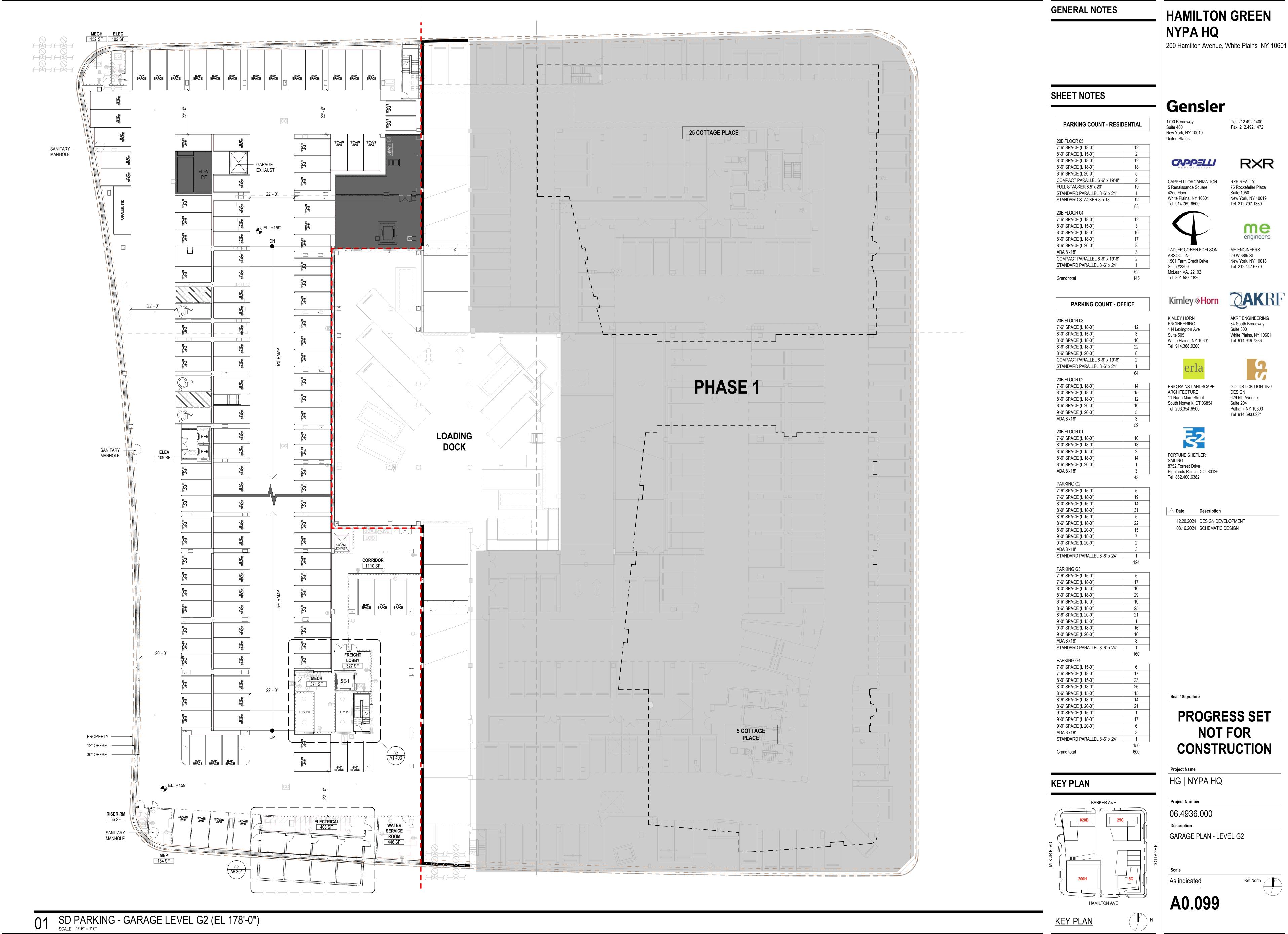
RXR REALTY 75 Rockefeller Plaza

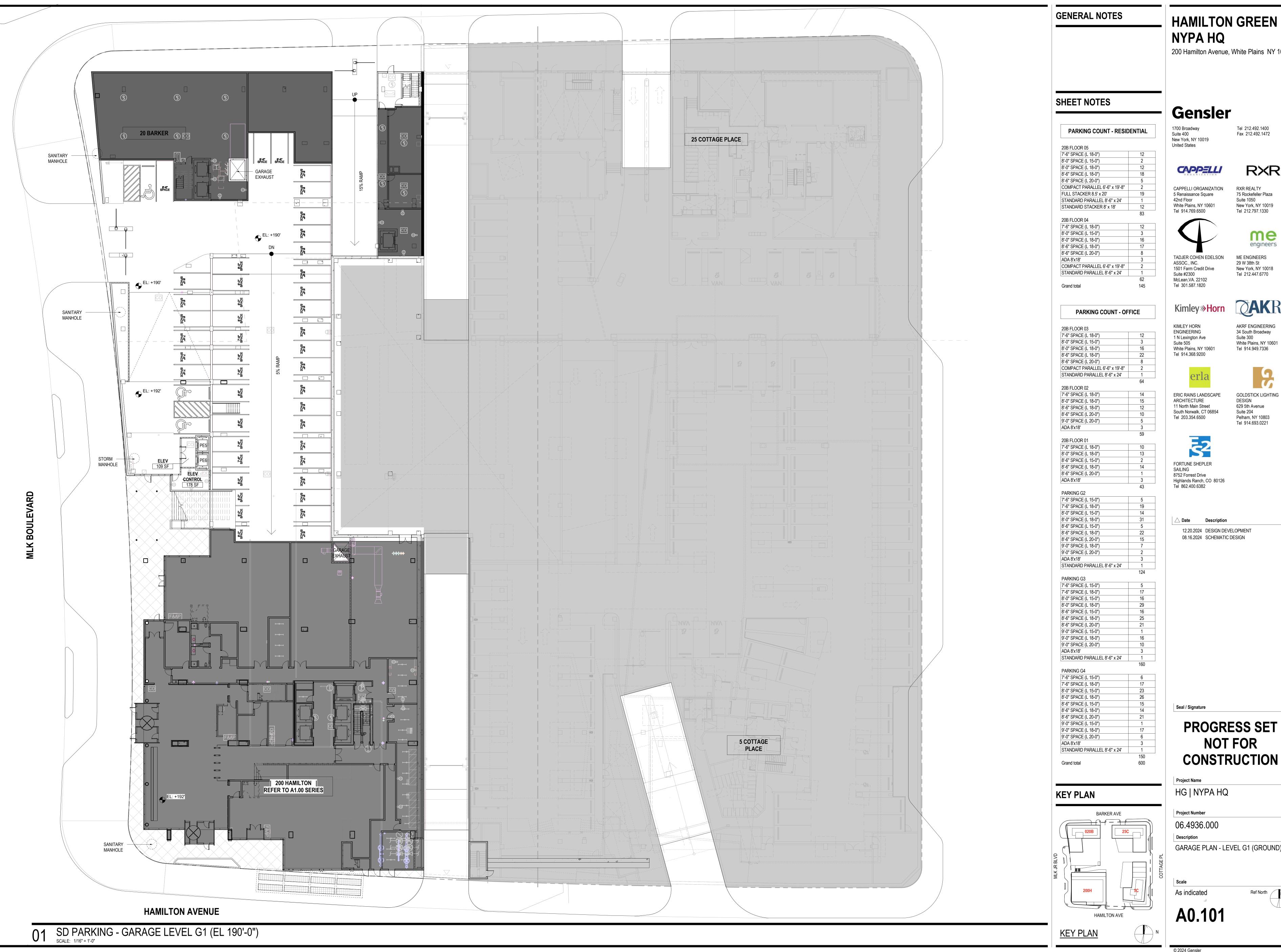
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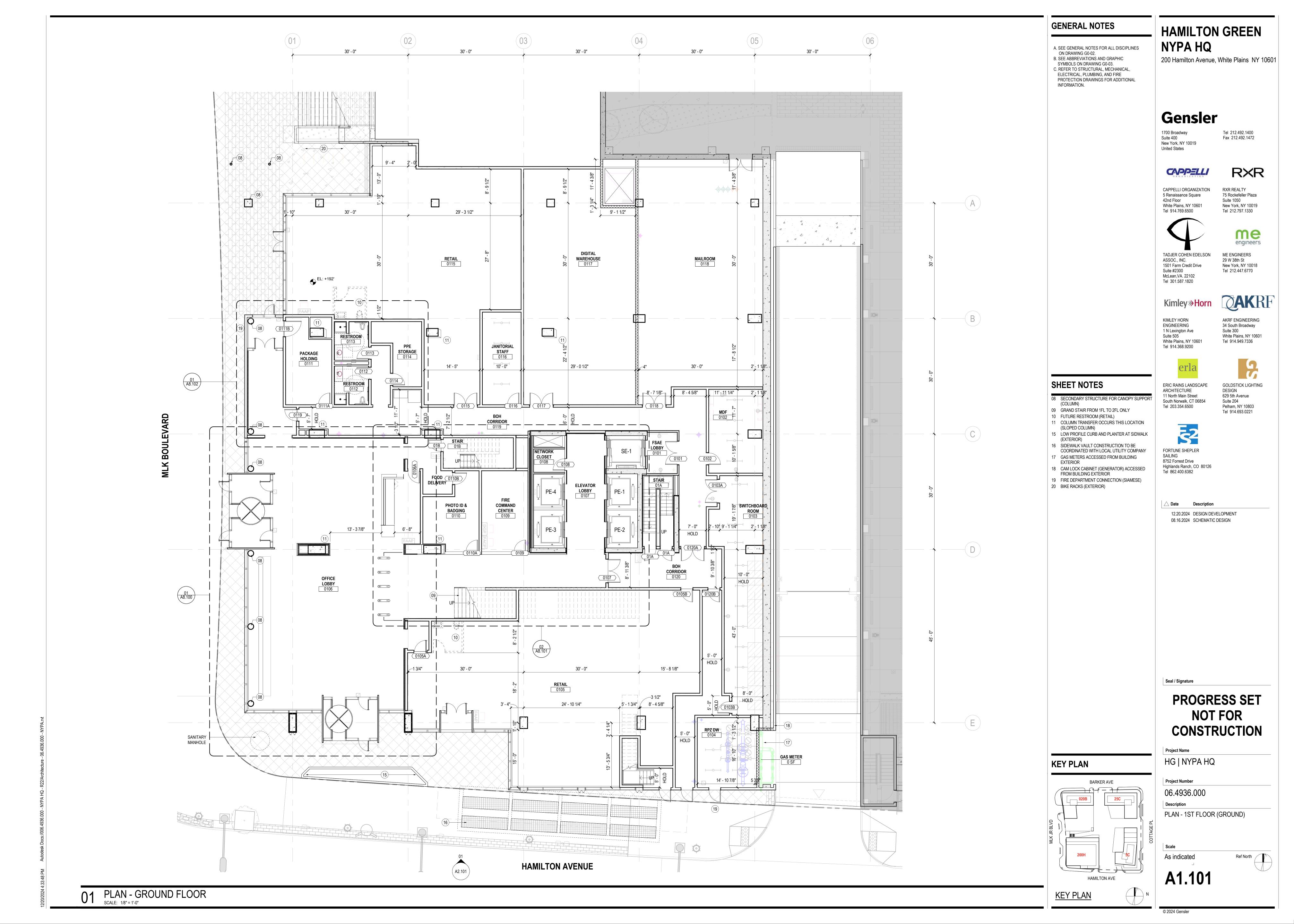
> DESIGN 629 5th Avenue Suite 204 Pelham, NY 10803 Tel 914.693.0221

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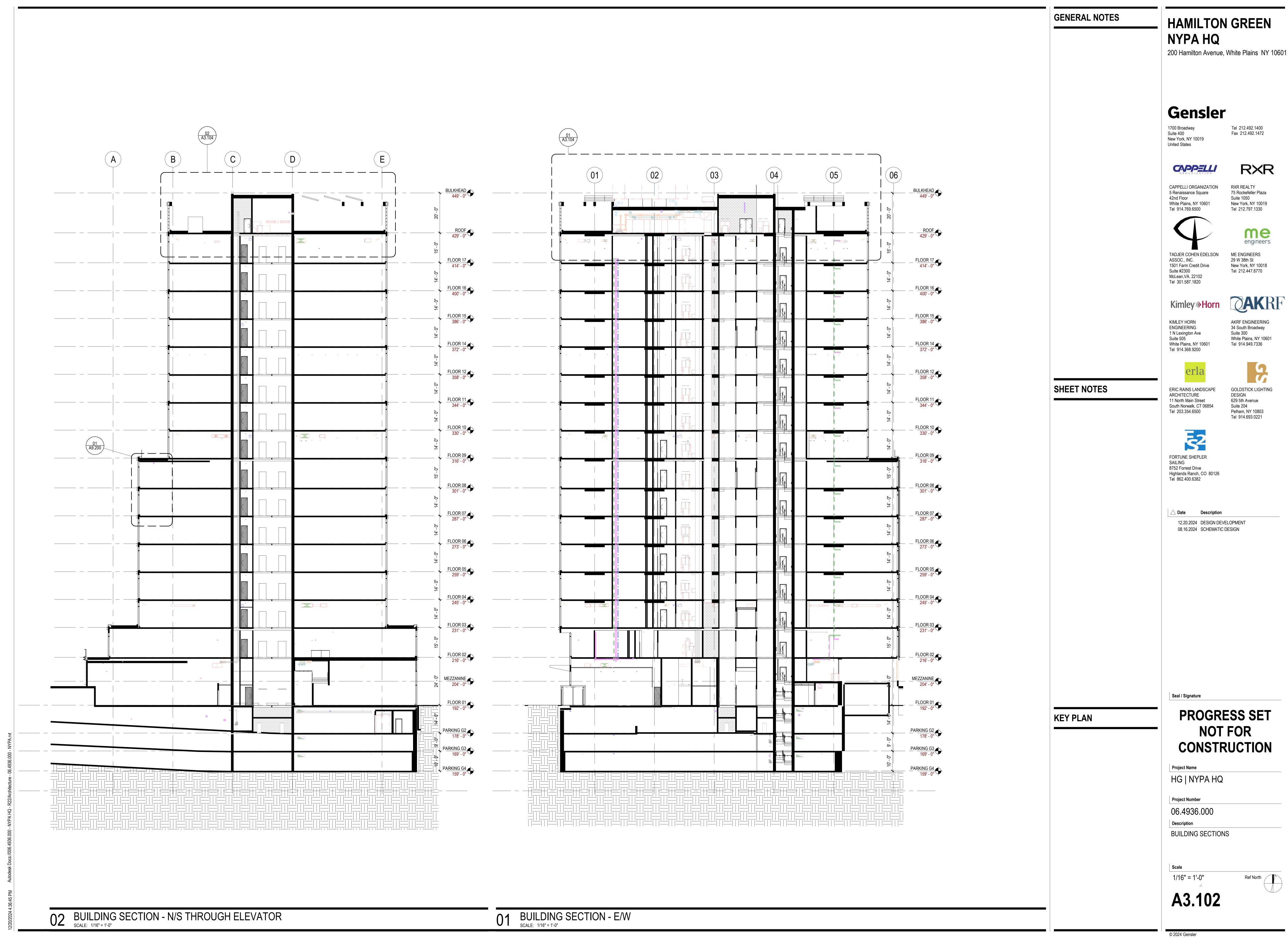
GARAGE PLAN - LEVEL G1 (GROUND)

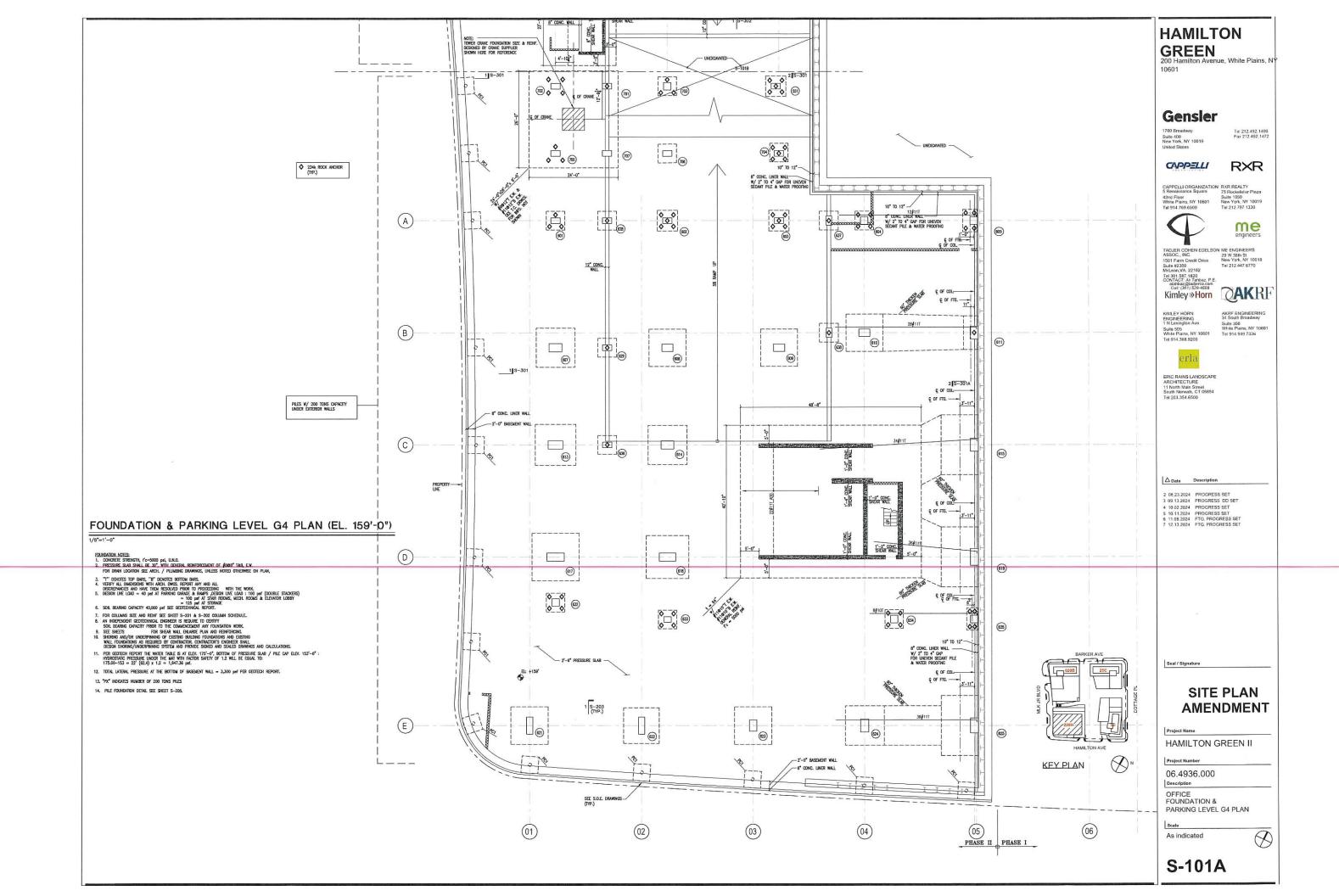
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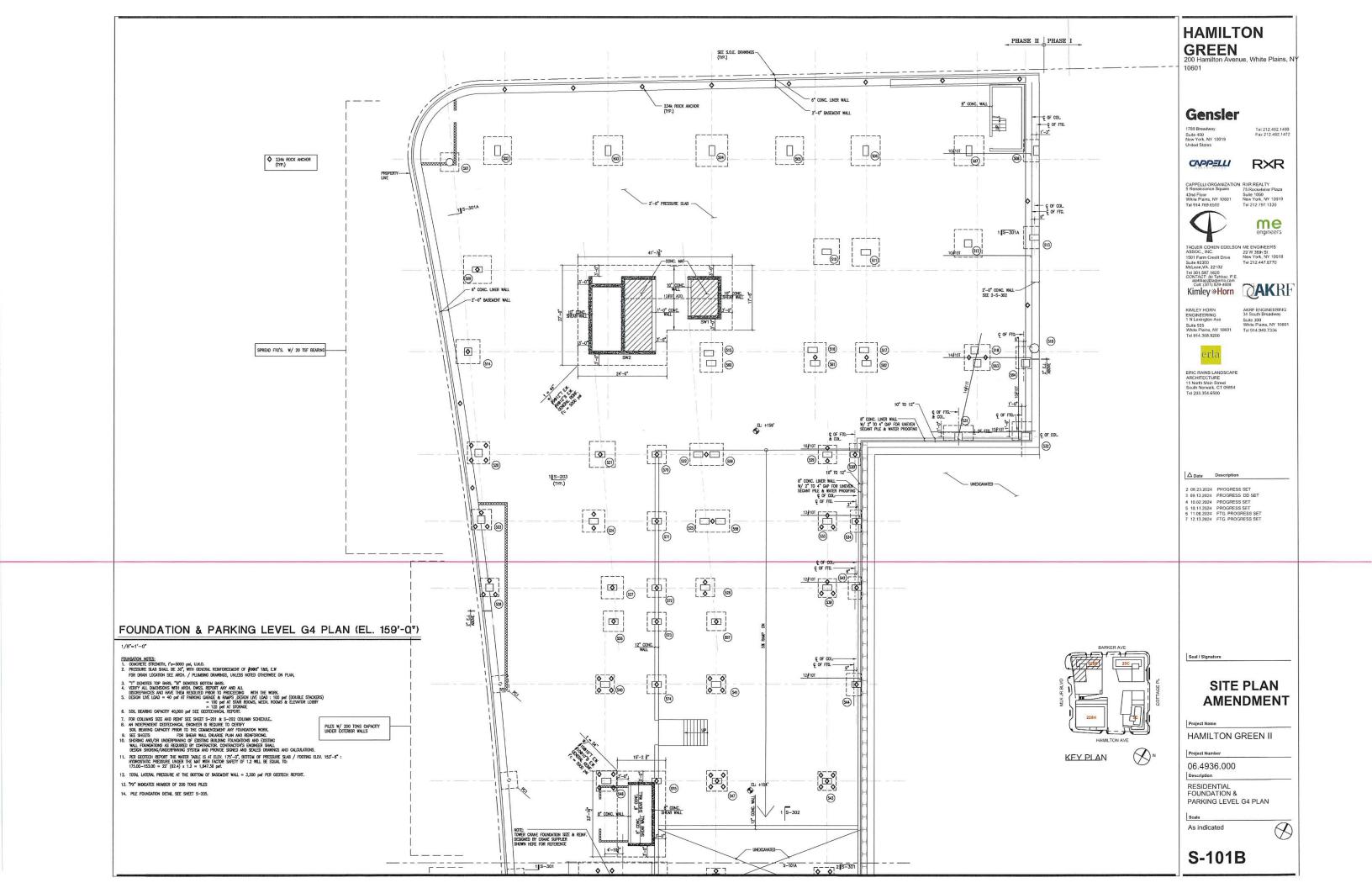


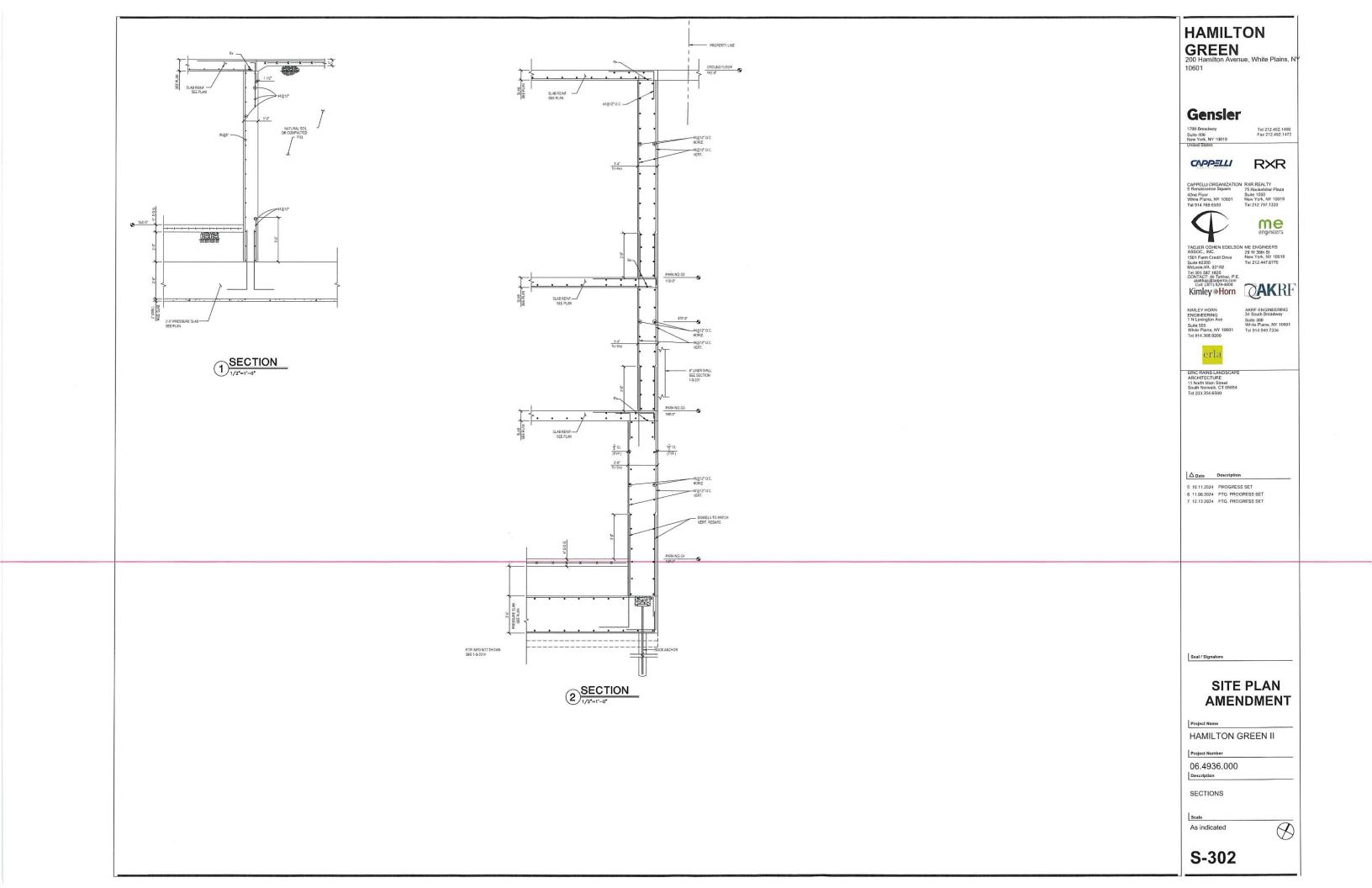
GENERAL NOTES

200 Hamilton Avenue, White Plains NY 10601











December 24, 2024

Mr. Louis Cappelli S-WD/WP LLC 5 Renaissance Square, 42nd Floor White Plains, NY 10601

Mr. Louis Cappelli Hamilton Green II Partners LLC 5 Renaissance Square, 42nd Floor White Plains, NY 10601

Re: Hamilton Green Redevelopment

Dear Mr. Cappelli,

ME Engineers is the MEP engineer for the Hamilton Green Unit 2 project. We are confirming that the proposed parking structure includes a 3 level of subsurface area with the lowest elevation at 153' subgrade. The 3 subterranean levels of the garage are at elevations 153', 168' and 178' and have been designed for full mechanical ventilation in accordance with all New York State, Westchester County and City of White Plains building codes and regulations.

Respectfully,

Ed Bosco, PE LEED CEM CxA Managing Principal

al bosco