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REMEDIAL INVESTIGATION WORK PLAN

For

Proposed Mixed-Use Development
177 North Avenue
Block 215, Lot 42
New Rochelle, Westchester County, NY

Prepared for:

177 North Avenue Owner LLC

July 2026

SESI Contact:

Andrew Schweitzer, PE
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SESI Project No:
12587A

CERTIFICATION STATEMENT

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

Andrew Schweitzer	DRAFT	
NYS Professional Engineer	Date	Signature
(# 093718)		

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education.

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LIST OF ACRONYMS

Acronym	Definition
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BER	Business Environmental Risks
CAMP	Community Air Monitoring Plan
COC	Contaminant of Concern
CPP	Community Participation Plan
DUSR	Data Usability Summary Report
ESA	Environmental Site Assessment
ft bgs	feet below ground surface
FWIA	Fish and Wildlife Impact Analysis
GRS	Green Remediation Strategies
HASP	Health and Safety Plan
IDW	Investigative Derived Waste
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PFAS	Per- and Polyfluoroalkyl Substances
PGWSCO	Protection of Groundwater Soil Cleanup Objectives
PHC	Petroleum Hydrocarbon
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
REC	Recognized Environmental Conditions
RIWP	Remedial Investigation Work Plan
RRSCO	Restricted Residential Soil Cleanup Objectives
SESI	SESI Consulting Engineers, Inc.
SCG	Standards Criteria and Guidance
SVOC	Semi-volatile Organic Compound
TCE	Trichloroethene
TCL	Target Compound List
VOC	Volatile Organic Compound
USEPA	United States Environmental Protection Agency
USCO	Unrestricted Use Soil Cleanup Objectives

1.0 INTRODUCTION

177 North Avenue Owner LLC has submitted an application as a Volunteer in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) for the property located at 177 North Avenue in New Rochelle, Westchester County, New York (the "Site"). The Site is identified on local tax map records as Block 215, Lot 42. This Remedial Investigation Work Plan (RIWP) was submitted with the BCP application. A Site Location Map is presented as **Figure 1.1.**

This document comprises a draft RIWP to be conducted at the Site after NYSDEC approval, as part of the Site's planned remedial investigation. It includes a description of the Site, summary of the Site history and previous environmental investigations, a description of the Site's physical, geologic, hydrogeologic setting and subsurface features and a plan of action for further investigation of the areas of concern identified previously.

This RIWP has been prepared to establish a plan to achieve the following objectives:

- To complete the horizontal and vertical delineation of the nature and extent of contamination on the Site,
- To identify any potential source areas of contamination,
- To determine the remedial action needed to protect human health and the environment, and
- To collect sufficient data to advance the remediation of the Site.

This RIWP is developed in general accordance with the Department's Remediation Technical Guidance for Site Investigation and Remediation (DER-10) and NYSDEC DER-31 Green Remediation.

2.0 PROJECT BACKGROUND

2.1 SITE DESCRIPTION

The Site consists of an approximately 0.433-acre area parcel and is located at 177 North Avenue, New Rochelle, Westchester County, New York, which is identified as Tax Block 215, Lot 42, as approved by the City of New Rochelle and discussed in the BCP application. The property boundary formerly included Lots 51, 52 and 54 and the very southern portion of Lot 29, but these former lots were merged and reconfigured several times to become the current Lot 42. The Site is currently developed with an asphalt parking lot with an entrance on North Avenue. **Figure 2.1** presents a Site Plan.

The Site is located in a residential and commercial area and is bounded by commercial development and Main Street beyond to the north, Clinton Place and mixed-use commercial beyond to the south, a church and mixed-use commercial and residential building to the east, and North Avenue and commercial and retail beyond to the west. **Figure 2.1** presents a Site Plan.

Adjacent properties are summarized on **Table 2.1** below:

Table 2.1: Summary of Surrounding Properties

Direction	**Adjacent Property**
North	Commercial Development and Main Street Beyond
South	Clinton Place and Mixed-Use Commercial Beyond
East	Church And Mixed-Use Commercial and Residential Building
West	North Avenue and Commercial and Retail beyond

The planned redevelopment of the Site entails an eight-story mixed-use building. The first floor will be for commercial use, followed by three (3) floors of parking, each floor accommodating approximately 32 parking spaces, for a total of 96 parking spaces. The next four (4) floors will be residential units, with approximately eight (8) units per floor, for a total of 32 residential units. The Site is only a 5-minute walk from the New Rochelle Transit Center, and is thus a transit-oriented development project, which will provide commuters with a 35-minute Metro North ride to

Manhattan's Grand Central Terminal, as well as Amtrak access to the northeast corridor and local bus services. Travelers by car can access major thoroughfares including Interstate 95, US Route 1, and the Hutchinson River Parkway.

2.2 SITE HISTORY

According to sources reviewed during the Phase I ESA, this Site contained a laundry (circa 1887 until potentially 1911), residential dwellings which likely contained heating oil tanks that may have leaked and a long history of vehicular parking, which has led to some significant petroleum contamination. In addition, the Site appears to have been filled with contaminated fill soils that contained high levels of heavy metals, particularly barium, lead, and mercury.

2.3 PREVIOUS ENVIRONMENTAL INVESTIGATION

The following environmental reports are attached in **Appendix A** and summarized below:

- Phase I Environmental Site Assessment prepared by SESI, dated July 2026, for Requestor 177 North Avenue Owner LLC
- Phase II Environmental Site Assessment prepared by SESI, dated July 2026, for Requestor 177 North Avenue Owner LLC

2.3.1 PHASE I ENVIRONMENTAL SITE ASSESSMENT (July 2026)

The July 2026 Phase I ESA prepared by SESI identified the following Recognized three (3) Environmental Conditions (RECs) and one (1) Business Environmental Risk (BER) for the Site:

- **REC 1 – Former Property Operations:** The Sanborn fire insurance maps indicated a laundry (circa 1887 until potentially 1911). These historic operations may have adversely impacted the Site due to the potential use of detergents and chlorinated solvents, which have been identified in soil vapor samples. Remediation and mitigation of the identified contamination will be required as part of the planned redevelopment of the Site.
- **REC 2 – Contaminated Historic Fill:** The soil at the Site contains elevated concentrations of heavy metals, including barium, lead, and mercury, with mercury identified at concentrations up to two (2) orders of magnitude above the Restricted Residential Soil Cleanup Objective (RRSCO).

- **REC 3 – Contaminated Groundwater:** The groundwater at the Site contains significant petroleum-related contamination exceeding NYSDEC Ambient Water Quality Standard (AWQS), likely the result of former heating oil tanks on the Site.

The following BER has been identified:

- **BER 1 – Monitoring Wells:** Two (2) monitoring wells were identified just south of the Site on the sidewalk along Clinton Place. During previous investigations, two (2) additional monitoring wells were identified, including one (1) well in the northern portion of the Site and one (1) well on the north-adjacent property south of the on-Site structure. These wells were placed by others prior to the SESI Phase II investigations and SESI has been unable to determine when and why these wells exist at the Site. These wells should be properly decommissioned prior to redevelopment.

The above RECs and BER are presented on **Figure 2.2**.

2.3.2 PHASE II ENVIRONMENTAL SITE ASSESSMENT (JUNE 2026)

SESI completed soil, groundwater, and soil vapor sampling during a Phase II ESA at the Site between August 2022 and October 2023.

Soil

SESI collected 19 soil samples from 19 soil borings. Soil sampling results confirmed the presence of barium, lead, and mercury above the RRSCOs, lead above Protection of Groundwater Soil Cleanup Objectives (PGWSCOs), and pesticides and other metals above the Unrestricted Soil Cleanup Objectives (USCOs) in soil and historic fill. In particular, mercury was present at very high levels in several borings throughout the Site, with concentrations up to two (2) orders of magnitude above the RRSCO.

A summary table of the soil analytical results compared to NYSDEC USCOs, RRSCOs, and PGWSCOs, is presented in the attached **Table 2.2**. **Table 2.3** below presents a summary of NYSDEC SCO exceedances.

Table 2.3 Summary of Soil Exceedances

SAMPLE ID:				SB-1 (7.5-8.0)		SB-2 (5.5-6)		SB-3 (7.5-8)		SB-4 (6.5-7)		SB-5 (6.5-7)	
LAB ID:				L2242456-01		L2242456-02		L2242456-03		L2242456-04		L2242456-05	
COLLECTION DATE:				8/6/2022		8/6/2022		8/6/2022		8/6/2022		8/6/2022	
SAMPLE DEPTH (FT):				7.5-8.0		5.5-6.0		7.5-8.0		6.5-7.0		6.5-7.0	
ANALYTE	USCO	RRSCO	PGWSCO	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Pesticides (mg/kg)													
4,4'-DDD	0.0033	5	14	ND		ND		ND		ND		ND	
4,4'-DDE	0.0033	3.4	9.3	ND		ND		ND		ND		ND	
4,4'-DDT	0.0033	3.8	135	ND		ND		ND		ND		ND	
Dieldrin	0.005	0.075	0.1	ND		ND		ND		ND		ND	
Metals (mg/kg)													
Barium, Total	410	410	820	49		45.6		63.9		45		58.7	
Chromium, Total	30	110	NS	17.6		13.5		13.8		12.1		17.6	
Copper, Total	50	280	1720	13.1		10.6		13.5		8.47		15.1	
Lead, Total	63	400	450	3.05	J	30.5		2.57	J	6.31		3.66	J
Mercury, Total	0.18	0.3	0.73	ND		0.17		ND		ND		ND	
Nickel, Total	30	320	130	11		8.74		11.8		7.75		12.9	
Zinc, Total	109	6600	2480	21.3		25.5		20.1		19.6		22.9	

SAMPLE ID:				SB-6 (8.0-8.5)		SB-7 (6.5-7)		SB-201 (4-4.5)		SB-202 (1.5-2)		SB-203 (3.5-4)	
LAB ID:				L2242456-06		L2242456-07		L2305142-01		L2305142-02		L2305142-03	
COLLECTION DATE:				8/6/2022		8/6/2022		1/28/2023		1/28/2023		1/28/2023	
SAMPLE DEPTH (FT):				8.0-8.5		6.5-7.0		4.0-4.5		1.5-2.0		3.5-4.0	
ANALYTE	USCO	RRSCO	PGWSCO	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Pesticides (mg/kg)													
4,4'-DDD	0.0033	5	14	ND		ND		ND		ND		0.0212	
4,4'-DDE	0.0033	3.4	9.3	ND		ND		ND		ND		0.0183	
4,4'-DDT	0.0033	3.8	135	ND		ND		ND		ND		0.0151	
Dieldrin	0.005	0.075	0.1	ND		ND		ND		ND		0.00706	
Metals (mg/kg)													
Barium, Total	410	410	820	65.8		109		205		131		76.8	
Chromium, Total	30	110	NS	14.6		21.8		14.3		17.2		18.1	
Copper, Total	50	280	1720	13		13.5		36.7		23.7		19.7	
Lead, Total	63	400	450	2.26	J	11.8		56.9		505		334	
Mercury, Total	0.18	0.3	0.73	ND		ND		0.114		23		0.079	
Nickel, Total	30	320	130	12.9		13.6		11.7		11.8		12.7	
Zinc, Total	109	6600	2480	21.6		36.8		127		213		102	

SAMPLE ID:				SB-204 (1-1.5)		SB-205 (2.5-3)		SB-206 (3.5-4)		SB-207 (3-3.5)		SB-208 (4-4.5)	
LAB ID:				L2305142-04		L2305142-05		L2305142-06		L2305142-07		L2305142-08	
COLLECTION DATE:				1/28/2023		1/28/2023		1/28/2023		1/28/2023		1/28/2023	
SAMPLE DEPTH (FT):				1.0-1.5		2.5-3.0		3.5-4.0		3.0-3.5		4.0-4.5	
ANALYTE	USCO	RRSCO	PGWSCO	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Pesticides (mg/kg)													
4,4'-DDD	0.0033	5	14	0.0192		ND		0.00349		ND		ND	
4,4'-DDE	0.0033	3.4	9.3	0.0414		ND		ND		ND		0.00359	
4,4'-DDT	0.0033	3.8	135	0.0421		ND		0.00686		ND		0.00253	IP
Dieldrin	0.005	0.075	0.1	ND		ND		ND		ND		ND	
Metals (mg/kg)													
Barium, Total	410	410	820	91.1		38.3		109		99.9		105	
Chromium, Total	30	110	NS	15		3.81		13		30.1		10.3	
Copper, Total	50	280	1720	35.8		14.5		32.7		30.4		22.7	
Lead, Total	63	400	450	287		89.3		335		360		131	
Mercury, Total	0.18	0.3	0.73	0.341		0.158		0.251		6.46		0.187	
Nickel, Total	30	320	130	10.6		5.35		10.8		11.8		7.99	
Zinc, Total	109	6600	2480	164		43		117		162		87.7	

SAMPLE ID:				SB-209 (2.5-3)		SB-306 (6-6.5)		SB-307 (9.5-10)		SB-308 (3.5-4)	
LAB ID:				L2305142-09		L2361279-01		L2361842-02		L2361842-01	
COLLECTION DATE:				1/28/2023		10/16/2023		10/18/2023		10/18/2023	
SAMPLE DEPTH (FT):				2.5-3.0		6.0-6.5		9.5-10.0		3.5-4.0	
ANALYTE	USCO	RRSCO	PGWSCO	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Pesticides (mg/kg)											
4,4'-DDD	0.0033	5	14	ND		ND		ND		ND	
4,4'-DDE	0.0033	3.4	9.3	ND		ND		ND		ND	
4,4'-DDT	0.0033	3.8	135	ND		ND		ND		ND	
Dieldrin	0.005	0.075	0.1	ND		ND		ND		ND	
Metals (mg/kg)											
Barium, Total	410	410	820	509		62.7		68.4		40.8	
Chromium, Total	30	110	NS	31.1		16.7		18.3		35.4	
Copper, Total	50	280	1720	84.3		14.4		12.4		28.7	
Lead, Total	63	400	450	626		3.66	J	3.69	J	20.6	
Mercury, Total	0.18	0.3	0.73	7.86		ND		ND		ND	
Nickel, Total	30	320	130	13.7		13.6		12		52.1	
Zinc, Total	109	6600	2480	443		20		25.5		20	

Notes
USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006, revised December 31, 2025.
RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006, revised December 31, 2025.
PGWSCO: New York NYCRR Part 375 Protection of Groundwater Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006, revised December 31, 2025.
Exceedance of USCO
Exceedance of RRSCO
Exceedance of PGWSCO
J = Estimated
ND = Not Detected
- = Not Tested

Groundwater

SESI collected four (4) groundwater samples from four (4) temporary wells. Groundwater sampling results indicated exceedances of the NYSDEC AWQS for volatile organic compounds (VOCs), per- and polyfluoroalkyl substances (PFAS), semi-volatile organic compounds (SVOCs), and total metals. Petroleum-related VOCs were high, likely the result leaking petroleum from the long history of vehicular parking and /or historic fuel tanks that were likely present in the former on-Site structures, although no tanks were detected from the GPR survey. Naphthalene was analyzed as both a VOC and an SVOC, and the concentration of naphthalene exceeded its AWQS at TW-302 with both analytical methods.

The complete groundwater analytical results are presented as **Table 2.4**. A summary table of the analytical results exceedances compared to AWQS is presented in **Table 2.5** below.

Table 2.5 Summary of Groundwater Exceedances

SAMPLE ID:		TW-1		TW-201		TW-301		TW-302	
LAB ID:		L2242491-01		L2305142-16		L2361842-03		L2362230-02	
COLLECTION DATE:		8/6/2022		1/28/2023		10/18/2023		10/19/2023	
ANALYTE	NY-AWQS	Conc	Q	Conc	Q	Conc	Q	Conc	Q
VOCs (ug/l)									
1,2,4-Trimethylbenzene	5	ND		ND		ND		11	
2-Butanone	50	ND		ND		2.8	J	61	
Acetone	50	ND		3.9	J	18		280	
Benzene	1	ND		ND		ND		180	
Ethylbenzene	5	ND		ND		ND		26	
Naphthalene	10	ND		ND		ND		20	
o-Xylene	5	ND		ND		ND		34	
p/m-Xylene	5	ND		ND		ND		54	
Toluene	5	ND		ND		ND		190	
PFAS (ug/l)									
PFOS	0.0027	0.0106		0.0213		ND		ND	
PFOA	0.0067	0.0665		0.0396		ND		ND	
SVOCs (ug/l)									
Bis(2-ethylhexyl)phthalate	5	ND		ND		17		ND	
Phenol	1	ND		ND		ND		6.6	
SVOCs - SIM (ug/l)									
Benzo(a)anthracene	0.002	0.03	J	ND		0.1	J	ND	
Benzo(b)fluoranthene	0.002	ND		ND		0.03	J	ND	
Benzo(k)fluoranthene	0.002	ND		ND		0.02	J	ND	
Chrysene	0.002	0.01	J	ND		0.02	J	ND	
Naphthalene	10	ND		ND		0.15		11	
Metals (ug/l)									
Arsenic, Total	25	1.08		25.71		6.5		6.36	
Barium, Total	1000	237.8		7864		3221		3929	
Beryllium, Total	3	0.44	J	9.4		6.1		5.46	
Cadmium, Total	5	0.11	J	8.42		4.88		2.66	
Chromium, Total	50	37.19		807.6		700.8		617	
Copper, Total	200	31.54		625.5		2864		414.2	
Iron, Total	300	28700		222000		226000		223000	
Lead, Total	25	7.14		1350		282.2		149.9	
Magnesium, Total	35000	102000		144000		75100		125000	
Manganese, Total	300	947.5		94000		40800		26730	
Nickel, Total	100	37.84		1208		1273		1025	
Selenium, Total	10	14.6		119		36.4		136	
Silver, Total	50	0.23	J	0.4		2010		0.59	J
Sodium, Total	20000	314000		64800		170000		182000	
Thallium, Total	0.5	0.49	J	3.61		1.72		2.5	

Notes
NY-AWQS: New York TOGS 111 Ambient Water Quality Standards & Guidance Values Criteria per Standards & Guidance Values including all addenda through February 2023.
Exceedance of NY-AWQS
J = Estimated
ND = Not Detected
- = Not Tested
PFOS = Perfluorooctanesulfonic Acid
PFOA = Perfluorooctanoic Acid

Soil Vapor

Two (2) soil vapor samples were collected during the Phase II ESA. Elevated VOC concentrations, specifically of the petroleum-related compounds ethylbenzene, o-xylene, and

p/m-xylene were identified at concentrations that may require mitigation based on indoor air sampling following redevelopment.

A summary table of the analytical results is presented in **Table 2.6.** A summary table of the analytical results detections compared to the New York State Department of Health (NYSDOH) Decision Matrices is presented as **Table 2.7** below.

Table 2.7 – Summary of Soil Vapor Detections

SAMPLE ID:									SV-1		SV-201	
LAB ID:									L2242461-01		L2304933-01	
COLLECTION DATE:									8/6/2022		1/28/2023	
SAMPLE MATRIX:									SOIL_VAPOR		SOIL_VAPOR	
ANALYTE	NY-IAC-B	NY-SSC-B	NY-IAC-D	NY-SSC-D	NY-IAC-E	NY-SSC-E	NY-IAC-F	NY-SSC-F	Conc	RL	Conc	RL
VOCs (ug/m3)												
1,2,4-Trimethylbenzene			2	60					ND	3.51	2.37	0.983
1,3-Butadiene									88.5	1.58	3.94	0.442
2-Butanone									74	5.25	24.1	1.47
2-Hexanone									32.5	2.92	ND	0.82
4-Methyl-2-pentanone									27	7.29	ND	2.05
Acetone									297	8.48	35.2	2.38
Benzene			2	60					18.4	2.28	4.73	0.639
Carbon disulfide									81.9	2.22	2.58	0.623
Chloroform									ND	3.48	1.91	0.977
Chloromethane									2.93	1.47	ND	0.413
Cyclohexane			2	60					5.23	2.45	2.08	0.688
Dichlorodifluoromethane									ND	3.53	2.07	0.989
Ethanol									ND	33.5	34.7	9.42
Ethyl Acetate									12.9	6.41	5.08	1.8
Ethylbenzene			2	60					ND	3.1	**176**	0.869
Heptane					6	200			22.3	2.92	37.4	0.82
Isopropanol									10.8	4.38	3.44	1.23
Methylene chloride	3	100							24.8	6.18	ND	1.74
n-Hexane					6	200			38.1	2.51	123	0.705
o-Xylene			2	60					ND	3.1	**151**	0.869
p/m-Xylene					6	200			7.3	6.21	**547**	1.74
Tertiary butyl Alcohol									55.8	5.4	2.66	1.52
Tetrachloroethene	3	100							ND	4.83	6.98	1.36
Tetrahydrofuran									9.73	5.25	ND	1.47
Toluene							10	300	24.8	2.69	56.2	0.754
trans-1,2-Dichloroethene									3.32	2.83	ND	0.793

Notes
ug/m^3: Micrograms per cubic meter
Bold: Elevated Concentration
Action Required by NYSDOH Decision Matrix
NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-IAC-D: New York DOH Matrix D Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-IAC-E: New York DOH Matrix E Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-IAC-F: New York DOH Matrix F Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-D: New York DOH Matrix D Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-E: New York DOH Matrix E Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-F: New York DOH Matrix F Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.

Based on the results and discussions with the development team, due to the proposed future residential use on the Site, remediation will be required to ensure Site safety for the planned predominantly residential use. The Site will require further delineation to quantify the volume of

soil, groundwater, and soil vapor that will require remediation to address the exceedances in soil, groundwater, and soil vapor.

2.4 GEOLOGIC SETTING

Regional surface topography slopes southeast. Based on the U.S. Geological Survey – 2019 Mount Vernon, New York, 7.5-minute Quadrangle map, the Property is approximately 91 feet above the North American Datum. Based on the Phase II investigation conducted by SESI, the stratigraphy of the Site, from the surface down, consists of historic fill. The historic fill materials were encountered to a maximum of 10 feet below ground surface (ft bgs). During the investigation, groundwater was encountered at depths ranging from 8 to 15 feet below grade.

2.5 HYDROGEOLOGIC SETTING

As per the USDA National Cooperative Soil Survey map for the area, the soils at the Site are characterized as UoA (Urban Land outwash substratum) urban land which is surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material, till substratum, 0 to 3 percent slopes. During the investigation, groundwater was encountered at depths ranging from 8 to 15 feet below grade. Groundwater flow direction is expected to be in the southeast direction toward the Long Island Sound based on regional topography. Historic fill generally consisted of brown coarse to fine sand, with varying amounts of silt and gravel were observed. Debris within the historic fill layer included concrete and brick.

2.6 SUBSURFACE FEATURES

There are no known underground storage tanks or drywells at the Site. However, there was one (1) monitoring well observed in the parking lot of the portion of the Site that was formerly part of Lot 29, as well as two (2) off-Site monitoring wells to the south and one (1) off-Site monitoring well to the north. It is anticipated that the existing monitoring well located on the portion of Lot 29 within the Site will be used, if feasible, as part of the remedial investigation groundwater sampling event(s) before it is eventually decommissioned.

2.7 SUMMARY OF ENVIRONMENTAL ASSESSMENT

Based on the investigations conducted to date, the primary contaminants of concern (COCs) are anticipated to be (VOCs, SVOCs, Pesticides, Metals and PFAS). COCs will be refined based on the RIR results.

Soil: (maximum concentrations).

- **Pesticides**: 4,4'-DDD (0.0212 mg/kg), 4,4'-DDE (0.0414 mg/kg), 4,4'-DDT (0.0421 mg/kg), and Dieldrin (0.00706 mg/kg)
- **Metals:** Barium (509 mg/kg), total chromium (35.4 mg/kg), copper (84.3 mg/kg), lead (626 mg/kg), mercury (23 mg/kg), nickel (52.1 mg/kg), and zinc (443 mg/kg)

Groundwater: (maximum concentrations)

- **VOCs:** 1,2,4-Trimethylbenzene (11 ug/L), 2-butanone (61 ug/L), acetone (280 ug/L), benzene (180 ug/L), ethylbenzene (26 ug/L), *naphthalene (20 ug/L), o-xylene (34 ug/L), p/m-xylene (54 ug/L), and toluene (190 ug/L)
- **SVOCs:** Bis(2-ethylhexyl)phthalate (17 ug/L), phenol (6.6 ug/L), benzo(a)anthracene (0.1 ug/L), benzo(b)fluoranthene (0.03 ug/L), benzo(k)fluoranthene (0.02 ug/), chrysene (0.02 ug/L), and *naphthalene (11 ug/L)
- **Total Metals:** arsenic (25.71 ug/L), barium (7,864 ug/L), beryllium (9.4 ug/L), cadmium (8.42 ug/L), total chromium (807.6 ug/L), copper (2,864 ug/L), iron (226,000 ug/L), lead (1,350 ug/L), magnesium (144,000 ug/L), manganese (94,000 ug/L), nickel (1,273 ug/L), selenium (136 ug/L), silver (2,010 ug/L), sodium (314,000 ug/L) and thallium (3.61 ug/L)
- **PFAS:** Perfluorooctanesulfonic acid (PFOS, 0.0213 ug/L) and Perfluorooctanoic acid (PFOA, 0.0665 ug/L)

*naphthalene was analyzed under both the VOC and SVOC analytical methods

Soil Vapor:

- Petroleum-related VOCs, including ethylbenzene, o-xylene and p/m-xylene were detected above the lower limits of the soil vapor NYSDOH Matrices concentrations in one (1) soil vapor sample. Additional VOCs were detected in soil vapor across the Site.

3.0 FIELD REMEDIAL INVESTIGATION

Soil borings, soil vapor borings, and groundwater monitoring wells are proposed based on the following rationale to complete the nature and extent delineation of contaminated soil, groundwater, and soil vapor on the Site. The applicable standards criteria and guidance (SCGs) for the Site soil are the Track 1 unrestricted use soil cleanup objectives (SCOs) in 6 NYCRR §375-6.8(a) and the soil screening levels for 41 PFAS compounds in NYSDEC Guidelines for Sampling and Analysis of PFAS, latest update April 2023. The applicable criteria for sub-slab vapor are the screening levels in the October 2006 NYSDOH Decision Matrices (most recently updated February 2024). The applicable SCGs for groundwater are the Class GA Ambient Water Quality Standards and Guidance Values in 6 NYCRR §703.6 (AWQS), and the maximum contaminant levels and the screening levels for PFOA and PFOS.

3.1 SOIL REMEDIAL INVESTIGATION

Surface soil samples are not being collected because the Site is paved with asphalt, and the proposed redevelopment is anticipated to remove this cover and the shallow subsurface soils for the entire Site. If the anticipated future conditions change and existing soil is to remain exposed at the Site, surface soil samples may need to be collected and analyzed.

To further evaluate the soils, nine (9) soil borings will be advanced across the Site in an approximate 50-foot grid pattern to evaluate and delineate soil contamination from historical operations and other potential sources. In addition, waste characterization samples will be collected from the borings for disposal approval. The proposed soil boring locations are shown on **Figure 3.1**.

The borings will be advanced using direct-push or other drilling methods as needed. The borings will extend to a depth of 20 ft-bgs or until bedrock is encountered. Soil samples will be collected at a minimum of one (1) sample per 5-foot depth interval biased based on field screening that includes visual observations, PID readings, and olfactory observations. Boring logs documenting soil classifications, PID readings, and visual observations will be provided in the final report.

Upon retrieval of the sampling barrel, the collected sample shall be placed in glass jars and labeled, stored on Site (on ice in a cooler if necessary), and transmitted to the NYSDOH ELAP-certified testing laboratory. Chain-of-custody procedures will be practiced following Section 15, EPA-600/4-

82-029, Handbook for Sampling and Sample Preservation of Water and Waste Waters. Soil samples for VOC analysis will be collected in Encore ® vials or Terracores.

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 and installing monitoring wells to levels directed by the supervising geologist following specifications further outlined in this protocol.

Up to 36 soil samples will be collected from the nine (9) boring locations and will be analyzed by a NYSDOH ELAP certified laboratory for TCL+30/TAL including VOCs by EPA Method 8260C, SVOCs by EPA Method 8270D, pesticides by EPA Method 8081B, PCBs by EPA Method 8082A, TAL metals by EPA Methods 6010C, 7471B, and 9012, the 41 PFASs compounds by EPA Method 1633A, and 1-4,dioxane by EPA Method 8270. Category B deliverables will be requested on each sample chain of custody.

The proposed soil sample locations and the rationale for their locations are presented in **Table 3.1** below.

Table 3.1 – Proposed Soil Sample Locations

Soil Boring Name	Proposed Sample Depths[1]	Boring Location Rationale	Analysis
RI-SB-01	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-SB-02	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-SB-03	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-SB-04	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS

Soil Boring Name	Proposed Sample Depths[1]	Boring Location Rationale	Analysis
RI-SB-05	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-SB-06	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-SB-07	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-SB-08	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-SB-09	1 sample every 5 feet to a total depth of 20 ft bgs or until bedrock refusal	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS

[1] Notes: ft bgs - feet below ground surface

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.

A summary of the parameters to be tested, the analytical methods and the holding times for the samples is shown on **Table 3.2**.

Table 3.2 – Soil Analyses Summary

Parameter and Analytical Method	Holding Time
Volatile Organic Compounds (VOCs) – USEPA 8260C	14 days

Parameter and Analytical Method	Holding Time
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270D or E	14 days (until extraction, 40 days extracted)
Pesticides – USEPA 8081B	14 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	None
Metals - Method 6010D, 7470A for mercury, and 9012B for cyanide	180 days Cyanide: 14 days
PFAS – USEPA 1633A	28 days

Quality assurance/quality control (QA/QC) samples will be collected and analyzed as specified in the QAPP. The number of duplicate, spiked and blank samples analyzed will be collected at a frequency of one (1) duplicate for every 20 samples. The inclusion and frequency of analysis of field blanks will be on the order of one (1) per every 20 soil samples but not more than one (1) per day. Samples to be analyzed for volatile organic compounds will be accompanied by a field blank for all matrix types and trip blank for water matrices. SESI's field sampling procedures are described in the quality assurance project plan (QAPP) presented in **Appendix B**. The Sampling Plan for Emerging Contaminants is included as **Appendix C**.

3.2 GROUNDWATER REMEDIAL INVESTIGATION

To investigate the Site groundwater, a total of three (3) permanent groundwater monitoring wells will be installed as shown on **Figure 3.2**. The wells will be installed to a depth of approximately 15-20 feet bgs with a 10-foot screen, such that the groundwater table intersects the well screen. The groundwater table is anticipated to be between 8 and 15 feet below ground surface based on previous investigations. If bedrock is encountered before 15-20 ft bgs, the well depth will be determined based on the depth to bedrock and the observed groundwater table. Wells are anticipated to be installed only in the overburden. Well depths and screen placement will be evaluated based on observed groundwater table.

Each monitoring well will be constructed with two (2)-inch-diameter well screens. The well screening will intersect the water table and extend to the bottom of the well boring. The annular

space of each well will be filled with well sand to at least two (2) feet above the screening and will be sealed with hydrated bentonite or cement grout. Finally, each monitoring well will be completed with a flush-mount road-box or stickup as necessary. A typical boring and well construction log is provided in **Appendix D**.

The Groundwater RI will be conducted to achieve the following:

- delineate the nature and extent of AOC-specific contaminants in the Site groundwater;
- identify actual or potential impacts to sensitive receptors, e.g. surface water;
- determine whether a contaminant plume exists;
- gather sufficient data to determine groundwater flow direction and contour map and evaluate groundwater Remedial alternatives, including, as appropriate, monitored natural attenuation (MNA), and
- provide information on the background quality of the groundwater flowing into the Site.

All the wells will be surveyed for location and elevation. The survey data will be provided pursuant to the DER-10 requirements in an acceptable format (e.g., North America Datum 83 [NAD83]). The wells will be gauged for groundwater depth to determine the groundwater elevation. The Site-specific groundwater flow direction and gradient will be determined based on the latest elevation data and summarized in the Remedial Investigation Report (RIR). The proposed well locations are shown on **Figure 3.2**.

One (1) round of samples will be conducted from the newly installed wells as well as from the existing monitoring well on the Site. The data will be analyzed to determine the nature and extent of groundwater contamination at the Site. In addition to the analytical data, field measurements and chemical analyses will be conducted to characterize the impacted groundwater.

Each groundwater sample will be analyzed for TCL+30/TAL VOCs, SVOCs, pesticides, PCBs, metals, PFAS, and 1-4 dioxane. The VOCs will be analyzed by EPA Method 8260C, SVOCs by EPA Method 8270D, pesticides by EPA Method 8081B, PCBs by EPA Method 8082A, TAL metals by EPA Methods 6010C, 7471B, and 9012, PFAS compounds by EPA Method 1633A, and 1-4 dioxane by EPA Method 8270 SIM. The QAPP, which describes all field sampling procedures, is included as **Appendix B**, and the Sampling Plan for Emerging Contaminants is included as **Appendix C**. The proposed groundwater monitoring wells and the rationale for their locations are presented in **Table 3.3** below.

Table 3.3 – Proposed Groundwater Monitoring Wells

Well Name	Proposed Sample Depths	Well Location Rationale	Analysis
RI-MW-01	10 feet below groundwater table	Horizontal / Vertical Delineation	TCL+30/TAL, 1,4-Dioxane, PFAS
RI-MW-02			
RI-MW-03			
Existing Well			

All groundwater samples will be analyzed by a NYSDOH ELAP certified laboratory and Category B deliverables will be requested on each sample chain of custody. In addition, QA/QC samples will be collected and analyzed as specified in the QAPP. Specifically, the number of duplicate, spiked and blank samples analyzed will be a minimum of one (1) duplicate for every 20 samples. For the aqueous matrix field blanks will be collected at a frequency of one (1) 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.

The wells will be sampled using the low flow technique, when possible. A flow rate of 100 ml to 250 ml per minute is used to purge the wells. Drawdown will not exceed 0.3 feet. 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 (3) 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. If the parameters of a well do not stabilize in a timely manner, the groundwater sample will be collected after emptying three (3) well volumes from the well being sampled.

In addition to water 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 before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies 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 TCL volatiles is planned (water matrix only). The trip blank will be analyzed for TCL VOCs as a measure of potential contamination from background sources and their effect on the results.
- 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 VOCs.

3.3 SOIL VAPOR INVESTIGATION

SESI will collect three (3) soil vapor samples from soil vapor points in the footprint of the proposed building, as indicated on **Table 3.4** below. The proposed soil vapor point locations are shown on **Figure 3.3**. The purpose of the soil vapor points is to assess the potential for vapor intrusion into future buildings. All soil vapor points will be installed within two (2) feet below the proposed foundation elevation.

The soil gas samples will be collected in accordance with the procedures of the NYS Department of Health October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York as amended most recently in February 2024 (DOH SVI Guidance). Specifically, the soil vapor probes will be advanced using direct push sampling equipment and samples will be collected by installing vapor implants. The soil vapor depth will be based on the final construction and development plan. A sacrificial vapor point connected to flexible tubing will be inserted into the borehole. The annular space of the borehole will be filled with sand and the surface will be sealed with bentonite to seal the surface. Prior to sampling the tubing system will be purged of ambient air with a low-flow pump.

The soil vapor samples will be collected into laboratory supplied one (1)-liter, stainless-steel, summa canisters. The summa canisters will be equipped with a manometer to verify the canister

is under vacuum, and a flow controller set to a flow rate of <200 ml/min. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols. The vapor samples will be sent to a certified laboratory for analysis of VOCs in accordance with EPA Method TO-15. In addition to the soil vapor, one (1) ambient air sample will be collected with a 1-liter summa canister set to a flow rate of <200 ml/min outside the building. The field sampling procedures are described in the QAPP, which is included as **Appendix B**.

As part of the vapor sampling, a tracer gas will be used to serve as a QA/QC device to verify the integrity of the soil vapor probe seal. Helium will be used as the tracer gas and a box will serve to keep it in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer prior to sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration. At the conclusion of the sampling round, tracer monitoring will be performed a second time to confirm the integrity of the probe seals.

Table 3.4 Proposed Soil Vapor Sample Locations

Soil Vapor/Indoor Air/Ambient Air Point Name	Sample Type	Proposed Sample Depths	Analysis
RI-SV-01	Soil Vapor	2 feet below foundation grade	VOCs (TO-15)
RI-SV-02	Soil Vapor	2 feet below foundation grade	VOCs (TO-15)
RI-SV-03	Soil Vapor	2 feet below foundation grade	VOCs (TO-15)
RI-AA-01	Ambient Air	3 feet above grade	VOCs (TO-15)

4.0 DECONTAMINATION AND IDW

Reusable equipment utilized for ground intrusive activities (i.e. borings and wells) will be decontaminated between each boring. Equipment utilized for sample collection (i.e. spoons, trowels) will be decontaminated between each sample unless disposable equipment is utilized. Appropriate decontamination areas will be established to support work being conducted in each area of the Site. PFAS free certified deionized water, supplied from the laboratory, will be used for the decontamination of the sampling tools if needed. Locally supplied water, if available, or water supplied by the driller in a tank will be used to decontaminate the equipment.

All investigative derived waste (IDW) of soil cuttings and purged groundwater will be containerized, sampled, and properly disposed of pursuant to DER-10 requirements. Disposable sampling equipment, including macro core liners, spoons, gloves, bags, paper towels, and PPE that contacts environmental media, will be double bagged and disposed of as municipal trash in a facility trash dumpster as non-hazardous refuse.

5.0 WASTE CHARACTERIZATION

Waste characterization will be completed in conjunction with the remedial investigation to obtain data for facility approvals. It is anticipated that 20 waste characterization samples will be collected, each from a five-point composite, and analyzed for TCL+30/TAL; however, the exact quantity and parameters will be determined based on disposal facility requirements.

6.0 SURVEY

After the RI sampling scope is completed, a survey will be completed, which includes the locations and elevations of each monitoring well.

7.0 HUMAN HEALTH EXPOSURE ASSESSMENT

A qualitative human health exposure assessment will be performed for the Site in accordance with the New York State Department of Health's Qualitative Human Health Exposure Assessment guidance document. Sampling data will be reviewed along with the physical conditions of the contaminant sources or physical hazards near the Site. Potential on-Site and off-Site exposures will be evaluated. The Exposure Assessment will describe the nature and size of the population exposed, or potentially exposed, to the contaminants that are present at, or migrating from the Site, and will characterize the exposure setting, identify exposure pathways and evaluate contaminant fate and transport.

Several objectives will be met by the exposure assessment. First, applicable Site information and characterization data for environmental media of concern will be evaluated. Applicable SCGs, including Part 375 SCOs for soil and AWQS for groundwater, will be applied.

An assessment of current and future Site activities and Site use will be conducted in relation to potential human exposure. Next, potential exposure pathways will be identified, and each aspect of the potential exposure pathway will be evaluated. Soil and groundwater contamination will be addressed and the impact of remediation on future exposure scenarios will be analyzed.

8.0 FISH AND WILDLIFE IMPACT ANALYSIS

A Fish and Wildlife Impact Analysis (FWIA) Decision Key will be completed prior to the excavation work to determine if a FWIA is needed. Contaminant migration pathways and any fish and wildlife exposure pathways will be identified. As stated in the FWIA, "if no resources are associated with the Site or if there is no potential for contaminant migration to the resources, then only the necessary information to support that conclusion should be provided."

If resources are identified, or migration pathways exist, a FWIA will be completed and submitted as part of the RI Report. The FWIA would include qualitative estimates of the following: 1) the routes, intensity, frequency, and duration of actual or potential exposures to chemicals; 2) the nature and size of the population exposed to the contaminants that are present at or migrating from the Site; 3) the exposure setting and possible exposure pathways; and 4) contaminant fate and transport.

It is important to note that this urban Site is over a half mile away from any water body and is not in a flood plain.

9.0 GREEN REMEDIATION STRATEGIES (GRS)

Remedial Investigation: While there are only a limited number of GRS principles that can be incorporated during the investigation phase of the project, the engineering firm of record will be required to incorporate as many carbon reduction measures as possible. Specifically, during the RI implementation, SESI will:

- Evaluate sensitive, local human and ecological receptors which require protection from contaminants of concern, traffic, noise, dust and odors during the implementation. An enhanced Community Air Monitoring Plan will be implemented.
- Identify vendors with operation centers local to the Site to minimize fuel consumption associated with travel to and from the Site and encourage use of the Metro North train station only a 5-minute walk from the Site or 0.28 miles from the Site.
- Salvage organic debris that is uncontaminated and free of pests or disease, for use as supplemental infill, mulch or compost.
- Salvage uncontaminated objects with potential recycle, resale, donation or on-Site infrastructure value, such as steel, concrete and granite.
- Designate collection points for recycling single-use items such as metal, plastic and glass containers; paper and cardboard; and other consumable items.
- Advise contractors to avoid idling vehicles while on the BCP Site.
- Waste reduction measures such as use of less disposable gloves and equipment will also be considered.

10.0 CLIMATE CHANGE SCREENING OR VULNERABILITY ASSESSMENT

The Site is entering the program at the investigation stage; therefore, a Climate Change Screening or Vulnerability Assessment is not required at this time. Further, this Site is not in a floodplain and is not located in the vicinity of a wetland; therefore, it is not anticipated to require a vulnerability assessment.

11.0 DUSR

Following the completion of the laboratory analysis program, a Data Usability Summary Report (DUSR) will be completed for the lab data and included as part of the RI Report. The DUSR will include available datasets from previous investigations, as well as data from this phase of Site characterization. The DUSR is carried out as specified in DER-10 to evaluate the quality control measures that were implemented during the field and laboratory analytical programs, with the objective of determining whether the reported analytical data are representative and usable for decision making. The DUSR will evaluate whether the data are technically defensible (i.e. were all analytical data requirements met and documented?). Data usability analysis reviews the Site data to determine whether they are adequate to draw conclusions regarding the nature and extent of contamination.

The items that will be reviewed as part of the DUSR will include the following:

- Completeness (number of samples collected and analyzed compared to plans)
- Chains of custody are complete and accurate
- Holding times
- Instrument calibration
- Relative percent difference between field duplicates
- Reasonableness of data (e.g. relationships between total and soluble analytes)
- Blank contamination

The DUSR will be conducted in accordance with guidelines provided under Appendix 2B of DER-10. The Site-specific Quality Assurance Project Plan (QAPP) is included in **Appendix B**.

12.0 REMEDIAL INVESTIGATION REPORT (RIR)

Following the completion of the RI activities and the receipt of sample results, an RIR will be prepared. The RIR report will summarize the activities completed during the RIR including analytical results, well construction and sampling logs, waste characterization information for disposal purposes, conclusions from the FWIA if necessary, a Data Usability Summary Report (DUSR) and laboratory data packages. Scaled figures showing the sample locations and areas of contamination exceeding applicable standards will be prepared for soil, soil vapor, and groundwater. Sampling results will be summarized and discussed and the need for additional investigation and remediation will be evaluated. In addition, analytical summary tables will be prepared for soil, soil vapor, and groundwater compared to applicable standards.

The RIR will also include: 1) a summary of the Site history and previous investigations, 2) a description of current Site conditions, 3) the identification of exposure pathways via a Qualitative Human Health Exposure Assessment; an analysis of the results, 4) a description of the nature and extent of the contamination; and 5) a detailed conclusion with recommendations.

Analytical data collected during the Remedial Investigation and previous data used for the selection of the remedy will be submitted in the NYSDEC approved Electronic Data Deliverable (EDD) format. EDDs will be prepared using the DEC's Environmental Information Management System (EIMS) database software application EQuIS™ for submission.

13.0 QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance and Quality Control (QA/QC) is addressed in the Quality Assurance Project Plan (QAPP) included as **Appendix B**. The QAPP outlines procedures to be followed for sampling and analysis to ensure quality of the results. A DUSR will be prepared with the final reports to document the reliability of the sample results.

14.0 HEALTH AND SAFETY PLAN

A Site-specific Health and Safety Plan (HASP) has been prepared and is included as **Appendix E**. All on-Site personnel and visitors involved in the RI will be required to read and sign the HASP prior to entry of the Site.

15.0 COMMUNITY AIR MONITORING

A Community Air Monitoring Plan (CAMP) is provided as **Appendix F**, in accordance with DER-10 requirements for remedial investigation. The CAMP sets forth air monitoring procedures that will be utilized to measure airborne emissions during the RI, in order to minimize the release of contaminants to off-Site areas.

16.0 COMMUNITY PARTICIPATION

Community participation activities will be performed throughout the RI process to involve and inform the public. The specific citizen participation activities to be performed will be outlined in the Community Participation Plan (CPP), included as **Appendix G**.

17.0 REMEDIAL INVESTIGATION SCHEDULE

The proposed remedial investigation schedule is presented on **Table 17.1** below.

Table 17.1: Proposed Remedial Investigation Schedule

Activity	Duration
Remedial Investigation Implementation, including soil, groundwater, and soil vapor sampling	2 weeks
Prepare and Submit Draft RIR	2 months

Tables

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-1 (7.5-8.0)				SB-2 (5.5-6)				SB-3 (7.5-8)				SB-4 (6.5-7)				SB-5 (6.5-7)				SB-6 (8.0-8.5)				SB-7 (6.5-7)			
LAB ID:					L2242456-01				L2242456-02				L2242456-03				L2242456-04				L2242456-05				L2242456-06				L2242456-07			
COLLECTION DATE:					8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022			
SAMPLE DEPTH (FT):					7.5-8.0				5.5-6.0				7.5-8.0				6.5-7.0				6.5-7.0				8.0-8.5				6.5-7.0			
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
VOCs (mg/kg)																																
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	ND		0.00052	0.00014	ND		0.00054	0.00014	ND		0.00044	0.00012	ND		0.00056	0.00015	ND		0.00049	0.00013	ND		0.00046	0.00012	ND		0.00055	0.00015
1,1,1-Trichloroethane	71-55-6	0.68	100	0.68	ND		0.00052	0.00017	ND		0.00054	0.00018	ND		0.00044	0.00015	ND		0.00056	0.00019	ND		0.00049	0.00016	ND		0.00046	0.00015	ND		0.00055	0.00018
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	ND		0.00052	0.00017	ND		0.00054	0.00018	ND		0.00044	0.00015	ND		0.00056	0.00018	ND		0.00049	0.00016	ND		0.00046	0.00015	ND		0.00055	0.00018
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	ND		0.001	0.00028	ND		0.0011	0.00029	ND		0.00088	0.00024	ND		0.0011	0.0003	ND		0.00098	0.00026	ND		0.00092	0.00024	ND		0.0011	0.0003
1,1-Dichloroethane	75-34-3	0.27	47	0.27	ND		0.001	0.00015	ND		0.0011	0.00016	ND		0.00088	0.00013	ND		0.0011	0.00016	ND		0.00098	0.00014	ND		0.00092	0.00013	ND		0.0011	0.00016
1,1-Dichloroethene	75-35-4	0.24	0.98	0.33	ND		0.001	0.00024	ND		0.0011	0.00026	ND		0.00088	0.00021	ND		0.0011	0.00026	ND		0.00098	0.00023	ND		0.00092	0.00022	ND		0.0011	0.00026
1,1-Dichloropropene	563-58-6	NS	NS	NS	ND		0.00052	0.00016	ND		0.00054	0.00017	ND		0.00044	0.00014	ND		0.00056	0.00018	ND		0.00049	0.00016	ND		0.00046	0.00015	ND		0.00055	0.00018
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	ND		0.0021	0.00033	ND		0.0022	0.00035	ND		0.0018	0.00028	ND		0.0022	0.00036	ND		0.002	0.00032	ND		0.0018	0.0003	ND		0.0022	0.00036
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	ND		0.0021	0.00013	ND		0.0022	0.00014	ND		0.0018	0.00011	ND		0.0022	0.00014	ND		0.002	0.00012	ND		0.0018	0.00012	ND		0.0022	0.00014
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	ND		0.0021	0.0002	ND		0.0022	0.00021	ND		0.0018	0.00017	ND		0.0022	0.00021	ND		0.002	0.00019	ND		0.0018	0.00018	ND		0.0022	0.00021
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	ND		0.0021	0.00028	ND		0.0022	0.00029	ND		0.0018	0.00024	ND		0.0022	0.0003	ND		0.002	0.00027	ND		0.0018	0.00025	ND		0.0022	0.0003
1,2,4-Trimethylbenzene	95-63-6	5.9	100	5.9	ND		0.0021	0.00034	ND		0.0022	0.00036	ND		0.0018	0.00029	ND		0.0022	0.00037	ND		0.002	0.00033	ND		0.0018	0.00031	ND		0.0022	0.00037
1,2-Dibromo-3-chloropropane	96-12-8	NS	NS	NS	ND		0.0031	0.001	ND		0.0032	0.0011	ND		0.0026	0.00088	ND		0.0033	0.0011	ND		0.0029	0.00098	ND		0.0028	0.00092	ND		0.0033	0.0011
1,2-Dibromoethane	106-93-4	NS	NS	NS	ND		0.001	0.00029	ND		0.0011	0.0003	ND		0.00088	0.00024	ND		0.0011	0.00031	ND		0.00098	0.00027	ND		0.00092	0.00026	ND		0.0011	0.00031
1,2-Dichlorobenzene	95-50-1	1.1	100	1.1	ND		0.0021	0.00015	ND		0.0022	0.00016	ND		0.0018	0.00013	ND		0.0022	0.00016	ND		0.002	0.00014	ND		0.0018	0.00013	ND		0.0022	0.00016
1,2-Dichloroethane	107-06-2	0.02	5.8	0.02	ND		0.001	0.00026	ND		0.0011	0.00028	ND		0.00088	0.00023	ND		0.0011	0.00029	ND		0.00098	0.00025	ND		0.00092	0.00024	ND		0.0011	0.00028
1,2-Dichloroethene, Total	540-59-0	NS	NS	NS	ND		0.001	0.00014	ND		0.0011	0.00015	ND		0.00088	0.00012	ND		0.0011	0.00015	ND		0.00098	0.00013	ND		0.00092	0.00012	ND		0.0011	0.00015
1,2-Dichloropropane	78-87-5	NS	NS	NS	ND		0.001	0.00013	ND		0.0011	0.00014	ND		0.00088	0.00011	ND		0.0011	0.00014	ND		0.00098	0.00012	ND		0.00092	0.00011	ND		0.0011	0.00014
1,3,5-Trimethylbenzene	108-67-8	3.1	100	3.1	ND		0.0021	0.0002	ND		0.0022	0.00021	ND		0.0018	0.00017	ND		0.0022	0.00022	ND		0.002	0.00019	ND		0.0018	0.00018	ND		0.0022	0.00021
1,3-Dichlorobenzene	541-73-1	2.6	38	2.6	ND		0.0021	0.00015	ND		0.0022	0.00016	ND		0.0018	0.00013	ND		0.0022	0.00016	ND		0.002	0.00014	ND		0.0018	0.00014	ND		0.0022	0.00016
1,3-Dichloropropane	142-28-9	NS	NS	NS	ND		0.0021	0.00017	ND		0.0022	0.00018	ND		0.0018	0.00015	ND		0.0022	0.00019	ND		0.002	0.00016	ND		0.0018	0.00015	ND		0.0022	0.00018
1,3-Dichloropropene, Total	542-75-6	NS	NS	NS	ND		0.00052	0.00016	ND		0.00054	0.00017	ND		0.00044	0.00014	ND		0.00056	0.00018	ND		0.00049	0.00015	ND		0.00046	0.00014	ND		0.00055	0.00017
1,4-Dichlorobenzene	106-46-7	1.8	24	1.8	ND		0.0021	0.00018	ND		0.0022	0.00018	ND		0.0018	0.00015	ND		0.0022	0.00019	ND		0.002	0.00017	ND		0.0018	0.00016	ND		0.0022	0.00019
1,4-Dioxane	123-91-1	0.1	5.7	0.1	ND		0.082	0.036	ND		0.086	0.038	ND		0.07	0.031	ND		0.089	0.039	ND		0.078	0.034	ND		0.074	0.032	ND		0.088	0.039
2,2-Dichloropropane	594-20-7	NS	NS	NS	ND		0.0021	0.00021	ND		0.0022	0.00022	ND		0.0018	0.00018	ND		0.0022	0.00022	ND		0.002	0.0002	ND		0.0018	0.00018	ND		0.0022	0.00022
2-Butanone	78-93-3	0.1	100	0.1	ND		0.01	0.0023	ND		0.011	0.0024	ND		0.0088	0.002	ND		0.011	0.0025	ND		0.0098	0.0022	ND		0.0092	0.002	ND		0.011	0.0024
2-Hexanone	591-78-6	NS	NS	NS	ND		0.01	0.0012	ND		0.011	0.0013	ND		0.0088	0.001	ND		0.011	0.0013	ND		0.0098	0.0012	ND		0.0092	0.0011	ND		0.011	0.0013
4-Methyl-2-pentanone	108-10-1	NS	NS	NS	ND		0.01	0.0013	ND		0.011	0.0014	ND		0.0088	0.0011	ND		0.011	0.0014	ND		0.0098	0.0012	ND		0.0092	0.0012	ND		0.011	0.0014
Acetone	67-64-1	0.03	100	0.03	0.01		0.01	0.005	0.0069	J	0.011	0.0052	0.0094		0.0088	0.0042	0.007	J	0.011	0.0054	0.0065	J	0.0098	0.0047	0.0094		0.0092	0.0044	ND		0.011	0.0053
Acrylonitrile	107-13-1	NS	NS	NS	ND		0.0041	0.0012	ND		0.0043	0.0012	ND		0.0035	0.001	ND		0.0045	0.0013	ND		0.0039	0.0011	ND		0.0037	0.001	ND		0.0044	0.0013
Benzene	71-43-2	0.06	3.7	0.06	ND		0.00052	0.00017	ND		0.00054	0.00018	ND		0.00044	0.00015	ND		0.00056	0.00018	ND		0.00049	0.00016	ND		0.00046	0.00015	ND		0.00055	0.00018
Bromobenzene	108-86-1	NS	NS	NS	ND		0.0021	0.00015	ND		0.0022	0.00016	ND		0.0018	0.00013	ND		0.0022	0.00016	ND		0.002	0.00014	ND		0.0018	0.00013	ND		0.0022	0.00016
Bromochloromethane	74-97-5	NS	NS	NS	ND		0.0021	0.00021	ND		0.0022	0.00022	ND		0.0018	0.00018	ND		0.0022	0.00023	ND		0.002	0.0002	ND		0.0018	0.00019	ND		0.0022	0.00023
Bromodichloromethane	75-27-4	NS	NS	NS	ND		0.00052	0.00011	ND		0.00054	0.00012	ND		0.00044	0.0001	ND		0.00056	0.00012	ND		0.00049	0.00011	ND		0.00046	0.0001	ND		0.00055	0.00012
Bromoform	75-25-2	NS	NS	NS	ND		0.0041	0.00025	ND		0.0043	0.00027	ND		0.0035	0.00022	ND		0.0045	0.00027	ND		0.0039	0.00024	ND		0.0037	0.00023	ND		0.0044	0.00027
Bromomethane	74-83-9	NS	NS	NS	ND		0.0021	0.0006	ND		0.0022	0.00063	ND		0.0018	0.00051	ND		0.0022	0.00065	ND		0.002	0.00057	ND		0.0018	0.00053	ND		0.0022	0.00064
Carbon disulfide	75-15-0	NS	NS	NS	ND		0.01	0.0047	ND		0.011	0.0049	ND		0.0088	0.004	ND		0.011	0.0051	ND		0.0098	0.0045	ND		0.0092	0.0042	ND		0.011	0.005
Carbon tetrachloride	56-23-5	0.76	7.1	0.76	ND		0.001	0.00024	ND		0.0011	0.00025	ND		0.00088	0.0002	ND		0.0011	0.00026	ND		0.00098	0.00022	ND		0.00092	0.00021	ND		0.0011	0.00025
Chlorobenzene	108-90-7	4.5	100	4.5	ND		0.00052	0.00013	ND		0.00054	0.00014	ND		0.00044	0.00011	ND		0.00056	0.00014	ND		0.00049	0.00012	ND		0.00046	0.00012	ND		0.00055	0.00014
Chloroethane	75-00-3	NS	NS	NS	ND		0.0021	0.00046	ND		0.0022	0.00049	ND		0.0018	0.0004	ND		0.0022	0.0005	ND		0.002	0.00044	ND		0.0018	0.00042	ND		0.0022	0.0005
Chloroform	67-66-3	0.37	24	0.37	ND		0.0015	0.00014	ND		0.0016	0.00015	ND		0.0013	0.00012	ND		0.0017	0.00016	ND		0.0015	0.00014	ND		0.0014	0.00013	ND		0.0016	0.00015
Chloromethane	74-87-3	NS	NS	NS	ND		0.0041	0.00096	ND		0.0043	0.001	ND		0.0035	0.00082	ND		0.0045	0.001	ND		0.0039	0.00091	ND		0.0037	0.00086	ND		0.0044	0.001
cis-1,2-Dichloroethene	156-59-2	0.19	41	0.19	ND		0.001	0.00018	ND		0.0011	0.00019	ND		0.00088	0.00015	ND		0.0011	0.0002	ND		0.00098	0.00017	ND		0.00092	0.00016	ND		0.0011	0.00019
cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	ND		0.00052	0.00016	ND		0.00054	0.00017	ND		0.00044	0.00014	ND		0.00056	0.00018	ND		0.00049	0.00015	ND		0.00046	0.00014	ND		0.00055	0.00017
Dibromochloromethane	124-48-1	NS	NS	NS	ND		0.001	0.00014	ND		0.0011	0.00015	ND		0.00088	0.00012	ND		0.0011	0.00016	ND		0.00098	0.00014	ND		0.00092	0.00013	ND		0.0011	0.00015
Dibromomethane	74-95-3	NS	NS	NS	ND		0.0021	0.00024	ND		0.0022	0.00026	ND		0.0018	0.00021	ND		0.0022	0.00026	ND		0.002	0.00023	ND		0.0018	0.00022	ND		0.0022	0.00026
Dichlorodifluoromethane	75-71-8	NS	NS	NS	ND		0.01	0.00094	ND		0.011	0.00099	ND		0.0088	0.00081	ND		0.011	0.001	ND		0.0098	0.0009	ND		0.0092	0.00084	ND		0.011	0.001
Ethyl ether	60-29-7	NS	NS	NS	ND		0.0021	0.00035	ND		0.0022	0.00037	ND		0.0018	0.0003	ND		0.0022	0.00038	ND		0.002	0.00033	ND		0.0018	0.00031	ND		0.0022	0.00038
Ethylbenzene	100-41-4	1	76	1	ND		0.001	0.00014	ND		0.0011	0.00015	ND		0.00088	0.00012	ND		0.0011	0.00016	ND		0.00098	0.00014	ND		0.00092	0.00013	ND		0.0011	0.00016
Hexachlorobutadiene	87-68-3	NS	NS	NS	ND		0.0041	0.00017	ND		0.0043	0.00018	ND		0.0035	0.00015	ND		0.0045	0.00019	ND		0.0039	0.00016	ND		0.0037	0.00016	ND		0.0044	0.00019
Isopropylbenzene	98-82-8	NS	NS	NS	ND		0.001	0.00011	ND		0.0011	0.00012	ND		0.00088	0.0001	ND		0.0011	0.00012	ND		0.00098	0.00011	ND		0.00092	0.0001	ND		0.0011	0.00012
Methyl tert butyl ether	1634-04-4	0.1	100	0.1	ND		0.0021	0.00021	ND		0.0022	0.00022	ND		0.0018	0.00018	ND		0.0022	0.0002	ND		0.002	0.0002	ND		0.0018	0.00018	ND		0.0022	0.00022
Methylene chloride	75-09-2	0.05	81	0.05	ND		0.0052	0.0024	ND		0.0054	0.0025	ND		0.0044	0.002	ND		0.0056	0.0026	ND		0.0049	0.0022	ND		0.0046	0.0021	ND		0.0055	0.0025
n-Butylbenzene	104-51-8	18	100	18	ND		0.001	0.00017	ND		0.0011	0.00018	ND		0.00088	0.00015	ND		0.0011	0.00019	ND		0.00098	0.00016	ND		0.00092	0.00015	ND		0.0011	0.00018
n-Propylbenzene	103-65-1	5	100	5	ND		0.001	0.00018	ND		0.0011	0.00018	ND		0.00088	0.00015	ND		0.0011	0.00019	ND		0.00098	0.00017	ND		0.00092	0.00016	ND		0.0011	0.00019
Naphthalene	91-20-3	12	100	12	ND		0.0041	0.00067	ND		0.0043	0.0007	ND		0.0035	0.00057	ND		0.0045	0.00072	ND		0.0039	0.00064	ND		0.0037	0.0006	ND		0.0044	0.00072
o-Chlorotoluene	95-49-8	NS	NS	NS	ND		0.0021	0.0002	ND		0.0022	0.00021	ND		0.0018	0.00017	ND		0.0022	0.00021	ND		0.002	0.00019	ND		0.0018	0.00018	ND		0.0022	0.00021
o-Xylene	95-47-6	NS	NS	NS	ND		0.001	0.0003	ND		0.0011	0.00031	ND		0.00088	0.00026	ND		0.0011	0.00032	ND		0.00098	0.00028	ND		0.00092	0.00027	ND		0.0011	0.00032
p-Chlorotoluene	106-43-4	NS	NS	NS	ND		0.0021	0.00011	ND		0.0022	0.00012	ND		0.0018	0.0001	ND		0.0022	0.00012	ND		0.002	0.0001	ND		0.0018	0.0001	ND		0.0022	0.00012
p-Diethylbenzene	105-05-5	NS	NS	NS	ND		0.0021	0.00018	ND		0.0022	0.00019	ND		0.0018	0.00016	ND		0.0022	0.0002	ND		0.002	0.00017	ND		0.0018	0.00016	ND		0.0022	0.0002
p-Ethyltoluene	622-96-8	NS	NS	NS	ND		0.0021	0.0004	ND		0.0022	0.00042	ND		0.0018	0.00034	ND		0.0022	0.00043	ND		0.002	0.00038	ND		0.0018	0.00035	ND		0.0022	0.00042
p-Isopropyltoluene	99-87-6	NS	NS	NS	ND		0.001	0.00011	ND		0.0011	0.00012	ND		0.00088	0.0001	ND		0.0011	0.00012	ND		0.00098	0.00011	ND		0.00092	0.0001	ND		0.0011	0.00012
p/m-Xylene	179601-23-1	NS	NS	NS	ND		0.0021	0.00058	ND		0.0022	0.00061	ND		0.0018	0.00049	ND		0.0022	0.00062	ND		0.002	0.00055	ND		0.0018	0.00051	ND		0.0022	0.00062
sec-Butylbenzene	135-98-8	25	100	25	ND		0.001	0.00015	ND		0.0011	0.00016	ND		0.00088	0.00013	ND		0.0011	0.00016	ND		0.00098	0.00014	ND		0.00092	0.00013	ND		0.0011	0.00016
Styrene	100-42-5	NS	NS	NS	0.00064	J	0.001	0.0002	0.00069	J	0.0011	0.00021	0.00054	J	0.00088	0.00017	0.00069	J	0.0011	0.00022	0.0006	J	0.00098	0.00019	0.00056	J	0.00092	0.00018	ND		0.0011	0.00022
tert-Butylbenzene	98-06-6	11	100	11	ND		0.0021	0.00012	ND		0.0022	0.00013	ND		0.0018	0.0001	ND		0.0022	0.00013	ND		0.002	0.00012	ND		0.0018	0.00011	ND		0.0022	0.00013
Tetrachloroethene	127-18-4	1.3	18	1.3	ND		0.00052	0.0002	ND		0.00054	0.00021	ND		0.00044	0.00017	ND		0.00056	0.00022	ND		0.00049	0.00019	ND		0.00046	0.00018	ND		0.00055	0.00022
Toluene	108-88-3	0.7	100	0.7	ND		0.001	0.00056	ND		0.0011	0.00059	ND		0.00088	0.00048	ND		0.0011	0.00061	ND		0.00098	0.00053	ND		0.00092	0.0005	ND		0.0011	0.0006
trans-1,2-Dichloroethene	156-60-5	0.19	100	0.19	ND		0.0015	0.00014	ND		0.0016	0.00015	ND		0.0013	0.00012	ND		0.0017	0.00015	ND		0.0015	0.00013	ND		0.0014	0.00012	ND		0.0016	0.00015
trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	ND		0.001	0.00028	ND		0.0011	0.0003	ND		0.00088	0.00024	ND		0.0011	0.0003	ND		0.00098	0.00027	ND		0.00092	0.00025	ND		0.0011	0.0003
trans-1,4-Dichloro-2-butene	110-57-6	NS	NS	NS	ND		0.0052	0.0015	ND		0.0054	0.0015	ND		0.0044	0.0012	ND		0.0056	0.0016	ND		0.0049	0.0014	ND		0.0046	0.0013	ND		0.0055	0.0016
Trichloroethene	79-01-6	0.47	6.4	0.47	ND		0.00052	0.00014	ND		0.00054	0.00015	ND		0.00044	0.00012	ND		0.00056	0.00015	ND		0.00049	0.00013	ND		0.00046	0.00012	ND		0.00055	0.00015
Trichlorofluoromethane	75-69-4	NS	NS	NS	ND		0.0041	0.00072	ND		0.0043	0.00075	ND		0.0035	0.00061	ND		0.0045	0.00078	ND		0.0039	0.00068	ND		0.0037	0.00064	ND		0.0044	0.00077
Vinyl acetate	108-05-4	NS	NS	NS	ND		0.01	0.0022	ND		0.011	0.0023	ND		0.0088	0.0019	ND		0.011	0.0024	ND		0.0098	0.0021	ND		0.0092	0.002	ND		0.011	0.0024
Vinyl chloride	75-01-4	0.02	0.48	0.02	ND		0.001	0.00034	ND		0.0011	0.00036	ND		0.00088	0.0003	ND		0.0011	0.00037	ND		0.00098	0.00033	ND		0.00092	0.00031	ND		0.0011	0.00037
Xylenes, Total	1330-20-7	0.26	100	1.2	ND		0.001	0.0003	ND		0.0011	0.00031	ND		0.00088	0.00026	ND		0.0011	0.00032	ND		0.00098	0.00028	ND		0.00092	0.00027	ND		0.0011	0.00032
Total VOCs	-	NS	NS	NS	0.01064	-	-	-	0.00759	-	-	-	0.00994	-	-	-	0.00769	-	-	-	0.0071	-	-	-	0.00996	-	-	-	-	-	-	-
PFAS (mg/kg)		NS	NS	NS																												
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	ND		0.000507	0.000291	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	ND		0.000507	0.000182	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	ND		0.000507	0.000086	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	ND		0.000507	0.000204	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	ND		0.000253	0.00004	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorobutanoic Acid (PFBA)	375-22-4	NS	NS	NS	ND		0.000507	0.000023	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	ND		0.000507	0.000155	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	ND		0.000253	0.000068	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	ND		0.000507	0.000071	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	ND		0.000507	0.000138	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-1 (7.5-8.0)				SB-2 (5.5-6)				SB-3 (7.5-8)				SB-4 (6.5-7)				SB-5 (6.5-7)				SB-6 (8.0-8.5)				SB-7 (6.5-7)			
LAB ID:					L2242456-01				L2242456-02				L2242456-03				L2242456-04				L2242456-05				L2242456-06				L2242456-07			
COLLECTION DATE:					8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022			
SAMPLE DEPTH (FT):					7.5-8.0				5.5-6.0				7.5-8.0				6.5-7.0				6.5-7.0				8.0-8.5				6.5-7.0			
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Perfluoroheptanoic Acid (PFHpA)	375-85-9	NS	NS	NS	ND		0.000253	0.000046	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	ND		0.000253	0.000061	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	ND		0.000507	0.000053	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	ND		0.000253	0.000076	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	ND		0.000507	0.000099	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	NS	NS	NS	ND		0.000253	0.000132	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorooctanoic Acid (PFOA)	335-67-1	NS	NS	NS	ND		0.000253	0.000043	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	ND		0.000507	0.000047	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	ND		0.000507	0.000055	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	ND		0.000507	0.000207	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	ND		0.000507	0.000047	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
PFOA/PFOS, Total		NS	NS	NS	ND		0.000253	0.000043	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
SVOCs (mg/kg)		NS	NS	NS																												
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	ND		0.18	0.018	ND		0.2	0.02	ND		0.18	0.018	ND		0.19	0.02	ND		0.18	0.019	ND		0.18	0.019	ND		0.2	0.021
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	ND		0.18	0.02	ND		0.2	0.022	ND		0.18	0.02	ND		0.19	0.022	ND		0.18	0.021	ND		0.18	0.02	ND		0.2	0.023
1,2-Dichlorobenzene	95-50-1	1.1	100	1.1	ND		0.18	0.032	ND		0.2	0.035	ND		0.18	0.032	ND		0.19	0.034	ND		0.18	0.033	ND		0.18	0.032	ND		0.2	0.036
1,3-Dichlorobenzene	541-73-1	2.6	38	2.6	ND		0.18	0.03	ND		0.2	0.034	ND		0.18	0.03	ND		0.19	0.032	ND		0.18	0.031	ND		0.18	0.031	ND		0.2	0.034
1,4-Dichlorobenzene	106-46-7	1.8	24	1.8	ND		0.18	0.031	ND		0.2	0.034	ND		0.18	0.031	ND		0.19	0.033	ND		0.18	0.032	ND		0.18	0.031	ND		0.2	0.035
1,4-Dioxane	123-91-1	0.1	5.7	0.1	ND		0.026	0.0082	ND		0.029	0.009	ND		0.026	0.0081	ND		0.028	0.0086	ND		0.027	0.0084	ND		0.027	0.0083	ND		0.03	0.0092
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	ND		0.18	0.034	ND		0.2	0.038	ND		0.18	0.034	ND		0.19	0.036	ND		0.18	0.035	ND		0.18	0.034	ND		0.2	0.038
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	ND		0.11	0.034	ND		0.12	0.037	ND		0.1	0.033	ND		0.11	0.036	ND		0.11	0.034	ND		0.11	0.034	ND		0.12	0.038
2,4-Dichlorophenol	120-83-2	NS	NS	NS	ND		0.16	0.028	ND		0.18	0.032	ND		0.16	0.028	ND		0.17	0.03	ND		0.16	0.029	ND		0.16	0.029	ND		0.18	0.032
2,4-Dimethylphenol	105-67-9	NS	NS	NS	ND		0.18	0.058	ND		0.2	0.065	ND		0.18	0.058	ND		0.19	0.062	ND		0.18	0.06	ND		0.18	0.059	ND		0.2	0.066
2,4-Dinitrophenol	51-28-5	NS	NS	NS	ND		0.85	0.082	ND		0.94	0.091	ND		0.85	0.082	ND		0.9	0.088	ND		0.87	0.085	ND		0.86	0.084	ND		0.96	0.093
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	ND		0.18	0.035	ND		0.2	0.039	ND		0.18	0.035	ND		0.19	0.038	ND		0.18	0.036	ND		0.18	0.036	ND		0.2	0.04
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	ND		0.18	0.03	ND		0.2	0.034	ND		0.18	0.03	ND		0.19	0.032	ND		0.18	0.031	ND		0.18	0.031	ND		0.2	0.034
2-Chloronaphthalene	91-58-7	NS	NS	NS	ND		0.18	0.018	ND		0.2	0.019	ND		0.18	0.017	ND		0.19	0.019	ND		0.18	0.018	ND		0.18	0.018	ND		0.2	0.02
2-Chlorophenol	95-57-8	NS	NS	NS	ND		0.18	0.021	ND		0.2	0.023	ND		0.18	0.021	ND		0.19	0.022	ND		0.18	0.021	ND		0.18	0.021	ND		0.2	0.024
2-Methylnaphthalene	91-57-6	NS	NS	NS	ND		0.21	0.021	ND		0.24	0.024	ND		0.21	0.021	ND		0.22	0.023	ND		0.22	0.022	ND		0.22	0.022	ND		0.24	0.024
2-Methylphenol	95-48-7	0.33	100	0.33	ND		0.18	0.027	ND		0.2	0.03	ND		0.18	0.027	ND		0.19	0.029	ND		0.18	0.028	ND		0.18	0.028	ND		0.2	0.031
2-Nitroaniline	88-74-4	NS	NS	NS	ND		0.18	0.034	ND		0.2	0.038	ND		0.18	0.034	ND		0.19	0.036	ND		0.18	0.035	ND		0.18	0.035	ND		0.2	0.039
2-Nitrophenol	88-75-5	NS	NS	NS	ND		0.38	0.067	ND		0.42	0.074	ND		0.38	0.066	ND		0.41	0.071	ND		0.39	0.068	ND		0.39	0.068	ND		0.43	0.075
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	ND		0.18	0.047	ND		0.2	0.052	ND		0.18	0.047	ND		0.19	0.05	ND		0.18	0.048	ND		0.18	0.048	ND		0.2	0.053
3-Methylphenol/4-Methylphenol	108-39-4/106-44-5	NS	NS	NS	ND		0.26	0.028	ND		0.28	0.031	ND		0.25	0.028	ND		0.27	0.029	ND		0.26	0.028	ND		0.26	0.028	ND		0.29	0.031
3-Nitroaniline	99-09-2	NS	NS	NS	ND		0.18	0.033	ND		0.2	0.037	ND		0.18	0.033	ND		0.19	0.035	ND		0.18	0.034	ND		0.18	0.034	ND		0.2	0.038
4,6-Dinitro-o-cresol	534-52-1	NS	NS	NS	ND		0.46	0.085	ND		0.51	0.094	ND		0.46	0.085	ND		0.49	0.09	ND		0.47	0.087	ND		0.47	0.086	ND		0.52	0.096
4-Bromophenyl phenyl ether	101-55-3	NS	NS	NS	ND		0.18	0.027	ND		0.2	0.03	ND		0.18	0.027	ND		0.19	0.029	ND		0.18	0.028	ND		0.18	0.027	ND		0.2	0.031
4-Chloroaniline	106-47-8	NS	NS	NS	ND		0.18	0.032	ND		0.2	0.036	ND		0.18	0.032	ND		0.19	0.034	ND		0.18	0.033	ND		0.18	0.033	ND		0.2	0.036
4-Chlorophenyl phenyl ether	7005-72-3	NS	NS	NS	ND		0.18	0.019	ND		0.2	0.021	ND		0.18	0.019	ND		0.19	0.02	ND		0.18	0.019	ND		0.18	0.019	ND		0.2	0.021
4-Nitroaniline	100-01-6	NS	NS	NS	ND		0.18	0.073	ND		0.2	0.081	ND		0.18	0.073	ND		0.19	0.078	ND		0.18	0.075	ND		0.18	0.074	ND		0.2	0.083
4-Nitrophenol	100-02-7	NS	NS	NS	ND		0.25	0.072	ND		0.27	0.08	ND		0.25	0.072	ND		0.26	0.077	ND		0.25	0.074	ND		0.25	0.073	ND		0.28	0.082
Acenaphthene	83-32-9	20	100	98	ND		0.14	0.018	ND		0.16	0.02	ND		0.14	0.018	ND		0.15	0.019	ND		0.14	0.019	ND		0.14	0.019	ND		0.16	0.021
Acenaphthylene	208-96-8	100	100	365	ND		0.14	0.027	ND		0.16	0.03	ND		0.14	0.027	ND		0.15	0.029	ND		0.14	0.028	ND		0.14	0.028	ND		0.16	0.031
Acetophenone	98-86-2	NS	NS	NS	ND		0.18	0.022	ND		0.2	0.024	ND		0.18	0.022	ND		0.19	0.023	ND		0.18	0.022	ND		0.18	0.022	ND		0.2	0.025
Anthracene	120-12-7	100	100	1000	ND		0.11	0.034	ND		0.12	0.038	ND		0.1	0.034	ND		0.11	0.037	ND		0.11	0.035	ND		0.11	0.035	ND		0.12	0.039
Benzo(a)anthracene	56-55-3	1	1.4	1	ND		0.11	0.02	ND		0.12	0.022	ND		0.1	0.02	ND		0.11	0.021	ND		0.11	0.02	ND		0.11	0.02	ND		0.12	0.022
Benzo(a)pyrene	50-32-8	1	1	22	ND		0.14	0.043	ND		0.16	0.048	ND		0.14	0.043	ND		0.15	0.046	ND		0.14	0.044	ND		0.14	0.044	ND		0.16	0.049
Benzo(b)fluoranthene	205-99-2	1	1.4	2.1	ND		0.11	0.03	ND		0.12	0.033	ND		0.1	0.03	ND		0.11	0.032	ND		0.11	0.03	ND		0.11	0.03	ND		0.12	0.034
Benzo(ghi)perylene	191-24-2	0.64	4.9	1000	ND		0.14	0.021	ND		0.16	0.023	ND		0.14	0.021	ND		0.15	0.022	ND		0.14	0.021	ND		0.14	0.021	ND		0.16	0.024
Benzo(k)fluoranthene	207-08-9	0.8	4.9	2	ND		0.11	0.028	ND		0.12	0.031	ND		0.1	0.028	ND		0.11	0.03	ND		0.11	0.029	ND		0.11	0.029	ND		0.12	0.032
Benzoic Acid	65-85-0	NS	NS	NS	ND		0.57	0.18	ND		0.64	0.2	ND		0.57	0.18	ND		0.61	0.19	ND		0.59	0.18	ND		0.58	0.18	ND		0.65	0.2
Benzyl Alcohol	100-51-6	NS	NS	NS	ND		0.18	0.054	ND		0.2	0.06	ND		0.18	0.054	ND		0.19	0.058	ND		0.18	0.056	ND		0.18	0.055	ND		0.2	0.061
Biphenyl	92-52-4	NS	NS	NS	ND		0.4	0.023	ND		0.45	0.025	ND		0.4	0.023	ND		0.43	0.024	ND		0.41	0.024	ND		0.41	0.023	ND		0.46	0.026
Bis(2-chloroethoxy)methane	111-91-1	NS	NS	NS	ND		0.19	0.018	ND		0.21	0.02	ND		0.19	0.018	ND		0.2	0.019	ND		0.2	0.018	ND		0.19	0.018	ND		0.22	0.02
Bis(2-chloroethyl)ether	111-44-4	NS	NS	NS	ND		0.16	0.024	ND		0.18	0.026	ND		0.16	0.024	ND		0.17	0.025	ND		0.16	0.025	ND		0.16	0.024	ND		0.18	0.027
Bis(2-chloroisopropyl)ether	108-60-1	NS	NS	NS	ND		0.21	0.03	ND		0.24	0.033	ND		0.21	0.03	ND		0.22	0.032	ND		0.22	0.031	ND		0.22	0.031	ND		0.24	0.034
Bis(2-ethylhexyl)phthalate	117-81-7	NS	NS	NS	ND		0.18	0.061	ND		0.2	0.068	ND		0.18	0.061	ND		0.19	0.065	ND		0.18	0.063	ND		0.18	0.062	ND		0.2	0.069
Butyl benzyl phthalate	85-68-7	NS	NS	NS	ND		0.18	0.045	ND		0.2	0.049	ND		0.18	0.044	ND		0.19	0.047	ND		0.18	0.046	ND		0.18	0.045	ND		0.2	0.05
Carbazole	86-74-8	NS	NS	NS	ND		0.18	0.017	ND		0.2	0.019	ND		0.18	0.017	ND		0.19	0.018	ND		0.18	0.018	ND		0.18	0.017	ND		0.2	0.019
Chrysene	218-01-9	1	4.9	1	ND		0.11	0.018	ND		0.12	0.02	ND		0.1	0.018	ND		0.11	0.02	ND		0.11	0.019	ND		0.11	0.019	ND		0.12	0.021
Di-n-butylphthalate	84-74-2	NS	NS	NS	ND		0.18	0.034	ND		0.2	0.037	ND		0.18	0.033	ND		0.19	0.036	ND		0.18	0.034	ND		0.18	0.034	ND		0.2	0.038
Di-n-octylphthalate	117-84-0	NS	NS	NS	ND		0.18	0.06	ND		0.2	0.067	ND		0.18	0.06	ND		0.19	0.064	ND		0.18	0.062	ND		0.18	0.061	ND		0.2	0.068
Dibenzo(a,h)anthracene	53-70-3	0.33	0.33	1000	ND		0.11	0.02	ND		0.12	0.023	ND		0.1	0.02	ND		0.11	0.022	ND		0.11	0.021	ND		0.11	0.021	ND		0.12	0.023
Dibenzofuran	132-64-9	2.1	18	110	ND		0.18	0.017	ND		0.2	0.018	ND		0.18	0.017	ND		0.19	0.018	ND		0.18	0.017	ND		0.18	0.017	ND		0.2	0.019
Diethyl phthalate	84-66-2	NS	NS	NS	ND		0.18	0.016	ND		0.2	0.018	ND		0.18	0.016	ND		0.19	0.017	ND		0.18	0.017	ND		0.18	0.017	ND		0.2	0.018
Dimethyl phthalate	131-11-3	NS	NS	NS	ND		0.18	0.037	ND		0.2	0.041	ND		0.18	0.037	ND		0.19	0.039	ND		0.18	0.038	ND		0.18	0.038	ND		0.2	0.042
Fluoranthene	206-44-0	85	100	1000	ND		0.11	0.02	ND		0.12	0.022	ND		0.1	0.02	ND		0.11	0.022	ND		0.11	0.021	ND		0.11	0.021	ND		0.12	0.023
Fluorene	86-73-7	30	100	386	ND		0.18	0.017	ND		0.2	0.019	ND		0.18	0.017	ND		0.19	0.018	ND		0.18	0.018	ND		0.18	0.017	ND		0.2	0.019
Hexachlorobenzene	118-74-1	0.33	0.33	3.2	ND		0.11	0.02	ND		0.12	0.022	ND		0.1	0.02	ND		0.11	0.021	ND		0.11	0.02	ND		0.11	0.02	ND		0.12	0.022
Hexachlorobutadiene	87-68-3	NS	NS	NS	ND		0.18	0.026	ND		0.2	0.029	ND		0.18	0.026	ND		0.19	0.028	ND		0.18	0.026	ND		0.18	0.026	ND		0.2	0.029
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	ND		0.51	0.16	ND		0.56	0.18	ND		0.5	0.16	ND		0.54	0.17	ND		0.52	0.16	ND		0.51	0.16	ND		0.57	0.18
Hexachloroethane	67-72-1	NS	NS	NS	ND		0.14	0.029	ND		0.16	0.032	ND		0.14	0.028	ND		0.15	0.03	ND		0.14	0.029	ND		0.14	0.029	ND		0.16	0.032
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	1.4	6.6	ND		0.14	0.025	ND		0.16	0.027	ND		0.14	0.024	ND		0.15	0.026	ND		0.14	0.025	ND		0.14	0.025	ND		0.16	0.028
Isophorone	78-59-1	NS	NS	NS	ND		0.16	0.023	ND		0.18	0.025	ND		0.16	0.023	ND		0.17	0.024	ND		0.16	0.024	ND		0.16	0.023	ND		0.18	0.026
n-Nitrosodi-n-propylamine	621-64-7	NS	NS	NS	ND		0.18	0.027	ND		0.2	0.03	ND		0.18	0.027	ND		0.19	0.029	ND		0.18	0.028	ND		0.18	0.028	ND		0.2	0.031
Naphthalene	91-20-3	12	100	12	ND		0.18	0.022	ND		0.2	0.024	ND		0.18	0.021	ND		0.19	0.023	ND		0.18	0.022	ND		0.18	0.022	ND		0.2	0.024
NDPA/DPA	86-30-6	NS	NS	NS	ND		0.14	0.02	ND		0.16	0.022	ND		0.14	0.02	ND		0.15	0.021	ND		0.14	0.021	ND		0.14	0.02	ND		0.16	0.023
Nitrobenzene	98-95-3	0.08	1.8	0.08	ND		0.16	0.026	ND		0.18	0.029	ND		0.16	0.026	ND		0.17	0.028	ND		0.16	0.027	ND		0.16	0.027	ND		0.18	0.03
p-Chloro-m-cresol	59-50-7	NS	NS	NS	ND		0.18	0.026	ND		0.2	0.029	ND		0.18	0.026	ND		0.19	0.028	ND		0.18	0.027	ND		0.18	0.027	ND		0.2	0.03
Pentachlorophenol	87-86-5	0.8	1.3	0.8	ND		0.14	0.039	ND		0.16	0.043	ND		0.14	0.039	ND		0.15	0.041	ND		0.14	0.04	ND		0.14	0.04	ND		0.16	0.044
Phenanthrene	85-01-8	1.1	4.9	1000	ND		0.11	0.022	ND		0.12	0.024	ND		0.1	0.021	ND		0.11	0.023	ND		0.11	0.022	ND		0.11	0.022	ND		0.12	0.024
Phenol	108-95-2	0.33	100	0.33	ND		0.18	0.027	ND		0.2	0.03	ND		0.18	0.027	ND		0.19	0.028	ND		0.18	0.027	ND		0.18	0.027	ND		0.2	0.03
Pyrene	129-00-0	64	100	1000	ND		0.11	0.018	ND		0.12	0.019	ND		0.1	0.018	ND		0.11	0.019	ND		0.11	0.018	ND		0.11	0.018	ND		0.12	0.02
Total SVOCs		NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides (mg/kg)		NS	NS	NS																												
4,4'-DDD	72-54-8	0.0033	5	14	ND		0.0017	0.000605	ND		0.00188	0.000669	ND		0.00166	0.00059	ND		0.00176	0.000628	ND		0.00168	0.000599	ND		0.00163	0.000582	ND		0.00191	0.000681
4,4'-DDE	72-55-9	0.0033	3.4	9.3	ND		0.0017	0.000392	ND		0.00188	0.000434	ND		0.00166	0.000383	ND		0.00176	0.000408	ND		0.00168	0.000388	ND		0.00163	0.000378	ND		0.00191	0.000442
4,4'-DDT	50-29-3	0.0033	3.8	135	ND		0.0017	0.00136	ND		0.00188	0.00151	ND		0.00166	0.00133	ND		0.00176	0.00142	ND		0.00168	0.00135	ND		0.00163	0.00131	ND		0.00191	0.00154
Aldrin	309-00-2	0.0048	0.044	0.19	ND		0.0017	0.000597	ND		0.00188	0.00066	ND		0.00166	0.000583	ND		0.00176	0.00062	ND		0.00168	0.000591	ND		0.00163	0.000575	ND		0.00191	0.000673

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-1 (7.5-8.0)				SB-2 (5.5-6)				SB-3 (7.5-8)				SB-4 (6.5-7)				SB-5 (6.5-7)				SB-6 (8.0-8.5)				SB-7 (6.5-7)			
LAB ID:					L2242456-01				L2242456-02				L2242456-03				L2242456-04				L2242456-05				L2242456-06				L2242456-07			
COLLECTION DATE:					8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022				8/6/2022			
SAMPLE DEPTH (FT):					7.5-8.0				5.5-6.0				7.5-8.0				6.5-7.0				6.5-7.0				8.0-8.5				6.5-7.0			
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Alpha-BHC	319-84-6	0.02	0.18	0.02	ND		0.000706	0.000201	ND		0.000781	0.000222	ND		0.00069	0.000196	ND		0.000734	0.000208	ND		0.000699	0.000199	ND		0.00068	0.000193	ND		0.000796	0.000226
Beta-BHC	319-85-7	0.021	0.18	0.09	ND		0.0017	0.000643	ND		0.00188	0.000711	ND		0.00166	0.000628	ND		0.00176	0.000668	ND		0.00168	0.000636	ND		0.00163	0.000619	ND		0.00191	0.000724
Chlordane	57-74-9	NS	NS	NS	ND		0.0141	0.00562	ND		0.0156	0.00621	ND		0.0138	0.00548	ND		0.0147	0.00584	ND		0.014	0.00556	ND		0.0136	0.00541	ND		0.0159	0.00633
cis-Chlordane	5103-71-9	0.014	0.65	4.5	ND		0.00212	0.00059	ND		0.00234	0.000653	ND		0.00207	0.000577	ND		0.0022	0.000614	ND		0.0021	0.000585	ND		0.00204	0.000569	ND		0.00239	0.000665
Delta-BHC	319-86-8	0.04	100	0.1	ND		0.0017	0.000332	ND		0.00188	0.000367	ND		0.00166	0.000324	ND		0.00176	0.000345	ND		0.00168	0.000329	ND		0.00163	0.00032	ND		0.00191	0.000374
Dieldrin	60-57-1	0.005	0.075	0.1	ND		0.00106	0.00053	ND		0.00117	0.000586	ND		0.00103	0.000517	ND		0.0011	0.000551	ND		0.00105	0.000524	ND		0.00102	0.00051	ND		0.00119	0.000597
Endosulfan I	959-98-8	4.3	35	65	ND		0.0017	0.0004	ND		0.00188	0.000443	ND		0.00166	0.000391	ND		0.00176	0.000416	ND		0.00168	0.000396	ND		0.00163	0.000386	ND		0.00191	0.000451
Endosulfan II	33213-65-9	4.3	35	44	ND		0.0017	0.000566	ND		0.00188	0.000626	ND		0.00166	0.000553	ND		0.00176	0.000589	ND		0.00168	0.000561	ND		0.00163	0.000546	ND		0.00191	0.000638
Endosulfan sulfate	1031-07-8	4.3	35	47	ND		0.000706	0.000336	ND		0.000781	0.000372	ND		0.00069	0.000328	ND		0.000734	0.00035	ND		0.000699	0.000333	ND		0.00068	0.000324	ND		0.000796	0.000379
Endrin	72-20-8	0.014	5.3	0.06	ND		0.000706	0.00029	ND		0.000781	0.00032	ND		0.00069	0.000283	ND		0.000734	0.000301	ND		0.000699	0.000287	ND		0.00068	0.000279	ND		0.000796	0.000326
Endrin aldehyde	7421-93-4	NS	NS	NS	ND		0.00212	0.000742	ND		0.00234	0.00082	ND		0.00207	0.000724	ND		0.0022	0.000771	ND		0.0021	0.000734	ND		0.00204	0.000714	ND		0.00239	0.000836
Endrin ketone	53494-70-5	NS	NS	NS	ND		0.0017	0.000436	ND		0.00188	0.000483	ND		0.00166	0.000426	ND		0.00176	0.000454	ND		0.00168	0.000432	ND		0.00163	0.00042	ND		0.00191	0.000492
Heptachlor	76-44-8	0.013	0.53	0.38	ND		0.000848	0.00038	ND		0.000938	0.00042	ND		0.000828	0.000371	ND		0.000881	0.000395	ND		0.000839	0.000376	ND		0.000817	0.000366	ND		0.000955	0.000428
Heptachlor epoxide	1024-57-3	NS	NS	NS	ND		0.00318	0.000954	ND		0.00352	0.00105	ND		0.0031	0.000931	ND		0.0033	0.000991	ND		0.00315	0.000944	ND		0.00306	0.000919	ND		0.00358	0.00107
Lindane	58-89-9	0.025	0.21	0.05	ND		0.000706	0.000316	ND		0.000781	0.000349	ND		0.00069	0.000308	ND		0.000734	0.000328	ND		0.000699	0.000313	ND		0.00068	0.000304	ND		0.000796	0.000356
Methoxychlor	72-43-5	NS	NS	NS	ND		0.00318	0.000989	ND		0.00352	0.00109	ND		0.0031	0.000966	ND		0.0033	0.00103	ND		0.00315	0.000979	ND		0.00306	0.000953	ND		0.00358	0.00111
Toxaphene	8001-35-2	NS	NS	NS	ND		0.0318	0.0089	ND		0.0352	0.00984	ND		0.031	0.00869	ND		0.033	0.00925	ND		0.0315	0.00881	ND		0.0306	0.00857	ND		0.0358	0.01
trans-Chlordane	5103-74-2	NS	NS	NS	ND		0.00212	0.000559	ND		0.00234	0.000619	ND		0.00207	0.000546	ND		0.0022	0.000582	ND		0.0021	0.000554	ND		0.00204	0.000539	ND		0.00239	0.00063
PCBs (mg/kg)		NS	NS	NS																												
Aroclor 1016	12674-11-2	NS	NS	NS	ND		0.0339	0.00301	ND		0.0375	0.00333	ND		0.0336	0.00298	ND		0.0367	0.00326	ND		0.035	0.0031	ND		0.035	0.0031	ND		0.0393	0.00349
Aroclor 1221	11104-28-2	NS	NS	NS	ND		0.0339	0.0034	ND		0.0375	0.00376	ND		0.0336	0.00336	ND		0.0367	0.00368	ND		0.035	0.0035	ND		0.035	0.0035	ND		0.0393	0.00393
Aroclor 1232	11141-16-5	NS	NS	NS	ND		0.0339	0.00718	ND		0.0375	0.00795	ND		0.0336	0.00711	ND		0.0367	0.00778	ND		0.035	0.00741	ND		0.035	0.00741	ND		0.0393	0.00832
Aroclor 1242	53469-21-9	NS	NS	NS	ND		0.0339	0.00457	ND		0.0375	0.00506	ND		0.0336	0.00452	ND		0.0367	0.00494	ND		0.035	0.00471	ND		0.035	0.00471	ND		0.0393	0.00529
Aroclor 1248	12672-29-6	NS	NS	NS	ND		0.0339	0.00508	ND		0.0375	0.00562	ND		0.0336	0.00503	ND		0.0367	0.0055	ND		0.035	0.00524	ND		0.035	0.00524	ND		0.0393	0.00589
Aroclor 1254	11097-69-1	NS	NS	NS	ND		0.0339	0.00371	ND		0.0375	0.0041	ND		0.0336	0.00367	ND		0.0367	0.00401	ND		0.035	0.00383	ND		0.035	0.00382	ND		0.0393	0.0043
Aroclor 1260	11096-82-5	NS	NS	NS	ND		0.0339	0.00626	ND		0.0375	0.00693	ND		0.0336	0.0062	ND		0.0367	0.00678	ND		0.035	0.00646	ND		0.035	0.00646	ND		0.0393	0.00726
Aroclor 1262	37324-23-5	NS	NS	NS	ND		0.0339	0.0043	ND		0.0375	0.00476	ND		0.0336	0.00426	ND		0.0367	0.00466	ND		0.035	0.00444	ND		0.035	0.00444	ND		0.0393	0.00499
Aroclor 1268	11100-14-4	NS	NS	NS	ND		0.0339	0.00351	ND		0.0375	0.00388	ND		0.0336	0.00348	ND		0.0367	0.0038	ND		0.035	0.00362	ND		0.035	0.00362	ND		0.0393	0.00407
PCBs, Total	1336-36-3	0.1	1	3.2	ND		0.0339	0.00301	ND		0.0375	0.00333	ND		0.0336	0.00298	ND		0.0367	0.00326	ND		0.035	0.0031	ND		0.035	0.0031	ND		0.0393	0.00349
Metals (mg/kg)		NS	NS	NS																												
Aluminum, Total	7429-90-5	NS	NS	NS	8950		8.47	2.29	7700		9.36	2.53	7600		8.1	2.19	7910		8.99	2.43	9020		8.41	2.27	6250		8.45	2.28	11200		9.67	2.61
Antimony, Total	7440-36-0	NS	NS	NS	ND		4.24	0.322	ND		4.68	0.356	ND		4.05	0.308	ND		4.5	0.342	ND		4.21	0.32	ND		4.23	0.321	ND		4.84	0.367
Arsenic, Total	7440-38-2	13	16	16	0.421	J	0.847	0.176	2.32		0.936	0.195	ND		0.81	0.168	2.05		0.899	0.187	0.559	J	0.841	0.175	ND		0.845	0.176	6.41		0.967	0.201
Barium, Total	7440-39-3	410	410	820	49		0.847	0.147	45.6		0.936	0.163	63.9		0.81	0.141	45		0.899	0.156	58.7		0.841	0.146	65.8		0.845	0.147	109		0.967	0.168
Beryllium, Total	7440-41-7	4.4	43	47	0.258	J	0.424	0.028	0.345	J	0.468	0.031	0.272	J	0.405	0.027	0.378	J	0.45	0.03	0.331	J	0.421	0.028	0.197	J	0.423	0.028	0.669		0.484	0.032
Cadmium, Total	7440-43-9	2.5	2.5	7.5	0.103	J	0.847	0.083	0.107	J	0.936	0.092	0.124	J	0.81	0.079	0.097	J	0.899	0.088	0.101	J	0.841	0.082	0.111	J	0.845	0.083	0.126	J	0.967	0.095
Calcium, Total	7440-70-2	NS	NS	NS	611		8.47	2.97	1180		9.36	3.28	390		8.1	2.83	1060		8.99	3.15	1170		8.41	2.94	806		8.45	2.96	2210		9.67	3.38
Chromium, Total	7440-47-3	30	110	NS	17.6		0.847	0.081	13.5		0.936	0.09	13.8		0.81	0.078	12.1		0.899	0.086	17.6		0.841	0.081	14.6		0.845	0.081	21.8		0.967	0.093
Cobalt, Total	7440-48-4	NS	NS	NS	3.21		1.69	0.141	3.02		1.87	0.155	4.13		1.62	0.134	5.2		1.8	0.149	5.37		1.68	0.14	4.48		1.69	0.14	11.4		1.93	0.16
Copper, Total	7440-50-8	50	280	1720	13.1		0.847	0.219	10.6		0.936	0.241	13.5		0.81	0.209	8.47		0.899	0.232	15.1		0.841	0.217	13		0.845	0.218	13.5		0.967	0.25
Iron, Total	7439-89-6	NS	NS	NS	12400		4.24	0.765	10900		4.68	0.845	12800		4.05	0.731	11600		4.5	0.812	14800		4.21	0.76	12600		4.23	0.763	15200		4.84	0.873
Lead, Total	7439-92-1	63	400	450	3.05	J	4.24	0.227	30.5		4.68	0.251	2.57	J	4.05	0.217	6.31		4.5	0.241	3.66	J	4.21	0.225	2.26	J	4.23	0.226	11.8		4.84	0.259
Magnesium, Total	7439-95-4	NS	NS	NS	2010		8.47	1.3	1940		9.36	1.44	2260		8.1	1.25	1990		8.99	1.38	2780		8.41	1.3	2350		8.45	1.3	2950		9.67	1.49
Manganese, Total	7439-96-5	1600	2000	2000	290		0.847	0.135	157		0.936	0.149	445		0.81	0.129	150		0.899	0.143	236		0.841	0.134	217		0.845	0.134	140		0.967	0.154
Mercury, Total	7439-97-6	0.18	0.3	0.73	ND		0.069	0.045	0.17		0.075	0.049	ND		0.068	0.044	ND		0.077	0.05	ND		0.072	0.047	ND		0.072	0.047	ND		0.078	0.051
Nickel, Total	7440-02-0	30	320	130	11		2.12	0.205	8.74		2.34	0.226	11.8		2.02	0.196	7.75		2.25	0.218	12.9		2.1	0.204	12.9		2.11	0.205	13.6		2.42	0.234
Potassium, Total	7440-09-7	NS	NS	NS	2380		212	12.2	661		234	13.5	2970		202	11.7	327		225	12.9	2060		210	12.1	3360		211	12.2	650		242	13.9
Selenium, Total	7782-49-2	3.9	110	4	ND		1.69	0.219	ND		1.87	0.241	ND		1.62	0.209	ND		1.8	0.232	ND		1.68	0.217	ND		1.69	0.218	ND		1.93	0.25
Silver, Total	7440-22-4	2	110	8.3	ND		0.847	0.24	ND		0.936	0.265	ND		0.81	0.229	ND		0.899	0.254	ND		0.841	0.238	ND		0.845	0.239	ND		0.967	0.274
Sodium, Total	7440-23-5	NS	NS	NS	141	J	169	2.67	215		187	2.95	99.8	J	162	2.55	146	J	180	2.83	413		168	2.65	158	J	169	2.66	902		193	3.05
Thallium, Total	7440-28-0	NS	NS	NS	ND		1.69	0.267	ND		1.87	0.295	ND		1.62	0.255	ND		1.8	0.283	ND		1.68	0.265	ND		1.69	0.266	ND		1.93	0.305
Vanadium, Total	7440-62-2	NS	NS	NS	17.8		0.847	0.172	16.2		0.936	0.19	16.9		0.81	0.164	16.1		0.899	0.182	22.1		0.841	0.171	17.7		0.845	0.172	29.5		0.967	0.196
Zinc, Total	7440-66-6	109	6600	2480	21.3		4.24	0.248	25.5		4.68	0.274	20.1		4.05	0.237	19.6		4.5	0.263	22.9		4.21	0.246	21.6		4.23	0.248	36.8		4.84	0.283
General Chemistry		NS	NS	NS																												
Cyanide, Total	57-12-5	2.3	13	40	ND		1	0.22	0.64	J	1.1	0.23	ND		1	0.22	ND		1.1	0.23	ND		1.1	0.23	ND		1	0.22	2.1		1.1	0.24
Solids, Total	NONE	NS	NS	NS	93.5		0.1	NA	84.6		0.1	NA	93.9		0.1	NA	87.3		0.1	NA	90.6		0.1	NA	91.9		0.1	NA	82		0.1	NA

Notes

USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

RSCO: New York NYCRR Part 375 Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

PGWSCO: New York NYCRR Part 375 Protection of Groundwater Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

Exceedance of USCO

Exceedance of RSCO

Exceedance of RRSCO

Exceedance of PGWSCO

J = Estimated

ND = Not Detected

- = Not Tested

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-201 (4-4.5)				SB-202 (1.5-2)				SB-203 (3.5-4)				SB-204 (1-1.5)				SB-205 (2.5-3)				SB-206 (3.5-4)				SB-207 (3-3.5)			
LAB ID:					L2305142-01				L2305142-02				L2305142-03				L2305142-04				L2305142-05				L2305142-06				L2305142-07			
COLLECTION DATE:					1/28/2023				1/28/2023				1/28/2023				1/28/2023				1/28/2023				1/28/2023				1/28/2023			
SAMPLE DEPTH (FT):					4.0-4.5				1.5-2.0				3.5-4.0				1.0-1.5				2.5-3.0				3.5-4.0				3.0-3.5			
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
VOCs (mg/kg)																																
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	ND		0.0004	0.0001	ND		0.00041	0.00011	ND		0.00034	0.00009	ND		0.00018	0.00005	ND		0.00027	0.00007	ND		0.00036	0.0001	ND		0.00031	0.00008
1,1,1-Trichloroethane	71-55-6	0.68	100	0.68	ND		0.0004	0.00013	ND		0.00041	0.00014	ND		0.00034	0.00011	ND		0.00018	0.00006	ND		0.00027	0.00009	ND		0.00036	0.00012	ND		0.00031	0.0001
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	ND		0.0004	0.00013	ND		0.00041	0.00014	ND		0.00034	0.00011	ND		0.00018	0.00006	ND		0.00027	0.00009	ND		0.00036	0.00012	ND		0.00031	0.0001
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	ND		0.0008	0.00021	ND		0.00083	0.00022	ND		0.00068	0.00018	ND		0.00037	0.0001	ND		0.00054	0.00014	ND		0.00072	0.00019	ND		0.00062	0.00017
1,1-Dichloroethane	75-34-3	0.27	47	0.27	ND		0.0008	0.00012	ND		0.00083	0.00012	ND		0.00068	0.0001	ND		0.00037	0.00005	ND		0.00054	0.00008	ND		0.00072	0.0001	ND		0.00062	0.00009
1,1-Dichloroethene	75-35-4	0.24	0.98	0.33	0.00065	J	0.0008	0.00019	ND		0.00083	0.0002	ND		0.00068	0.00016	ND		0.00037	0.00009	ND		0.00054	0.00013	ND		0.00072	0.00017	ND		0.00062	0.00015
1,1-Dichloropropene	563-58-6	NS	NS	NS	ND		0.0004	0.00013	ND		0.00041	0.00013	ND		0.00034	0.00011	ND		0.00018	0.00006	ND		0.00027	0.00009	ND		0.00036	0.00011	ND		0.00031	0.0001
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	ND		0.0016	0.00026	ND		0.0016	0.00027	ND		0.0014	0.00022	ND		0.00074	0.00012	ND		0.0011	0.00017	ND		0.0014	0.00023	ND		0.0012	0.0002
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	ND		0.0016	0.0001	ND		0.0016	0.0001	ND		0.0014	0.00009	ND		0.00074	0.00005	ND		0.0011	0.00007	ND		0.0014	0.00009	ND		0.0012	0.00008
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	ND		0.0016	0.00015	ND		0.0016	0.00016	ND		0.0014	0.00013	ND		0.00074	0.00007	ND		0.0011	0.0001	ND		0.0014	0.00014	ND		0.0012	0.00012
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	ND		0.0016	0.00022	ND		0.0016	0.00022	ND		0.0014	0.00018	ND		0.00074	0.0001	ND		0.0011	0.00015	ND		0.0014	0.0002	ND		0.0012	0.00017
1,2,4-Trimethylbenzene	95-63-6	5.9	100	5.9	ND		0.0016	0.00027	ND		0.0016	0.00028	ND		0.0014	0.00023	ND		0.00074	0.00012	ND		0.0011	0.00018	ND		0.0014	0.00024	ND		0.0012	0.00021
1,2-Dibromo-3-chloropropane	96-12-8	NS	NS	NS	ND		0.0024	0.0008	ND		0.0025	0.00082	ND		0.002	0.00068	ND		0.0011	0.00037	ND		0.0016	0.00054	ND		0.0022	0.00072	ND		0.0019	0.00062
1,2-Dibromoethane	106-93-4	NS	NS	NS	ND		0.0008	0.00022	ND		0.00083	0.00023	ND		0.00068	0.00019	ND		0.00037	0.0001	ND		0.00054	0.00015	ND		0.00072	0.0002	ND		0.00062	0.00017
1,2-Dichlorobenzene	95-50-1	1.1	100	1.1	ND		0.0016	0.00011	ND		0.0016	0.00012	ND		0.0014	0.0001	ND		0.00074	0.00005	ND		0.0011	0.00008	ND		0.0014	0.0001	ND		0.0012	0.00009
1,2-Dichloroethane	107-06-2	0.02	5.8	0.02	ND		0.0008	0.0002	ND		0.00083	0.00021	ND		0.00068	0.00017	ND		0.00037	0.0001	ND		0.00054	0.00014	ND		0.00072	0.00018	ND		0.00062	0.00016
1,2-Dichloroethene, Total	540-59-0	NS	NS	NS	ND		0.0008	0.00011	ND		0.00083	0.00011	ND		0.00068	0.00009	ND		0.00037	0.00005	ND		0.00054	0.00007	ND		0.00072	0.0001	ND		0.00062	0.00009
1,2-Dichloropropane	78-87-5	NS	NS	NS	ND		0.0008	0.0001	ND		0.00083	0.0001	ND		0.00068	0.00009	ND		0.00037	0.00005	ND		0.00054	0.00007	ND		0.00072	0.00009	ND		0.00062	0.00008
1,3,5-Trimethylbenzene	108-67-8	3.1	100	3.1	ND		0.0016	0.00015	ND		0.0016	0.00016	ND		0.0014	0.00013	ND		0.00074	0.00007	ND		0.0011	0.0001	ND		0.0014	0.00014	ND		0.0012	0.00012
1,3-Dichlorobenzene	541-73-1	2.6	38	2.6	ND		0.0016	0.00012	ND		0.0016	0.00012	ND		0.0014	0.0001	ND		0.00074	0.00006	ND		0.0011	0.00008	ND		0.0014	0.00011	ND		0.0012	0.00009
1,3-Dichloropropane	142-28-9	NS	NS	NS	ND		0.0016	0.00013	ND		0.0016	0.00014	ND		0.0014	0.00011	ND		0.00074	0.00006	ND		0.0011	0.00009	ND		0.0014	0.00012	ND		0.0012	0.0001
1,3-Dichloropropene, Total	542-75-6	NS	NS	NS	ND		0.0004	0.00013	ND		0.00041	0.00013	ND		0.00034	0.00011	ND		0.00018	0.00006	ND		0.00027	0.00009	ND		0.00036	0.00011	ND		0.00031	0.0001
1,4-Dichlorobenzene	106-46-7	1.8	24	1.8	ND		0.0016	0.00014	ND		0.0016	0.00014	ND		0.0014	0.00012	ND		0.00074	0.00006	ND		0.0011	0.00009	ND		0.0014	0.00012	ND		0.0012	0.00011
1,4-Dioxane	123-91-1	0.1	5.7	0.1	ND		0.064	0.028	ND		0.066	0.029	ND		0.054	0.024	ND		0.03	0.013	ND		0.043	0.019	ND		0.058	0.025	ND		0.05	0.022
2,2-Dichloropropane	594-20-7	NS	NS	NS	ND		0.0016	0.00016	ND		0.0016	0.00017	ND		0.0014	0.00014	ND		0.00074	0.00008	ND		0.0011	0.00011	ND		0.0014	0.00014	ND		0.0012	0.00012
2-Butanone	78-93-3	0.1	100	0.1	ND		0.008	0.0018	ND		0.0083	0.0018	ND		0.0068	0.0015	ND		0.0037	0.00082	ND		0.0054	0.0012	ND		0.0072	0.0016	ND		0.0062	0.0014
2-Hexanone	591-78-6	NS	NS	NS	ND		0.008	0.00094	ND		0.0083	0.00098	ND		0.0068	0.0008	ND		0.0037	0.00044	ND		0.0054	0.00064	ND		0.0072	0.00085	ND		0.0062	0.00073
4-Methyl-2-pentanone	108-10-1	NS	NS	NS	ND		0.008	0.001	ND		0.0083	0.001	ND		0.0068	0.00087	ND		0.0037	0.00047	ND		0.0054	0.00069	ND		0.0072	0.00092	ND		0.0062	0.0008
Acetone	67-64-1	0.03	100	0.03	ND		0.008	0.0038	ND		0.0083	0.004	0.012		0.0068	0.0032	ND		0.0037	0.0018	ND		0.0054	0.0026	ND		0.0072	0.0035	ND		0.0062	0.003
Acrylonitrile	107-13-1	NS	NS	NS	ND		0.0032	0.00092	ND		0.0033	0.00095	ND		0.0027	0.00078	ND		0.0015	0.00042	ND		0.0022	0.00062	ND		0.0029	0.00083	ND		0.0025	0.00072
Benzene	71-43-2	0.06	3.7	0.06	ND		0.0004	0.00013	ND		0.00041	0.00014	ND		0.00034	0.00011	ND		0.00018	0.00006	ND		0.00027	0.00009	ND		0.00036	0.00012	ND		0.00031	0.0001
Bromobenzene	108-86-1	NS	NS	NS	ND		0.0016	0.00012	ND		0.0016	0.00012	ND		0.0014	0.0001	ND		0.00074	0.00005	ND		0.0011	0.00008	ND		0.0014	0.0001	ND		0.0012	0.00009
Bromochloromethane	74-97-5	NS	NS	NS	ND		0.0016	0.00016	ND		0.0016	0.00017	ND		0.0014	0.00014	ND		0.00074	0.00008	ND		0.0011	0.00011	ND		0.0014	0.00015	ND		0.0012	0.00013
Bromodichloromethane	75-27-4	NS	NS	NS	ND		0.0004	0.00009	ND		0.00041	0.00009	ND		0.00034	0.00007	ND		0.00018	0.00004	ND		0.00027	0.00006	ND		0.00036	0.00008	ND		0.00031	0.00007
Bromoform	75-25-2	NS	NS	NS	ND		0.0032	0.0002	ND		0.0033	0.0002	ND		0.0027	0.00017	ND		0.0015	0.00009	ND		0.0022	0.00013	ND		0.0029	0.00018	ND		0.0025	0.00015
Bromomethane	74-83-9	NS	NS	NS	ND		0.0016	0.00046	ND		0.0016	0.00048	ND		0.0014	0.00039	ND		0.00074	0.00021	ND		0.0011	0.00031	ND		0.0014	0.00042	ND		0.0012	0.00036
Carbon disulfide	75-15-0	NS	NS	NS	ND		0.008	0.0036	ND		0.0083	0.0038	ND		0.0068	0.0031	ND		0.0037	0.0017	ND		0.0054	0.0025	ND		0.0072	0.0033	ND		0.0062	0.0028
Carbon tetrachloride	56-23-5	0.76	7.1	0.76	ND		0.0008	0.00018	ND		0.00083	0.00019	ND		0.00068	0.00016	ND		0.00037	0.00009	ND		0.00054	0.00012	ND		0.00072	0.00016	ND		0.00062	0.00014
Chlorobenzene	108-90-7	4.5	100	4.5	ND		0.0004	0.0001	ND		0.00041	0.0001	ND		0.00034	0.00009	ND		0.00018	0.00005	ND		0.00027	0.00007	ND		0.00036	0.00009	ND		0.00031	0.00008
Chloroethane	75-00-3	NS	NS	NS	ND		0.0016	0.00036	ND		0.0016	0.00037	ND		0.0014	0.00031	ND		0.00074	0.00017	ND		0.0011	0.00024	ND		0.0014	0.00032	ND		0.0012	0.00028
Chloroform	67-66-3	0.37	24	0.37	ND		0.0012	0.00011	ND		0.0012	0.00012	ND		0.001	0.0001	ND		0.00055	0.00005	ND		0.00081	0.00008	ND		0.0011	0.0001	ND		0.00093	0.00009
Chloromethane	74-87-3	NS	NS	NS	ND		0.0032	0.00074	ND		0.0033	0.00077	ND		0.0027	0.00063	ND		0.0015	0.00034	ND		0.0022	0.0005	ND		0.0029	0.00067	ND		0.0025	0.00058
cis-1,2-Dichloroethene	156-59-2	0.19	41	0.19	ND		0.0008	0.00014	ND		0.00083	0.00014	ND		0.00068	0.00012	ND		0.00037	0.00007	ND		0.00054	0.0001	ND		0.00072	0.00013	ND		0.00062	0.00011
cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	ND		0.0004	0.00013	ND		0.00041	0.00013	ND		0.00034	0.00011	ND		0.00018	0.00006	ND		0.00027	0.00009	ND		0.00036	0.00011	ND		0.00031	0.0001
Dibromochloromethane	124-48-1	NS	NS	NS	ND		0.0008	0.00011	ND		0.00083	0.00012	ND		0.00068	0.0001	ND		0.00037	0.00005	ND		0.00054	0.00008	ND		0.00072	0.0001	ND		0.00062	0.00009
Dibromomethane	74-95-3	NS	NS	NS	ND		0.0016	0.00019	ND		0.0016	0.0002	ND		0.0014	0.00016	ND		0.00074	0.00009	ND		0.0011	0.00013	ND		0.0014	0.00017	ND		0.0012	0.00015
Dichlorodifluoromethane	75-71-8	NS	NS	NS	ND		0.008	0.00073	ND		0.0083	0.00076	ND		0.0068	0.00062	ND		0.0037	0.00034	ND		0.0054	0.00049	ND		0.0072	0.00066	ND		0.0062	0.00057
Ethyl ether	60-29-7	NS	NS	NS	ND		0.0016	0.00027	ND		0.0016	0.00028	ND		0.0014	0.00023	ND		0.00074	0.00013	ND		0.0011	0.00018	ND		0.0014	0.00024	ND		0.0012	0.00021
Ethylbenzene	100-41-4	1	76	1	ND		0.0008	0.00011	0.00012	J	0.00083	0.00012	0.00033	J	0.00068	0.0001	ND		0.00037	0.00005	ND		0.00054	0.00008	ND		0.00072	0.0001	ND		0.00062	0.00009
Hexachlorobutadiene	87-68-3	NS	NS	NS	ND		0.0032	0.00013	ND		0.0033	0.00014	ND		0.0027	0.00011	ND		0.0015	0.00006	ND		0.0022	0.00009	ND		0.0029	0.00012	ND		0.0025	0.0001
Isopropylbenzene	98-82-8	NS	NS	NS	ND		0.0008	0.00009	ND		0.00083	0.00009	ND		0.00068	0.00007	ND		0.00037	0.00004	ND		0.00054	0.00006	ND		0.00072	0.00008	ND		0.00062	0.00007
Methyl tert butyl ether	1634-04-4	0.1	100	0.1	ND		0.0016	0.00016	ND		0.0016	0.00017	ND		0.0014	0.00014	ND		0.00074	0.00007	ND		0.0011	0.00011	ND		0.0014	0.00014	ND		0.0012	0.00012
Methylene chloride	75-09-2	0.05	81	0.05	ND		0.004	0.0018	ND		0.0041	0.0019	ND		0.0034	0.0016	ND		0.0018	0.00085	ND		0.0027	0.0012	ND		0.0036	0.0016	ND		0.0031	0.0014
n-Butylbenzene	104-51-8	18	100	18	ND		0.0008	0.00013	ND		0.00083	0.00014	ND		0.00068	0.00011	ND		0.00037	0.00006	ND		0.00054	0.00009	ND		0.00072	0.00012	ND		0.00062	0.0001
n-Propylbenzene	103-65-1	5	100	5	ND		0.0008	0.00014	ND		0.00083	0.00014	ND		0.00068	0.00012	ND		0.00037	0.00006	ND		0.00054	0.00009	ND		0.00072	0.00012	ND		0.00062	0.00011
Naphthalene	91-20-3	12	100	12	ND		0.0032	0.00052	ND		0.0033	0.00054	ND		0.0027	0.00044	ND		0.0015	0.00024	ND		0.0022	0.00035	ND		0.0029	0.00047	ND		0.0025	0.0004
o-Chlorotoluene	95-49-8	NS	NS	NS	ND		0.0016	0.00015	ND		0.0016	0.00016	ND		0.0014	0.00013	ND		0.00074	0.00007	ND		0.0011	0.0001	ND		0.0014	0.00014	ND		0.0012	0.00012
o-Xylene	95-47-6	NS	NS	NS	ND		0.0008	0.00023	ND		0.00083	0.00024	0.00055	J	0.00068	0.0002	ND		0.00037	0.00011	ND		0.00054	0.00016	ND		0.00072	0.00021	ND		0.00062	0.00018
p-Chlorotoluene	106-43-4	NS	NS	NS	ND		0.0016	0.00009	ND		0.0016	0.00009	ND		0.0014	0.00007	ND		0.00074	0.00004	ND		0.0011	0.00006	ND		0.0014	0.00008	ND		0.0012	0.00007
p-Diethylbenzene	105-05-5	NS	NS	NS	ND		0.0016	0.00014	ND		0.0016	0.00015	ND		0.0014	0.00012	ND		0.00074	0.00007	ND		0.0011	0.0001	ND		0.0014	0.00013	ND		0.0012	0.00011
p-Ethyltoluene	622-96-8	NS	NS	NS	ND		0.0016	0.00031	ND		0.0016	0.00032	ND		0.0014	0.00026	ND		0.00074	0.00014	ND		0.0011	0.00021	ND		0.0014	0.00028	ND		0.0012	0.00024
p-Isopropyltoluene	99-87-6	NS	NS	NS	ND		0.0008	0.00009	ND		0.00083	0.00009	ND		0.00068	0.00007	ND		0.00037	0.00004	ND		0.00054	0.00006	ND		0.00072	0.00008	ND		0.00062	0.00007
p/m-Xylene	179601-23-1	NS	NS	NS	ND		0.0016	0.00045	ND		0.0016	0.00046	0.0016		0.0014	0.00038	ND		0.00074	0.00021	ND		0.0011	0.0003	ND		0.0014	0.0004	ND		0.0012	0.00035
sec-Butylbenzene	135-98-8	25	100	25	ND		0.0008	0.00012	ND		0.00083	0.00012	ND		0.00068	0.0001	ND		0.00037	0.00005	ND		0.00054	0.00008	ND		0.00072	0.0001	ND		0.00062	0.00009
Styrene	100-42-5	NS	NS	NS	ND		0.0008	0.00016	ND		0.00083	0.00016	ND		0.00068	0.00013	ND		0.00037	0.00007	ND		0.00054	0.00011	ND		0.00072	0.00014	ND		0.00062	0.00012
tert-Butylbenzene	98-06-6	11	100	11	ND		0.0016	0.00009	ND		0.0016	0.0001	ND		0.0014	0.00008	ND		0.00074	0.00004	ND		0.0011	0.00006	ND		0.0014	0.00009	ND		0.0012	0.00007
Tetrachloroethene	127-18-4	1.3	18	1.3	ND		0.0004	0.00016	ND		0.00041	0.00016	ND		0.00034	0.00013	ND		0.00018	0.00007	ND		0.00027	0.00011	ND		0.00036	0.00014	ND		0.00031	0.00012
Toluene	108-88-3	0.7	100	0.7	ND		0.0008	0.00043	ND		0.00083	0.00045	ND		0.00068	0.00037	ND		0.00037	0.0002	ND		0.00054	0.00029	ND		0.00072	0.00039	ND		0.00062	0.00034
trans-1,2-Dichloroethene	156-60-5	0.19	100	0.19	ND		0.0012	0.00011	ND		0.0012	0.00011	ND		0.001	0.00009	ND		0.00055	0.00005	ND		0.00081	0.00007	ND		0.0011	0.0001	ND		0.00093	0.00009
trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	ND		0.0008	0.00022	ND		0.00083	0.00022	ND		0.00068	0.00018	ND		0.00037	0.0001	ND		0.00054	0.00015	ND		0.00072	0.0002	ND		0.00062	0.00017
trans-1,4-Dichloro-2-butene	110-57-6	NS	NS	NS	ND		0.004	0.0011	ND		0.0041	0.0012	ND		0.0034	0.00096	ND		0.0018	0.00052	ND		0.0027	0.00077	ND		0.0036	0.001	ND		0.0031	0.00088
Trichloroethene	79-01-6	0.47	6.4	0.47	ND		0.0004	0.00011	ND		0.00041	0.00011	ND		0.00034	0.00009	ND		0.00018	0.00005	ND		0.00027	0.00007	ND		0.00036	0.0001	ND		0.00031	0.00009
Trichlorofluoromethane	75-69-4	NS	NS	NS	ND		0.0032	0.00055	ND		0.0033	0.00057	ND		0.0027	0.00047	ND		0.0015	0.00026	ND		0.0022	0.00038	ND		0.0029	0.0005	ND		0.0025	0.00043
Vinyl acetate	108-05-4	NS	NS	NS	ND		0.008	0.0017	ND		0.0083	0.0018	ND		0.0068	0.0014	ND		0.0037	0.00079	ND		0.0054	0.0012	ND		0.0072	0.0015	ND		0.0062	0.0013
Vinyl chloride	75-01-4	0.03	0.48	0.03	ND		0.0008	0.00027	ND		0.00083	0.00028	ND		0.00068	0.00023	ND		0.00037	0.00012	ND		0.00054	0.00018	ND		0.00072	0.00024	ND		0.00062	0.00021
Xylenes, Total	1330-20-7	0.26	100	1.2	ND		0.0008	0.00023	ND		0.00083	0.00024	0.0022	J	0.00068	0.0002	ND		0.00037	0.00011	ND		0.00054	0.00016	ND		0.00072	0.00021	ND		0.00062	0.00018
Total VOCs		NS	NS	NS	0.00065	-	-	-	0.00012	-	-	-	0.01448	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS (mg/kg)		NS	NS	NS																												
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorobutanoic Acid (PFBA)	375-22-4	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-201 (4-4.5)			SB-202 (1.5-2)			SB-203 (3.5-4)			SB-204 (1-1.5)			SB-205 (2.5-3)			SB-206 (3.5-4)			SB-207 (3-3.5)		
LAB ID:					L2305142-01			L2305142-02			L2305142-03			L2305142-04			L2305142-05			L2305142-06			L2305142-07		
COLLECTION DATE:					1/28/2023			1/28/2023			1/28/2023			1/28/2023			1/28/2023			1/28/2023			1/28/2023		
SAMPLE DEPTH (FT):					4.0-4.5			1.5-2.0			3.5-4.0			1.0-1.5			2.5-3.0			3.5-4.0			3.0-3.5		
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Perfluoroheptanoic Acid (PFHpA)	375-85-9	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorooctanoic Acid (PFOA)	335-67-1	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
PFOA/PFOS, Total		NS	NS	NS	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		-	-
SVOCs (mg/kg)		NS	NS	NS																												
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	ND		0.19	0.02	ND		0.19	0.02	ND		0.18	0.019	ND		0.17	0.018	ND		0.19	0.02	ND		0.19	0.02	ND		0.19	0.02
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	ND		0.19	0.022	ND		0.19	0.022	ND		0.18	0.02	ND		0.17	0.02	ND		0.19	0.022	ND		0.19	0.022	ND		0.19	0.022
1,2-Dichlorobenzene	95-50-1	1.1	100	1.1	ND		0.19	0.035	ND		0.19	0.034	ND		0.18	0.032	ND		0.17	0.031	ND		0.19	0.034	ND		0.19	0.034	ND		0.19	0.034
1,3-Dichlorobenzene	541-73-1	2.6	38	2.6	ND		0.19	0.033	ND		0.19	0.033	ND		0.18	0.031	ND		0.17	0.03	ND		0.19	0.033	ND		0.19	0.033	ND		0.19	0.033
1,4-Dichlorobenzene	106-46-7	1.8	24	1.8	ND		0.19	0.034	ND		0.19	0.033	ND		0.18	0.031	ND		0.17	0.03	ND		0.19	0.033	ND		0.19	0.033	ND		0.19	0.033
1,4-Dioxane	123-91-1	0.1	5.7	0.1	ND		0.029	0.0089	ND		0.028	0.0087	ND		0.027	0.0082	ND		0.026	0.008	ND		0.029	0.0088	ND		0.028	0.0087	ND		0.028	0.0088
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	ND		0.19	0.037	ND		0.19	0.036	ND		0.18	0.034	ND		0.17	0.034	ND		0.19	0.036	ND		0.19	0.036	ND		0.19	0.036
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	ND		0.12	0.037	ND		0.11	0.036	ND		0.11	0.034	ND		0.1	0.033	ND		0.11	0.036	ND		0.11	0.036	ND		0.11	0.036
2,4-Dichlorophenol	120-83-2	NS	NS	NS	ND		0.18	0.031	ND		0.17	0.03	ND		0.16	0.029	ND		0.16	0.028	ND		0.17	0.031	ND		0.17	0.03	ND		0.17	0.031
2,4-Dimethylphenol	105-67-9	NS	NS	NS	ND		0.19	0.064	ND		0.19	0.063	ND		0.18	0.059	ND		0.17	0.058	ND		0.19	0.063	ND		0.19	0.063	ND		0.19	0.063
2,4-Dinitrophenol	51-28-5	NS	NS	NS	ND		0.93	0.091	ND		0.91	0.088	ND		0.86	0.084	ND		0.84	0.082	ND		0.92	0.089	ND		0.91	0.088	ND		0.91	0.089
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	ND		0.19	0.039	ND		0.19	0.038	ND		0.18	0.036	ND		0.17	0.035	ND		0.19	0.038	ND		0.19	0.038	ND		0.19	0.038
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	ND		0.19	0.033	ND		0.19	0.033	ND		0.18	0.031	ND		0.17	0.03	ND		0.19	0.033	ND		0.19	0.033	ND		0.19	0.033
2-Chloronaphthalene	91-58-7	NS	NS	NS	ND		0.19	0.019	ND		0.19	0.019	ND		0.18	0.018	ND		0.17	0.017	ND		0.19	0.019	ND		0.19	0.019	ND		0.19	0.019
2-Chlorophenol	95-57-8	NS	NS	NS	ND		0.19	0.023	ND		0.19	0.022	ND		0.18	0.021	ND		0.17	0.021	ND		0.19	0.022	ND		0.19	0.022	ND		0.19	0.022
2-Methylnaphthalene	91-57-6	NS	NS	NS	ND		0.23	0.023	ND		0.23	0.023	ND		0.22	0.022	ND		0.21	0.021	ND		0.23	0.023	ND		0.23	0.023	ND		0.23	0.023
2-Methylphenol	95-48-7	0.33	100	0.33	ND		0.19	0.03	ND		0.19	0.029	ND		0.18	0.028	ND		0.17	0.027	ND		0.19	0.03	ND		0.19	0.029	ND		0.19	0.03
2-Nitroaniline	88-74-4	NS	NS	NS	ND		0.19	0.038	ND		0.19	0.037	ND		0.18	0.034	ND		0.17	0.034	ND		0.19	0.037	ND		0.19	0.037	ND		0.19	0.037
2-Nitrophenol	88-75-5	NS	NS	NS	ND		0.42	0.073	ND		0.41	0.071	ND		0.39	0.067	ND		0.38	0.066	ND		0.41	0.072	ND		0.41	0.071	ND		0.41	0.072
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	ND		0.19	0.052	ND		0.19	0.05	ND		0.18	0.048	ND		0.17	0.046	ND		0.19	0.051	ND		0.19	0.05	ND		0.19	0.051
3-Methylphenol/4-Methylphenol	108-39-4/106-44-5	NS	NS	NS	ND		0.28	0.03	ND		0.27	0.03	ND		0.26	0.028	ND		0.25	0.027	ND		0.27	0.03	ND		0.27	0.03	ND		0.27	0.03
3-Nitroaniline	99-09-2	NS	NS	NS	ND		0.19	0.037	ND		0.19	0.036	ND		0.18	0.034	ND		0.17	0.033	ND		0.19	0.036	ND		0.19	0.036	ND		0.19	0.036
4,6-Dinitro-o-cresol	534-52-1	NS	NS	NS	ND		0.5	0.093	ND		0.49	0.091	ND		0.47	0.086	ND		0.45	0.084	ND		0.5	0.092	ND		0.49	0.091	ND		0.49	0.091
4-Bromophenyl phenyl ether	101-55-3	NS	NS	NS	ND		0.19	0.03	ND		0.19	0.029	ND		0.18	0.027	ND		0.17	0.027	ND		0.19	0.029	ND		0.19	0.029	ND		0.19	0.029
4-Chloroaniline	106-47-8	NS	NS	NS	ND		0.19	0.035	ND		0.19	0.034	ND		0.18	0.033	ND		0.17	0.032	ND		0.19	0.035	ND		0.19	0.034	ND		0.19	0.035
4-Chlorophenyl phenyl ether	7005-72-3	NS	NS	NS	ND		0.19	0.021	ND		0.19	0.02	ND		0.18	0.019	ND		0.17	0.019	ND		0.19	0.02	ND		0.19	0.02	ND		0.19	0.02
4-Nitroaniline	100-01-6	NS	NS	NS	ND		0.19	0.08	ND		0.19	0.079	ND		0.18	0.074	ND		0.17	0.072	ND		0.19	0.079	ND		0.19	0.079	ND		0.19	0.079
4-Nitrophenol	100-02-7	NS	NS	NS	ND		0.27	0.079	ND		0.26	0.078	ND		0.25	0.073	ND		0.24	0.071	ND		0.27	0.078	ND		0.26	0.078	ND		0.27	0.078
Acenaphthene	83-32-9	20	100	98	ND		0.16	0.02	ND		0.15	0.02	ND		0.14	0.018	0.044	J	0.14	0.018	ND		0.15	0.02	ND		0.15	0.02	0.023	J	0.15	0.02
Acenaphthylene	208-96-8	100	100	365	ND		0.16	0.03	ND		0.15	0.029	ND		0.14	0.028	ND		0.14	0.027	ND		0.15	0.029	ND		0.15	0.029	0.064	J	0.15	0.029
Acetophenone	98-86-2	NS	NS	NS	ND		0.19	0.024	ND		0.19	0.024	ND		0.18	0.022	ND		0.17	0.022	ND		0.19	0.024	ND		0.19	0.024	ND		0.19	0.024
Anthracene	120-12-7	100	100	1000	ND		0.12	0.038	ND		0.11	0.037	ND		0.11	0.035	0.12		0.1	0.034	ND		0.11	0.037	ND		0.11	0.037	0.093	J	0.11	0.037
Benzo(a)anthracene	56-55-3	1	1.4	1	0.097	J	0.12	0.022	0.35		0.11	0.021	0.078	J	0.11	0.02	0.44		0.1	0.02	0.12		0.11	0.021	0.051	J	0.11	0.021	0.58		0.11	0.021
Benzo(a)pyrene	50-32-8	1	1	22	0.1	J	0.16	0.047	0.38		0.15	0.046	0.081	J	0.14	0.044	0.41		0.14	0.043	0.14	J	0.15	0.046	0.062	J	0.15	0.046	0.63		0.15	0.046
Benzo(b)fluoranthene	205-99-2	1	1.4	2.1	0.13		0.12	0.033	0.47		0.11	0.032	0.1	J	0.11	0.03	0.52		0.1	0.029	0.16		0.11	0.032	0.074	J	0.11	0.032	0.77		0.11	0.032
Benzo(ghi)perylene	191-24-2	0.64	4.9	1000	0.073	J	0.16	0.023	0.22		0.15	0.022	0.074	J	0.14	0.021	0.24		0.14	0.02	0.1	J	0.15	0.022	0.042	J	0.15	0.022	0.37		0.15	0.022
Benzo(k)fluoranthene	207-08-9	0.8	4.9	2	0.042	J	0.12	0.031	0.15		0.11	0.03	0.032	J	0.11	0.029	0.15		0.1	0.028	0.057	J	0.11	0.03	ND		0.11	0.03	0.24		0.11	0.03
Benzoic Acid	65-85-0	NS	NS	NS	ND		0.63	0.2	ND		0.62	0.19	ND		0.58	0.18	ND		0.57	0.18	ND		0.62	0.19	ND		0.62	0.19	ND		0.62	0.19
Benzyl Alcohol	100-51-6	NS	NS	NS	ND		0.19	0.06	ND		0.19	0.058	ND		0.18	0.055	ND		0.17	0.054	ND		0.19	0.058	ND		0.19	0.058	ND		0.19	0.058
Biphenyl	92-52-4	NS	NS	NS	ND		0.44	0.025	ND		0.43	0.025	ND		0.41	0.023	ND		0.4	0.023	ND		0.44	0.025	ND		0.43	0.025	ND		0.43	0.025
Bis(2-chloroethoxy)methane	111-91-1	NS	NS	NS	ND		0.21	0.019	ND		0.2	0.019	ND		0.19	0.018	ND		0.19	0.018	ND		0.21	0.019	ND		0.2	0.019	ND		0.2	0.019
Bis(2-chloroethyl)ether	111-44-4	NS	NS	NS	ND		0.18	0.026	ND		0.17	0.026	ND		0.16	0.024	ND		0.16	0.024	ND		0.17	0.026	ND		0.17	0.026	ND		0.17	0.026
Bis(2-chloroisopropyl)ether	108-60-1	NS	NS	NS	ND		0.23	0.033	ND		0.23	0.032	ND		0.22	0.031	ND		0.21	0.03	ND		0.23	0.033	ND		0.23	0.032	ND		0.23	0.032
Bis(2-ethylhexyl)phthalate	117-81-7	NS	NS	NS	ND		0.19	0.067	ND		0.19	0.066	ND		0.18	0.062	ND		0.17	0.06	ND		0.19	0.066	ND		0.19	0.066	ND		0.19	0.066
Butyl benzyl phthalate	85-68-7	NS	NS	NS	ND		0.19	0.049	ND		0.19	0.048	ND		0.18	0.045	ND		0.17	0.044	ND		0.19	0.048	ND		0.19	0.048	ND		0.19	0.048
Carbazole	86-74-8	NS	NS	NS	ND		0.19	0.019	0.019	J	0.19	0.018	ND		0.18	0.017	0.056	J	0.17	0.017	ND		0.19	0.018	ND		0.19	0.018	0.036	J	0.19	0.018
Chrysene	218-01-9	1	4.9	1	0.084	J	0.12	0.02	0.35		0.11	0.02	0.08	J	0.11	0.019	0.4		0.1	0.018	0.12		0.11	0.02	0.051	J	0.11	0.02	0.6		0.11	0.02
Di-n-butylphthalate	84-74-2	NS	NS	NS	ND		0.19	0.037	ND		0.19	0.036	ND		0.18	0.034	ND		0.17	0.033	ND		0.19	0.036	ND		0.19	0.036	ND		0.19	0.036
Di-n-octylphthalate	117-84-0	NS	NS	NS	ND		0.19	0.066	ND		0.19	0.064	ND		0.18	0.061	ND		0.17	0.059	ND		0.19	0.065	ND		0.19	0.064	ND		0.19	0.065
Dibenzo(a,h)anthracene	53-70-3	0.33	0.33	1000	ND		0.12	0.022	0.052	J	0.11	0.022	ND		0.11	0.021	0.059	J	0.1	0.02	0.022	J	0.11	0.022	ND		0.11	0.022	0.088	J	0.11	0.022
Dibenzofuran	132-64-9	2.1	18	110	ND		0.19	0.018	ND		0.19	0.018	ND		0.18	0.017	0.021	J	0.17	0.016	ND		0.19	0.018	ND		0.19	0.018	ND		0.19	0.018
Diethyl phthalate	84-66-2	NS	NS	NS	ND		0.19	0.018	ND		0.19	0.018	ND		0.18	0.017	ND		0.17	0.016	ND		0.19	0.018	ND		0.19	0.018	ND		0.19	0.018
Dimethyl phthalate	131-11-3	NS	NS	NS	ND		0.19	0.041	ND		0.19	0.04	ND		0.18	0.038	ND		0.17	0.037	ND		0.19	0.04	ND		0.19	0.04	ND		0.19	0.04
Fluoranthene	206-44-0	85	100	1000	0.13		0.12	0.022	0.54		0.11	0.022	0.14		0.11	0.02	0.88		0.1	0.02	0.17		0.11	0.022	0.077	J	0.11	0.022	1		0.11	0.022
Fluorene	86-73-7	30	100	386	ND		0.19	0.019	ND		0.19	0.018	ND		0.18	0.017	0.043	J	0.17	0.017	ND		0.19	0.018	ND		0.19	0.018	0.028	J	0.19	0.018
Hexachlorobenzene	118-74-1	0.33	0.33	3.2	ND		0.12	0.022	ND		0.11	0.021	ND		0.11	0.02	ND		0.1	0.02	ND		0.11	0.021	ND		0.11	0.021	ND		0.11	0.021
Hexachlorobutadiene	87-68-3	NS	NS	NS	ND		0.19	0.028	ND		0.19	0.028	ND		0.18	0.026	ND		0.17	0.026	ND		0.19	0.028	ND		0.19	0.028	ND		0.19	0.028
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	ND		0.56	0.18	ND		0.54	0.17	ND		0.51	0.16	ND		0.5	0.16	ND		0.55	0.17	ND		0.54	0.17	ND		0.54	0.17
Hexachloroethane	67-72-1	NS	NS	NS	ND		0.16	0.031	ND		0.15	0.031	ND		0.14	0.029	ND		0.14	0.028	ND		0.15	0.031	ND		0.15	0.031	ND		0.15	0.031
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	1.4	6.6	0.083	J	0.16	0.027	0.27		0.15	0.026	0.064	J	0.14	0.025	0.29		0.14	0.024	0.1	J	0.15	0.027	0.046	J	0.15	0.026	0.44		0.15	0.026
Isophorone	78-59-1	NS	NS	NS	ND		0.18	0.025	ND		0.17	0.025	ND		0.16	0.023	ND		0.16	0.023	ND		0.17	0.025	ND		0.17	0.025	ND		0.17	0.025
n-Nitrosodi-n-propylamine	621-64-7	NS	NS	NS	ND		0.19	0.03	ND		0.19	0.029	ND		0.18	0.028	ND		0.17	0.027	ND		0.19	0.029	ND		0.19	0.029	ND		0.19	0.029
Naphthalene	91-20-3	12	100	12	ND		0.19	0.024	ND		0.19	0.023	ND		0.18	0.022	0.03	J	0.17	0.021	ND		0.19	0.023	ND		0.19	0.023	0.023	J	0.19	0.023
NDPA/DPA	86-30-6	NS	NS	NS	ND		0.16	0.022	ND		0.15	0.022	ND		0.14	0.02	ND		0.14	0.02	ND		0.15	0.022	ND		0.15	0.022	ND		0.15	0.022
Nitrobenzene	98-95-3	0.08	1.8	0.08	ND		0.18	0.029	ND		0.17	0.028	ND		0.16	0.026	ND		0.16	0.026	ND		0.17	0.028	ND		0.17	0.028	ND		0.17	0.028
p-Chloro-m-cresol	59-50-7	NS	NS	NS	ND		0.19	0.029	ND		0.19	0.028	ND		0.18	0.027	ND		0.17	0.026	ND		0.19	0.028	ND		0.19	0.028	ND		0.19	0.028
Pentachlorophenol	87-86-5	0.8	1.3	0.8	ND		0.16	0.043	ND		0.15	0.042	0.075	J	0.14	0.039	ND		0.14	0.038	ND		0.15	0.042	ND		0.15	0.042	ND		0.15	0.042
Phenanthrene	85-01-8	1.1	4.9	1000	ND		0.12	0.024	0.096	J	0.11	0.023	0.064	J	0.11	0.022	0.52		0.1	0.021	0.078	J	0.11	0.023	ND		0.11	0.023	0.34		0.11	0.023
Phenol	108-95-2	0.33	100	0.33	ND		0.19	0.029	ND		0.19	0.029	ND		0.18	0.027	ND		0.17	0.026	ND		0.19	0.029	ND		0.19	0.029	ND		0.19	0.029
Pyrene	129-00-0	64	100	1000	0.12		0.12	0.019	0.49		0.11	0.019	0.12		0.11	0.018	0.72		0.1	0.017	0.16		0.11	0.019	0.074	J	0.11	0.019	0.9		0.11	0.019
Total SVOCs		NS	NS	NS	0.859	-	-	-	3.387	-	-	-	0.908	-	-	-	4.943	-	-	-	1.227	-	-	-	0.477	-	-	-	6.225	-	-	-
Pesticides (mg/kg)		NS	NS	NS																												
4,4'-DDD	72-54-8	0.0033	5	14	ND		0.00187	0.000667	ND		0.00181	0.000644	0.0212		0.00166	0.000593	0.0192		0.00163	0.00058	ND		0.00179	0.000638	0.00349		0.00178	0.000633	ND		0.00178	0.000635
4,4'-DDE	72-55-9	0.0033	3.4	9.3	ND		0.00187	0.000432	ND		0.00181	0.000418	0.0183		0.00166	0.000385	0.0414		0.00163	0.000376	ND		0.00179	0.000414	ND		0.00178	0.000411	ND		0.00178	0.000412
4,4'-DDT	50-29-3	0.0033	3.8	135	ND		0.00187	0.0015	ND		0.00181	0.00145	0.0151		0.00166	0.00134	0.0421		0.00163	0.00131	ND		0.00179	0.00144	0.00686		0.00178	0.00143	ND		0.00178	0.00143
Aldrin	309-00-2	0.0048	0.044	0.19	ND		0.00187	0.000658	ND		0.00181	0.000636	ND		0.00166	0.000586	ND		0.00163	0.000573	ND		0.00179	0.00063	ND		0.00178	0.000625	ND		0.00178	0.000627

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-201 (4-4.5)			SB-202 (1.5-2)			SB-203 (3.5-4)			SB-204 (1-1.5)			SB-205 (2.5-3)			SB-206 (3.5-4)			SB-207 (3-3.5)		
LAB ID:					L2305142-01			L2305142-02			L2305142-03			L2305142-04			L2305142-05			L2305142-06			L2305142-07		
COLLECTION DATE:					1/28/2023			1/28/2023			1/28/2023			1/28/2023			1/28/2023			1/28/2023			1/28/2023		
SAMPLE DEPTH (FT):					4.0-4.5			1.5-2.0			3.5-4.0			1.0-1.5			2.5-3.0			3.5-4.0			3.0-3.5		
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Alpha-BHC	319-84-6	0.02	0.18	0.02	ND		0.000779	0.000221	ND		0.000753	0.000214	ND		0.000693	0.000197	ND		0.000678	0.000192	ND		0.000745	0.000212	ND		0.00074	0.00021	ND		0.000742	0.000211
Beta-BHC	319-85-7	0.021	0.18	0.09	ND		0.00187	0.000709	ND		0.00181	0.000685	ND		0.00166	0.000631	ND		0.00163	0.000617	ND		0.00179	0.000678	ND		0.00178	0.000673	ND		0.00178	0.000675
Chlordane	57-74-9	NS	NS	NS	ND		0.0156	0.00619	ND		0.015	0.00598	0.0392	P	0.0139	0.00551	0.121		0.0136	0.00539	ND		0.0149	0.00592	ND		0.0148	0.00588	ND		0.0148	0.0059
cis-Chlordane	5103-71-9	0.014	0.65	4.5	ND		0.00234	0.000651	ND		0.00226	0.000629	0.00752		0.00208	0.000579	0.0108		0.00203	0.000567	ND		0.00224	0.000623	ND		0.00222	0.000618	ND		0.00222	0.00062
Delta-BHC	319-86-8	0.04	100	0.1	ND		0.00187	0.000366	ND		0.00181	0.000354	ND		0.00166	0.000326	ND		0.00163	0.000318	ND		0.00179	0.00035	ND		0.00178	0.000348	ND		0.00178	0.000348
Dieldrin	60-57-1	0.005	0.075	0.1	ND		0.00117	0.000584	ND		0.00113	0.000564	0.00706		0.00104	0.00052	ND		0.00102	0.000508	ND		0.00112	0.000559	ND		0.00111	0.000555	ND		0.00111	0.000556
Endosulfan I	959-98-8	4.3	35	65	ND		0.00187	0.000442	ND		0.00181	0.000427	ND		0.00166	0.000393	ND		0.00163	0.000384	ND		0.00179	0.000422	ND		0.00178	0.00042	ND		0.00178	0.00042
Endosulfan II	33213-65-9	4.3	35	44	ND		0.00187	0.000624	ND		0.00181	0.000604	ND		0.00166	0.000556	ND		0.00163	0.000544	ND		0.00179	0.000598	ND		0.00178	0.000593	ND		0.00178	0.000595
Endosulfan sulfate	1031-07-8	4.3	35	47	ND		0.000779	0.000371	ND		0.000753	0.000358	ND		0.000693	0.00033	ND		0.000678	0.000323	ND		0.000745	0.000355	ND		0.00074	0.000352	ND		0.000742	0.000353
Endrin	72-20-8	0.014	5.3	0.06	ND		0.000779	0.000319	ND		0.000753	0.000308	ND		0.000693	0.000284	ND		0.000678	0.000278	ND		0.000745	0.000306	ND		0.00074	0.000303	ND		0.000742	0.000304
Endrin aldehyde	7421-93-4	NS	NS	NS	ND		0.00234	0.000818	ND		0.00226	0.00079	ND		0.00208	0.000728	ND		0.00203	0.000712	ND		0.00224	0.000782	ND		0.00222	0.000777	ND		0.00222	0.000779
Endrin ketone	53494-70-5	NS	NS	NS	ND		0.00187	0.000481	ND		0.00181	0.000465	ND		0.00166	0.000428	ND		0.00163	0.000419	ND		0.00179	0.00046	ND		0.00178	0.000457	ND		0.00178	0.000458
Heptachlor	76-44-8	0.013	0.53	0.38	ND		0.000934	0.000419	ND		0.000903	0.000405	ND		0.000832	0.000373	ND		0.000813	0.000365	ND		0.000894	0.000401	ND		0.000888	0.000398	ND		0.00089	0.000399
Heptachlor epoxide	1024-57-3	NS	NS	NS	ND		0.0035	0.00105	ND		0.00339	0.00102	ND		0.00312	0.000936	ND		0.00305	0.000915	ND		0.00335	0.00101	ND		0.00333	0.000999	ND		0.00334	0.001
Lindane	58-89-9	0.025	0.21	0.05	ND		0.000779	0.000348	ND		0.000753	0.000336	ND		0.000693	0.00031	ND		0.000678	0.000303	ND		0.000745	0.000333	ND		0.00074	0.000331	ND		0.000742	0.000331
Methoxychlor	72-43-5	NS	NS	NS	ND		0.0035	0.00109	ND		0.00339	0.00105	ND		0.00312	0.00097	ND		0.00305	0.000949	ND		0.00335	0.00104	ND		0.00333	0.00104	ND		0.00334	0.00104
Toxaphene	8001-35-2	NS	NS	NS	ND		0.035	0.00981	ND		0.0339	0.00948	ND		0.0312	0.00873	ND		0.0305	0.00854	ND		0.0335	0.00939	ND		0.0333	0.00932	ND		0.0334	0.00934
trans-Chlordane	5103-74-2	NS	NS	NS	ND		0.00234	0.000617	ND		0.00226	0.000596	0.00637		0.00208	0.000549	0.00876		0.00203	0.000537	ND		0.00224	0.00059	ND		0.00222	0.000586	ND		0.00222	0.000587
PCBs (mg/kg)		NS	NS	NS																											
Aroclor 1016	12674-11-2	NS	NS	NS	ND		0.0387	0.00344	ND		0.0379	0.00336	ND		0.0345	0.00306	ND		0.0346	0.00307	ND		0.037	0.00329	ND		0.0366	0.00325	ND		0.0381	0.00338
Aroclor 1221	11104-28-2	NS	NS	NS	ND		0.0387	0.00388	ND		0.0379	0.0038	ND		0.0345	0.00345	ND		0.0346	0.00347	ND		0.037	0.00371	ND		0.0366	0.00366	ND		0.0381	0.00381
Aroclor 1232	11141-16-5	NS	NS	NS	ND		0.0387	0.0082	ND		0.0379	0.00803	ND		0.0345	0.00731	ND		0.0346	0.00734	ND		0.037	0.00785	ND		0.0366	0.00775	ND		0.0381	0.00807
Aroclor 1242	53469-21-9	NS	NS	NS	ND		0.0387	0.00521	ND		0.0379	0.0051	ND		0.0345	0.00465	ND		0.0346	0.00467	ND		0.037	0.00499	ND		0.0366	0.00493	ND		0.0381	0.00513
Aroclor 1248	12672-29-6	NS	NS	NS	ND		0.0387	0.0058	ND		0.0379	0.00568	ND		0.0345	0.00517	ND		0.0346	0.00519	ND		0.037	0.00555	ND		0.0366	0.00548	ND		0.0381	0.00571
Aroclor 1254	11097-69-1	NS	NS	NS	ND		0.0387	0.00423	ND		0.0379	0.00414	ND		0.0345	0.00377	ND		0.0346	0.00379	ND		0.037	0.00405	ND		0.0366	0.004	ND		0.0381	0.00416
Aroclor 1260	11096-82-5	NS	NS	NS	ND		0.0387	0.00715	ND		0.0379	0.007	0.0072	J	0.0345	0.00637	0.0086	J	0.0346	0.0064	ND		0.037	0.00684	0.0084	J	0.0366	0.00676	ND		0.0381	0.00703
Aroclor 1262	37324-23-5	NS	NS	NS	ND		0.0387	0.00491	ND		0.0379	0.00481	ND		0.0345	0.00438	ND		0.0346	0.0044	ND		0.037	0.0047	ND		0.0366	0.00464	ND		0.0381	0.00483
Aroclor 1268	11100-14-4	NS	NS	NS	ND		0.0387	0.00401	ND		0.0379	0.00392	ND		0.0345	0.00357	0.00408	J	0.0346	0.00359	ND		0.037	0.00384	0.0049	J	0.0366	0.00379	ND		0.0381	0.00394
PCBs, Total	1336-36-3	0.1	1	3.2	ND		0.0387	0.00344	ND		0.0379	0.00336	0.0072	J	0.0345	0.00306	0.0127	J	0.0346	0.00307	ND		0.037	0.00329	0.0133	J	0.0366	0.00325	ND		0.0381	0.00338
Metals (mg/kg)		NS	NS	NS																											
Aluminum, Total	7429-90-5	NS	NS	NS	7680		9.12	2.46	9520		9.06	2.44	9400		8.59	2.32	8130		8.52	2.3	1910		9.12	2.46	5390		8.77	2.37	7550		8.97	2.42
Antimony, Total	7440-36-0	NS	NS	NS	1.57	J	4.56	0.346	1.47	J	4.53	0.344	1.21	J	4.3	0.326	1.52	J	4.26	0.324	0.528	J	4.56	0.347	4.12	J	4.38	0.333	1.13	J	4.49	0.341
Arsenic, Total	7440-38-2	13	16	16	5.06		0.912	0.19	5.84		0.906	0.188	4.12		0.859	0.179	7.74		0.852	0.177	7.81		0.912	0.19	6.81		0.877	0.182	5.36		0.897	0.187
Barium, Total	7440-39-3	410	410	820	205		0.912	0.159	131		0.906	0.158	76.8		0.859	0.15	91.1		0.852	0.148	38.3		0.912	0.159	109		0.877	0.152	99.9		0.897	0.156
Beryllium, Total	7440-41-7	4.4	43	47	0.197	J	0.456	0.03	0.334	J	0.453	0.03	0.197	J	0.43	0.028	0.283	J	0.426	0.028	ND		0.456	0.03	0.141	J	0.438	0.029	0.377	J	0.449	0.03
Cadmium, Total	7440-43-9	2.5	2.5	7.5	ND		0.912	0.089	0.472	J	0.906	0.089	0.272	J	0.859	0.084	0.375	J	0.852	0.084	0.207	J	0.912	0.089	0.29	J	0.877	0.086	0.454	J	0.897	0.088
Calcium, Total	7440-70-2	NS	NS	NS	31100		9.12	3.19	13700		9.06	3.17	3870		8.59	3.01	1040		8.52	2.98	149000		91.2	31.9	30900		8.77	3.07	6600		8.97	3.14
Chromium, Total	7440-47-3	30	110	NS	14.3		0.912	0.088	17.2		0.906	0.087	18.1		0.859	0.083	15		0.852	0.082	3.81		0.912	0.088	13		0.877	0.084	30.1		0.897	0.086
Cobalt, Total	7440-48-4	NS	NS	NS	4.38		1.82	0.151	5.52		1.81	0.15	5.26		1.72	0.143	4.02		1.7	0.142	2.63		1.82	0.151	4.65		1.75	0.146	5.93		1.79	0.149
Copper, Total	7440-50-8	50	280	1720	36.7		0.912	0.235	23.7		0.906	0.234	19.7		0.859	0.222	35.8		0.852	0.22	14.5		0.912	0.235	32.7		0.877	0.226	30.4		0.897	0.232
Iron, Total	7439-89-6	NS	NS	NS	15800		4.56	0.823	14000		4.53	0.818	14500		4.3	0.776	11700		4.26	0.77	6440		4.56	0.824	11600		4.38	0.792	13100		4.49	0.81
Lead, Total	7439-92-1	63	400	450	56.9		4.56	0.244	505		4.53	0.243	334		4.3	0.23	287		4.26	0.228	89.3		4.56	0.244	335		4.38	0.235	360		4.49	0.24
Magnesium, Total	7439-95-4	NS	NS	NS	2660		9.12	1.4	4580		9.06	1.39	2420		8.59	1.32	1770		8.52	1.31	69100		9.12	1.4	17400		8.77	1.35	4110		8.97	1.38
Manganese, Total	7439-96-5	1600	2000	2000	175		0.912	0.145	343		0.906	0.144	334		0.859	0.137	261		0.852	0.136	116		0.912	0.145	274		0.877	0.139	282		0.897	0.143
Mercury, Total	7439-97-6	0.18	0.3	0.73	0.114		0.077	0.05	23		0.794	0.518	0.079		0.072	0.047	0.341		0.072	0.047	0.158		0.077	0.051	0.251		0.075	0.049	6.46		0.8	0.521
Nickel, Total	7440-02-0	30	320	130	11.7		2.28	0.221	11.8		2.26	0.219	12.7		2.15	0.208	10.6		2.13	0.206	5.35		2.28	0.221	10.8		2.19	0.212	11.8		2.24	0.217
Potassium, Total	7440-09-7	NS	NS	NS	1180		228	13.1	1120		226	13	1540		215	12.4	864		213	12.3	364		228	13.1	1340		219	12.6	1140		224	12.9
Selenium, Total	7782-49-2	3.9	110	4	ND		1.82	0.235	0.53	J	1.81	0.234	0.528	J	1.72	0.222	0.802	J	1.7	0.22	0.277	J	1.82	0.235	0.561	J	1.75	0.226	0.734	J	1.79	0.232
Silver, Total	7440-22-4	2	110	8.3	ND		0.456	0.258	ND		0.453	0.256	ND		0.43	0.243	ND		0.426	0.241	ND		0.456	0.258	ND		0.438	0.248	ND		0.449	0.254
Sodium, Total	7440-23-5	NS	NS	NS	247		182	2.87	272		181	2.85	276		172	2.71	54.8	J	170	2.68	188		182	2.87	267		175	2.76	284		179	2.83
Thallium, Total	7440-28-0	NS	NS	NS	ND		1.82	0.287	ND		1.81	0.285	ND		1.72	0.271	ND		1.7	0.268	0.468	J	1.82	0.287	0.316	J	1.75	0.276	0.338	J	1.79	0.283
Vanadium, Total	7440-62-2	NS	NS	NS	20.6		0.912	0.185	23.6		0.906	0.184	23.5		0.859	0.174	21.9		0.852	0.173	10.8		0.912	0.185	19.1		0.877	0.178	21.1		0.897	0.182
Zinc, Total	7440-66-6	109	6600	2480	127		4.56	0.267	213		4.53	0.265	102		4.3	0.252	164		4.26	0.25	43		4.56	0.267	117		4.38	0.257	162		4.49	0.263
General Chemistry		NS	NS	NS																											
Cyanide, Total	57-12-5	2.3	13	40	ND		1.2	0.25	ND		1.1	0.23	ND		1	0.21	ND		1	0.22	ND		1.1	0.23	ND		1	0.22	ND		1.1	0.24
Solids, Total	NONE	NS	NS	NS	84.7		0.1	NA	86		0.1	NA	92.5		0.1	NA	92.5		0.1	NA	86.8		0.1	NA	87.2		0.1	NA	85.4		0.1	NA

Notes

USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

RSCO: New York NYCRR Part 375 Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

PGWSCO: New York NYCRR Part 375 Protection of Groundwater Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

Exceedance of USCO
Exceedance of RSCO
Exceedance of RRSCO
Exceedance of PGWSCO
J = Estimated
ND = Not Detected
- = Not Tested

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-208 (4-4.5)				SB-209 (2.5-3)				SB-306 (6-6.5)				SB-307 (9.5-10)				SB-308 (3.5-4)			
LAB ID:					L2305142-08				L2305142-09				L2361279-01				L2361842-02				L2361842-01			
COLLECTION DATE:					1/28/2023				1/28/2023				10/16/2023				10/18/2023				10/18/2023			
SAMPLE DEPTH (FT):					4.0-4.5				2.5-3.0				6.0-6.5				9.5-10.0				3.5-4.0			
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
VOCs (mg/kg)																								
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	ND		0.00024	0.00006	ND		0.00025	0.00007	ND		0.00047	0.00012	ND		0.00046	0.00012	ND		0.00051	0.00013
1,1,1-Trichloroethane	71-55-6	0.68	100	0.68	ND		0.00024	0.00008	ND		0.00025	0.00008	ND		0.00047	0.00016	ND		0.00046	0.00015	ND		0.00051	0.00017
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	ND		0.00024	0.00008	ND		0.00025	0.00008	ND		0.00047	0.00015	ND		0.00046	0.00015	ND		0.00051	0.00017
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	ND		0.00047	0.00013	ND		0.00049	0.00013	ND		0.00093	0.00025	ND		0.00092	0.00024	ND		0.001	0.00027
1,1-Dichloroethane	75-34-3	0.27	47	0.27	ND		0.00047	0.00007	ND		0.00049	0.00007	ND		0.00093	0.00014	ND		0.00092	0.00013	ND		0.001	0.00015
1,1-Dichloroethene	75-35-4	0.24	0.98	0.33	ND		0.00047	0.00011	ND		0.00049	0.00012	ND		0.00093	0.00022	ND		0.00092	0.00022	ND		0.001	0.00024
1,1-Dichloropropene	563-58-6	NS	NS	NS	ND		0.00024	0.00008	ND		0.00025	0.00008	ND		0.00047	0.00015	ND		0.00046	0.00015	ND		0.00051	0.00016
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	ND		0.00095	0.00015	ND		0.00098	0.00016	ND		0.0019	0.0003	ND		0.0018	0.0003	ND		0.002	0.00033
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	ND		0.00095	0.00006	ND		0.00098	0.00006	ND		0.0019	0.00012	ND		0.0018	0.00012	ND		0.002	0.00013
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	ND		0.00095	0.00009	ND		0.00098	0.00009	ND		0.0019	0.00018	ND		0.0018	0.00018	ND		0.002	0.00019
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	ND		0.00095	0.00013	ND		0.00098	0.00013	ND		0.0019	0.00025	ND		0.0018	0.00025	ND		0.002	0.00028
1,2,4-Trimethylbenzene	95-63-6	5.9	100	5.9	ND		0.00095	0.00016	ND		0.00098	0.00016	ND		0.0019	0.00031	ND		0.0018	0.00031	ND		0.002	0.00034
1,2-Dibromo-3-chloropropane	96-12-8	NS	NS	NS	ND		0.0014	0.00047	ND		0.0015	0.00049	ND		0.0028	0.00093	ND		0.0028	0.00092	ND		0.003	0.001
1,2-Dibromoethane	106-93-4	NS	NS	NS	ND		0.00047	0.00013	ND		0.00049	0.00014	ND		0.00093	0.00026	ND		0.00092	0.00026	ND		0.001	0.00028
1,2-Dichlorobenzene	95-50-1	1.1	100	1.1	ND		0.00095	0.00007	ND		0.00098	0.00007	ND		0.0019	0.00013	ND		0.0018	0.00013	ND		0.002	0.00015
1,2-Dichloroethane	107-06-2	0.02	5.8	0.02	ND		0.00047	0.00012	ND		0.00049	0.00013	ND		0.00093	0.00024	ND		0.00092	0.00024	ND		0.001	0.00026
1,2-Dichloroethene, Total	540-59-0	NS	NS	NS	ND		0.00047	0.00007	ND		0.00049	0.00007	ND		0.00093	0.00013	ND		0.00092	0.00012	ND		0.001	0.00014
1,2-Dichloropropane	78-87-5	NS	NS	NS	ND		0.00047	0.00006	ND		0.00049	0.00006	ND		0.00093	0.00012	ND		0.00092	0.00011	ND		0.001	0.00013
1,3,5-Trimethylbenzene	108-67-8	3.1	100	3.1	ND		0.00095	0.00009	ND		0.00098	0.0001	ND		0.0019	0.00018	ND		0.0018	0.00018	ND		0.002	0.0002
1,3-Dichlorobenzene	541-73-1	2.6	38	2.6	ND		0.00095	0.00007	ND		0.00098	0.00007	ND		0.0019	0.00014	ND		0.0018	0.00014	ND		0.002	0.00015
1,3-Dichloropropane	142-28-9	NS	NS	NS	ND		0.00095	0.00008	ND		0.00098	0.00008	ND		0.0019	0.00016	ND		0.0018	0.00015	ND		0.002	0.00017
1,3-Dichloropropene, Total	542-75-6	NS	NS	NS	ND		0.00024	0.00008	ND		0.00025	0.00008	ND		0.00047	0.00015	ND		0.00046	0.00014	ND		0.00051	0.00016
1,4-Dichlorobenzene	106-46-7	1.8	24	1.8	ND		0.00095	0.00008	ND		0.00098	0.00008	ND		0.0019	0.00016	ND		0.0018	0.00016	ND		0.002	0.00017
1,4-Dioxane	123-91-1	0.1	5.7	0.1	ND		0.038	0.017	ND		0.039	0.017	ND		0.075	0.033	ND		0.073	0.032	ND		0.081	0.036
2,2-Dichloropropane	594-20-7	NS	NS	NS	ND		0.00095	0.0001	ND		0.00098	0.0001	ND		0.0019	0.00019	ND		0.0018	0.00018	ND		0.002	0.0002
2-Butanone	78-93-3	0.1	100	0.1	ND		0.0047	0.001	ND		0.0049	0.0011	ND		0.0093	0.0021	ND		0.0092	0.002	ND		0.01	0.0022
2-Hexanone	591-78-6	NS	NS	NS	ND		0.0047	0.00056	ND		0.0049	0.00058	ND		0.0093	0.0011	ND		0.0092	0.0011	ND		0.01	0.0012
4-Methyl-2-pentanone	108-10-1	NS	NS	NS	ND		0.0047	0.00061	ND		0.0049	0.00063	ND		0.0093	0.0012	ND		0.0092	0.0012	ND		0.01	0.0013
Acetone	67-64-1	0.03	100	0.03	ND		0.0047	0.0023	ND		0.0049	0.0024	ND		0.0093	0.0045	ND		0.0092	0.0044	ND		0.01	0.0049
Acrylonitrile	107-13-1	NS	NS	NS	ND		0.0019	0.00055	ND		0.002	0.00057	ND		0.0037	0.0011	ND		0.0037	0.001	ND		0.004	0.0012
Benzene	71-43-2	0.06	3.7	0.06	ND		0.00024	0.00008	ND		0.00025	0.00008	ND		0.00047	0.00015	ND		0.00046	0.00015	ND		0.00051	0.00017
Bromobenzene	108-86-1	NS	NS	NS	ND		0.00095	0.00007	ND		0.00098	0.00007	ND		0.0019	0.00014	ND		0.0018	0.00013	ND		0.002	0.00015
Bromochloromethane	74-97-5	NS	NS	NS	ND		0.00095	0.0001	ND		0.00098	0.0001	ND		0.0019	0.00019	ND		0.0018	0.00019	ND		0.002	0.00021
Bromodichloromethane	75-27-4	NS	NS	NS	ND		0.00024	0.00005	ND		0.00025	0.00005	ND		0.00047	0.0001	ND		0.00046	0.0001	ND		0.00051	0.00011
Bromoform	75-25-2	NS	NS	NS	ND		0.0019	0.00012	ND		0.002	0.00012	ND		0.0037	0.00023	ND		0.0037	0.00022	ND		0.004	0.00025
Bromomethane	74-83-9	NS	NS	NS	ND		0.00095	0.00028	ND		0.00098	0.00029	ND		0.0019	0.00054	ND		0.0018	0.00053	ND		0.002	0.00059
Carbon disulfide	75-15-0	NS	NS	NS	ND		0.0047	0.0022	ND		0.0049	0.0022	ND		0.0093	0.0042	ND		0.0092	0.0042	ND		0.01	0.0046
Carbon tetrachloride	56-23-5	0.76	7.1	0.76	ND		0.00047	0.00011	ND		0.00049	0.00011	ND		0.00093	0.00021	ND		0.00092	0.00021	ND		0.001	0.00023
Chlorobenzene	108-90-7	4.5	100	4.5	ND		0.00024	0.00006	ND		0.00025	0.00006	ND		0.00047	0.00012	ND		0.00046	0.00012	ND		0.00051	0.00013
Chloroethane	75-00-3	NS	NS	NS	ND		0.00095	0.00021	ND		0.00098	0.00022	ND		0.0019	0.00042	ND		0.0018	0.00042	ND		0.002	0.00046
Chloroform	67-66-3	0.37	24	0.37	ND		0.00071	0.00007	ND		0.00074	0.00007	ND		0.0014	0.00013	ND		0.0014	0.00013	ND		0.0015	0.00014
Chloromethane	74-87-3	NS	NS	NS	ND		0.0019	0.00044	ND		0.002	0.00046	ND		0.0037	0.00087	ND		0.0037	0.00086	ND		0.004	0.00094
cis-1,2-Dichloroethene	156-59-2	0.19	41	0.19	ND		0.0047	0.00008	ND		0.0049	0.00009	ND		0.0093	0.00016	ND		0.0092	0.00016	ND		0.001	0.00018
cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	ND		0.00024	0.00008	ND		0.00025	0.00008	ND		0.00047	0.00015	ND		0.00046	0.00014	ND		0.00051	0.00016
Dibromochloromethane	124-48-1	NS	NS	NS	ND		0.00047	0.00007	ND		0.00049	0.00007	ND		0.00093	0.00013	ND		0.00092	0.00013	ND		0.001	0.00014
Dibromomethane	74-95-3	NS	NS	NS	ND		0.00095	0.00011	ND		0.00098	0.00012	ND		0.0019	0.00022	ND		0.0018	0.00022	ND		0.002	0.00024
Dichlorodifluoromethane	75-71-8	NS	NS	NS	ND		0.0047	0.00043	ND		0.0049	0.00045	ND		0.0093	0.00085	ND		0.0092	0.00084	ND		0.01	0.00093
Ethyl ether	60-29-7	NS	NS	NS	ND		0.00095	0.00016	ND		0.00098	0.00017	ND		0.0019	0.00032	ND		0.0018	0.00031	ND		0.002	0.00035
Ethylbenzene	100-41-4	1	76	1	0.00035	J	0.00047	0.00007	ND		0.00049	0.00007	ND		0.00093	0.00013	ND		0.00092	0.00013	ND		0.001	0.00014
Hexachlorobutadiene	87-68-3	NS	NS	NS	ND		0.0019	0.00008	ND		0.002	0.00008	ND		0.0037	0.00016	ND		0.0037	0.00016	ND		0.004	0.00017
Isopropylbenzene	98-82-8	NS	NS	NS	ND		0.00047	0.00005	ND		0.00049	0.00005	ND		0.00093	0.0001	ND		0.00092	0.0001	ND		0.001	0.00011
Methyl tert butyl ether	1634-04-4	0.1	100	0.1	ND		0.00095	0.0001	ND		0.00098	0.0001	ND		0.0019	0.00019	ND		0.0018	0.00018	ND		0.002	0.0002
Methylene chloride	75-09-2	0.05	81	0.05	ND		0.0024	0.0011	ND		0.0025	0.0011	ND		0.0047	0.0021	ND		0.0046	0.0021	ND		0.0051	0.0023
n-Butylbenzene	104-51-8	18	100	18	ND		0.00047	0.00008	ND		0.00049	0.00008	ND		0.00093	0.00016	ND		0.00092	0.00015	ND		0.001	0.00017
n-Propylbenzene	103-65-1	5	100	5	ND		0.00047	0.00008	ND		0.00049	0.00008	ND		0.00093	0.00016	ND		0.00092	0.00016	ND		0.001	0.00017
Naphthalene	91-20-3	12	100	12	ND		0.0019	0.00031	ND		0.002	0.00032	ND		0.0037	0.00061	ND		0.0037	0.0006	ND		0.004	0.00066
o-Chlorotoluene	95-49-8	NS	NS	NS	ND		0.00095	0.00009	ND		0.00098	0.00009	ND		0.0019	0.00018	ND		0.0018	0.00018	ND		0.002	0.00019
o-Xylene	95-47-6	NS	NS	NS	0.00055		0.00047	0.00014	ND		0.00049	0.00014	ND		0.00093	0.00027	ND		0.00092	0.00027	ND		0.001	0.0003
p-Chlorotoluene	106-43-4	NS	NS	NS	ND		0.00095	0.00005	ND		0.00098	0.00005	ND		0.0019	0.0001	ND		0.0018	0.0001	ND		0.002	0.00011
p-Diethylbenzene	105-05-5	NS	NS	NS	ND		0.00095	0.00008	ND		0.00098	0.00009	ND		0.0019	0.00016	ND		0.0018	0.00016	ND		0.002	0.00018
p-Ethyltoluene	622-96-8	NS	NS	NS	ND		0.00095	0.00018	ND		0.00098	0.00019	ND		0.0019	0.00036	ND		0.0018	0.00035	ND		0.002	0.00039
p-Isopropyltoluene	99-87-6	NS	NS	NS	ND		0.00047	0.00005	ND		0.00049	0.00005	ND		0.00093	0.0001	ND		0.00092	0.0001	ND		0.001	0.00011
p/m-Xylene	179601-23-1	NS	NS	NS	0.0016		0.00095	0.00026	ND		0.00098	0.00028	ND		0.0019	0.00052	ND		0.0018	0.00051	ND		0.002	0.00057
sec-Butylbenzene	135-98-8	25	100	25	ND		0.00047	0.00007	ND		0.00049	0.00007	ND		0.00093	0.00014	ND		0.00092	0.00013	ND		0.001	0.00015
Styrene	100-42-5	NS	NS	NS	ND		0.00047	0.00009	ND		0.00049	0.0001	ND		0.00093	0.00018	ND		0.00092	0.00018	ND		0.001	0.0002
tert-Butylbenzene	98-06-6	11	100	11	ND		0.00095	0.00006	ND		0.00098	0.00006	ND		0.0019	0.00011	ND		0.0018	0.00011	ND		0.002	0.00012
Tetrachloroethene	127-18-4	1.3	18	1.3	ND		0.00024	0.00009	ND		0.00025	0.0001	ND		0.00047	0.00018	ND		0.00046	0.00018	ND		0.00051	0.0002
Toluene	108-88-3	0.7	100	0.7	ND		0.00047	0.00026	ND		0.00049	0.00027	ND		0.00093	0.00051	ND		0.00092	0.0005	ND		0.001	0.00055
trans-1,2-Dichloroethene	156-60-5	0.19	100	0.19	ND		0.00071	0.00007	ND		0.00074	0.00007	ND		0.0014	0.00013	ND		0.0014	0.00012	ND		0.0015	0.00014
trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	ND		0.00047	0.00013	ND		0.00049	0.00013	ND		0.00093	0.00025	ND		0.00092	0.00025	ND		0.001	0.00028
trans-1,4-Dichloro-2-butene	110-57-6	NS	NS	NS	ND		0.0024	0.00067	ND		0.0025	0.0007	ND		0.0047	0.0013	ND		0.0046	0.0013	ND		0.0051	0.0014
Trichloroethene	79-01-6	0.47	6.4	0.47	ND		0.00024	0.00007	ND		0.00025	0.00007	ND		0.00047	0.00013	ND		0.00046	0.00012	ND		0.00051	0.00014
Trichlorofluoromethane	75-69-4	NS	NS	NS	ND		0.0019	0.00033	ND		0.002	0.00034	ND		0.0037	0.00065	ND		0.0037	0.00064	ND		0.004	0.0007
Vinyl acetate	108-05-4	NS	NS	NS	ND		0.0047	0.001	ND		0.0049	0.001	ND		0.0093	0.002	ND		0.0092	0.002	ND		0.01	0.0022
Vinyl chloride	75-01-4	0.03	0.48	0.03	ND		0.00047	0.00016	ND		0.00049	0.00016	ND		0.00093	0.00031	ND		0.00092	0.00031	ND		0.001	0.00034
Xylenes, Total	1330-20-7	0.26	100	1.2	0.0022		0.00047	0.00014	ND		0.00049	0.00014	ND		0.00093	0.00027	ND		0.00092	0.00027	ND		0.001	0.0003
Total VOCs		NS	NS	NS	0.0025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS (mg/kg)		NS	NS	NS																				
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	-		-	-	-		-	-	ND		0.000788	0.000381	-	-	-	-	-	-	-	-
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	-		-	-	-		-	-	ND		0.000788	0.000276	-	-	-	-	-	-	-	-
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000081	-	-	-	-	-	-	-	-
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000098	-	-	-	-	-	-	-	-
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000043	-	-	-	-	-	-	-	-
Perfluorobutanoic Acid (PFBA)	375-22-4	NS	NS	NS	-		-	-	-		-	-	ND		0.000788	0.00005	-	-	-	-	-	-	-	-
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000032	-	-	-	-	-	-	-	-
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000074	-	-	-	-	-	-	-	-
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.00004	-	-	-	-	-	-	-	-
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000036	-	-	-	-	-	-	-	-

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-208 (4-4.5)				SB-209 (2.5-3)				SB-306 (6-6.5)				SB-307 (9.5-10)				SB-308 (3.5-4)			
LAB ID:					L2305142-08				L2305142-09				L2361279-01				L2361842-02				L2361842-01			
COLLECTION DATE:					1/28/2023				1/28/2023				10/16/2023				10/18/2023				10/18/2023			
SAMPLE DEPTH (FT):					4.0-4.5				2.5-3.0				6.0-6.5				9.5-10.0				3.5-4.0			
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Perfluoroheptanoic Acid (PFHpA)	375-85-9	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000023	-	-	-	-	-	-	-	-
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000058	-	-	-	-	-	-	-	-
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000046	-	-	-	-	-	-	-	-
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000077	-	-	-	-	-	-	-	-
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000043	-	-	-	-	-	-	-	-
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000078	-	-	-	-	-	-	-	-
Perfluorooctanoic Acid (PFOA)	335-67-1	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000051	-	-	-	-	-	-	-	-
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	-		-	-	-		-	-	ND		0.000394	0.000055	-	-	-	-	-	-	-	-
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000105	-	-	-	-	-	-	-	-
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000052	-	-	-	-	-	-	-	-
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.00005	-	-	-	-	-	-	-	-
PFOA/PFOS, Total		NS	NS	NS	-		-	-	-		-	-	ND		0.000197	0.000051	-	-	-	-	-	-	-	-
SVOCs (mg/kg)		NS	NS	NS																				
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	ND		0.19	0.02	ND		0.19	0.02	ND		0.18	0.019	ND		0.18	0.019	ND		0.17	0.018
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	ND		0.19	0.022	ND		0.19	0.022	ND		0.18	0.02	ND		0.18	0.021	ND		0.17	0.019
1,2-Dichlorobenzene	95-50-1	1.1	100	1.1	ND		0.19	0.034	ND		0.19	0.035	ND		0.18	0.032	ND		0.18	0.033	ND		0.17	0.03
1,3-Dichlorobenzene	541-73-1	2.6	38	2.6	ND		0.19	0.032	ND		0.19	0.033	ND		0.18	0.031	ND		0.18	0.031	ND		0.17	0.029
1,4-Dichlorobenzene	106-46-7	1.8	24	1.8	ND		0.19	0.033	ND		0.19	0.034	ND		0.18	0.031	ND		0.18	0.032	ND		0.17	0.03
1,4-Dioxane	123-91-1	0.1	5.7	0.1	ND		0.028	0.0087	ND		0.029	0.0089	ND		0.027	0.0083	ND		0.027	0.0084	ND		0.026	0.0078
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	ND		0.19	0.036	ND		0.19	0.037	ND		0.18	0.034	ND		0.18	0.035	ND		0.17	0.033
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	ND		0.11	0.036	ND		0.12	0.037	ND		0.11	0.034	ND		0.11	0.034	ND		0.1	0.032
2,4-Dichlorophenol	120-83-2	NS	NS	NS	ND		0.17	0.03	ND		0.17	0.031	ND		0.16	0.029	ND		0.16	0.029	ND		0.15	0.027
2,4-Dimethylphenol	105-67-9	NS	NS	NS	ND		0.19	0.062	ND		0.19	0.064	ND		0.18	0.059	ND		0.18	0.06	ND		0.17	0.056
2,4-Dinitrophenol	51-28-5	NS	NS	NS	ND		0.91	0.088	ND		0.93	0.09	ND		0.86	0.084	ND		0.88	0.085	ND		0.82	0.079
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	ND		0.19	0.038	ND		0.19	0.039	ND		0.18	0.036	ND		0.18	0.036	ND		0.17	0.034
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	ND		0.19	0.032	ND		0.19	0.033	ND		0.18	0.031	ND		0.18	0.031	ND		0.17	0.029
2-Chloronaphthalene	91-58-7	NS	NS	NS	ND		0.19	0.019	ND		0.19	0.019	ND		0.18	0.018	ND		0.18	0.018	ND		0.17	0.017
2-Chlorophenol	95-57-8	NS	NS	NS	ND		0.19	0.022	ND		0.19	0.023	ND		0.18	0.021	ND		0.18	0.022	ND		0.17	0.02
2-Methylnaphthalene	91-57-6	NS	NS	NS	ND		0.23	0.023	ND		0.23	0.023	ND		0.22	0.022	ND		0.22	0.022	ND		0.2	0.02
2-Methylphenol	95-48-7	0.33	100	0.33	ND		0.19	0.029	ND		0.19	0.03	ND		0.18	0.028	ND		0.18	0.028	ND		0.17	0.026
2-Nitroaniline	88-74-4	NS	NS	NS	ND		0.19	0.036	ND		0.19	0.037	ND		0.18	0.035	ND		0.18	0.035	ND		0.17	0.033
2-Nitrophenol	88-75-5	NS	NS	NS	ND		0.41	0.071	ND		0.42	0.073	ND		0.39	0.068	ND		0.39	0.068	ND		0.37	0.064
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	ND		0.19	0.05	ND		0.19	0.052	ND		0.18	0.048	ND		0.18	0.048	ND		0.17	0.045
3-Methylphenol/4-Methylphenol	108-39-4/106-44-5	NS	NS	NS	ND		0.27	0.03	ND		0.28	0.03	ND		0.26	0.028	ND		0.26	0.028	ND		0.24	0.027
3-Nitroaniline	99-09-2	NS	NS	NS	ND		0.19	0.036	ND		0.19	0.036	ND		0.18	0.034	ND		0.18	0.034	ND		0.17	0.032
4,6-Dinitro-o-cresol	534-52-1	NS	NS	NS	ND		0.49	0.091	ND		0.5	0.093	ND		0.47	0.086	ND		0.47	0.088	ND		0.44	0.082
4-Bromophenyl phenyl ether	101-55-3	NS	NS	NS	ND		0.19	0.029	ND		0.19	0.03	ND		0.18	0.027	ND		0.18	0.028	ND		0.17	0.026
4-Chloroaniline	106-47-8	NS	NS	NS	ND		0.19	0.034	ND		0.19	0.035	ND		0.18	0.033	ND		0.18	0.033	ND		0.17	0.031
4-Chlorophenyl phenyl ether	7005-72-3	NS	NS	NS	ND		0.19	0.02	ND		0.19	0.021	ND		0.18	0.019	ND		0.18	0.02	ND		0.17	0.018
4-Nitroaniline	100-01-6	NS	NS	NS	ND		0.19	0.078	ND		0.19	0.08	ND		0.18	0.074	ND		0.18	0.076	ND		0.17	0.07
4-Nitrophenol	100-02-7	NS	NS	NS	ND		0.26	0.077	ND		0.27	0.079	ND		0.25	0.073	ND		0.26	0.074	ND		0.24	0.069
Acenaphthene	83-32-9	20	100	98	0.067	J	0.15	0.02	0.06	J	0.16	0.02	ND		0.14	0.019	ND		0.14	0.019	ND		0.14	0.018
Acenaphthylene	208-96-8	100	100	365	0.032	J	0.15	0.029	0.031	J	0.16	0.03	ND		0.14	0.028	ND		0.14	0.028	0.064	J	0.14	0.026
Acetophenone	98-86-2	NS	NS	NS	ND		0.19	0.023	ND		0.19	0.024	ND		0.18	0.022	ND		0.18	0.022	ND		0.17	0.021
Anthracene	120-12-7	100	100	1000	0.13		0.11	0.037	0.14		0.12	0.038	ND		0.11	0.035	ND		0.11	0.036	0.082	J	0.1	0.033
Benzo(a)anthracene	56-55-3	1	1.4	1	0.42		0.11	0.021	0.62		0.12	0.022	ND		0.11	0.02	ND		0.11	0.02	0.036	J	0.1	0.019
Benzo(a)pyrene	50-32-8	1	1	22	0.38		0.15	0.046	0.58		0.16	0.047	ND		0.14	0.044	ND		0.14	0.044	ND		0.14	0.042
Benzo(b)fluoranthene	205-99-2	1	1.4	2.1	0.46		0.11	0.032	0.67		0.12	0.033	ND		0.11	0.03	ND		0.11	0.031	ND		0.1	0.029
Benzo(ghi)perylene	191-24-2	0.64	4.9	1000	0.22		0.15	0.022	0.32		0.16	0.023	ND		0.14	0.021	ND		0.14	0.021	0.62		0.14	0.02
Benzo(k)fluoranthene	207-08-9	0.8	4.9	2	0.17		0.11	0.03	0.26		0.12	0.031	ND		0.11	0.029	ND		0.11	0.029	ND		0.1	0.027
Benzoic Acid	65-85-0	NS	NS	NS	ND		0.61	0.19	ND		0.63	0.2	ND		0.58	0.18	ND		0.59	0.18	ND		0.55	0.17
Benzyl Alcohol	100-51-6	NS	NS	NS	ND		0.19	0.058	ND		0.19	0.059	ND		0.18	0.055	ND		0.18	0.056	ND		0.17	0.052
Biphenyl	92-52-4	NS	NS	NS	ND		0.43	0.025	ND		0.44	0.025	ND		0.41	0.023	ND		0.42	0.024	ND		0.39	0.022
Bis(2-chloroethoxy)methane	111-91-1	NS	NS	NS	ND		0.2	0.019	ND		0.21	0.019	ND		0.19	0.018	ND		0.2	0.018	ND		0.18	0.017
Bis(2-chloroethyl)ether	111-44-4	NS	NS	NS	ND		0.17	0.026	ND		0.17	0.026	ND		0.16	0.024	ND		0.16	0.025	ND		0.15	0.023
Bis(2-chloroisopropyl)ether	108-60-1	NS	NS	NS	ND		0.23	0.032	ND		0.23	0.033	ND		0.22	0.031	ND		0.22	0.031	ND		0.2	0.029
Bis(2-ethylhexyl)phthalate	117-81-7	NS	NS	NS	ND		0.19	0.066	ND		0.19	0.067	ND		0.18	0.062	ND		0.18	0.063	ND		0.17	0.059
Butyl benzyl phthalate	85-68-7	NS	NS	NS	ND		0.19	0.048	ND		0.19	0.049	ND		0.18	0.045	ND		0.18	0.046	ND		0.17	0.043
Carbazole	86-74-8	NS	NS	NS	0.056	J	0.19	0.018	0.042	J	0.19	0.019	ND		0.18	0.017	ND		0.18	0.018	0.027	J	0.17	0.016
Chrysene	218-01-9	1	4.9	1	0.39		0.11	0.02	0.58		0.12	0.02	ND		0.11	0.019	ND		0.11	0.019	0.027	J	0.1	0.018
Di-n-butylphthalate	84-74-2	NS	NS	NS	ND		0.19	0.036	ND		0.19	0.037	ND		0.18	0.034	ND		0.18	0.034	ND		0.17	0.032
Di-n-octylphthalate	117-84-0	NS	NS	NS	ND		0.19	0.064	ND		0.19	0.066	ND		0.18	0.061	ND		0.18	0.062	ND		0.17	0.058
Dibenzo(a,h)anthracene	53-70-3	0.33	0.33	1000	0.057	J	0.11	0.022	0.083	J	0.12	0.022	ND		0.11	0.021	ND		0.11	0.021	ND		0.1	0.02
Dibenzofuran	132-64-9	2.1	18	110	0.022	J	0.19	0.018	ND		0.19	0.018	ND		0.18	0.017	ND		0.18	0.017	ND		0.17	0.016
Diethyl phthalate	84-66-2	NS	NS	NS	ND		0.19	0.018	ND		0.19	0.018	ND		0.18	0.017	ND		0.18	0.017	ND		0.17	0.016
Dimethyl phthalate	131-11-3	NS	NS	NS	ND		0.19	0.04	ND		0.19	0.041	ND		0.18	0.038	ND		0.18	0.038	ND		0.17	0.036
Fluoranthene	206-44-0	85	100	1000	0.78		0.11	0.022	1.1		0.12	0.022	ND		0.11	0.021	ND		0.11	0.021	0.056	J	0.1	0.02
Fluorene	86-73-7	30	100	386	0.051	J	0.19	0.018	0.034	J	0.19	0.019	ND		0.18	0.017	ND		0.18	0.018	ND		0.17	0.016
Hexachlorobenzene	118-74-1	0.33	0.33	3.2	ND		0.11	0.021	ND		0.12	0.022	ND		0.11	0.02	ND		0.11	0.02	ND		0.1	0.019
Hexachlorobutadiene	87-68-3	NS	NS	NS	ND		0.19	0.028	ND		0.19	0.028	ND		0.18	0.026	ND		0.18	0.027	ND		0.17	0.025
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	ND		0.54	0.17	ND		0.55	0.18	ND		0.51	0.16	ND		0.52	0.16	ND		0.49	0.15
Hexachloroethane	67-72-1	NS	NS	NS	ND		0.15	0.031	ND		0.16	0.031	ND		0.14	0.029	ND		0.14	0.03	ND		0.14	0.028
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	1.4	6.6	0.26		0.15	0.026	0.39		0.16	0.027	ND		0.14	0.025	ND		0.14	0.025	0.27		0.14	0.024
Isophorone	78-59-1	NS	NS	NS	ND		0.17	0.024	ND		0.17	0.025	ND		0.16	0.023	ND		0.16	0.024	ND		0.15	0.022
n-Nitrosodi-n-propylamine	621-64-7	NS	NS	NS	ND		0.19	0.029	ND		0.19	0.03	ND		0.18	0.028	ND		0.18	0.028	ND		0.17	0.026
Naphthalene	91-20-3	12	100	12	ND		0.19	0.023	ND		0.19	0.024	ND		0.18	0.022	ND		0.18	0.022	ND		0.17	0.021
NDPA/DPA	86-30-6	NS	NS	NS	ND		0.15	0.022	ND		0.16	0.022	ND		0.14	0.02	ND		0.14	0.021	ND		0.14	0.019
Nitrobenzene	98-95-3	0.08	1.8	0.08	ND		0.17	0.028	ND		0.17	0.029	ND		0.16	0.026	ND		0.16	0.027	ND		0.15	0.025
p-Chloro-m-cresol	59-50-7	NS	NS	NS	ND		0.19	0.028	ND		0.19	0.029	ND		0.18	0.027	ND		0.18	0.027	ND		0.17	0.025
Pentachlorophenol	87-86-5	0.8	1.3	0.8	ND		0.15	0.042	ND		0.16	0.043	ND		0.14	0.04	ND		0.14	0.04	ND		0.14	0.037
Phenanthrene	85-01-8	1.1	4.9	1000	0.51		0.11	0.023	0.47		0.12	0.024	ND		0.11	0.022	ND		0.11	0.022	0.074	J	0.1	0.021
Phenol	108-95-2	0.33	100	0.33	ND		0.19	0.028	ND		0.19	0.029	ND		0.18	0.027	ND		0.18	0.028	ND		0.17	0.026
Pyrene	129-00-0	64	100	1000	0.61		0.11	0.019	0.88		0.12	0.019	ND		0.11	0.018	ND		0.11	0.018	0.051	J	0.1	0.017
Total SVOCs		NS	NS	NS	4.615	-	-	-	6.26	-	-	-	-	-	-	-	-	-	-	-	1.307	-	-	-
Pesticides (mg/kg)		NS	NS	NS																				
4,4'-DDD	72-54-8	0.0033	5	14	ND		0.00174	0.000622	ND		0.00188	0.000671	ND		0.00167	0.000597	ND		0.00171	0.000609	ND		0.00161	0.000574
4,4'-DDE	72-55-9	0.0033	3.4	9.3	0.00359		0.00174	0.000403	ND		0.00188	0.000435	ND		0.00167	0.000387	ND		0.00171	0.000395	ND		0.00161	0.000372
4,4'-DDT	50-29-3	0.0033	3.8	135	0.00253	IP	0.00174	0.0014	ND		0.00188	0.00151	ND		0.00167	0.00135	ND		0.00171	0.00137	ND		0.00161	0.0013
Aldrin	309-00-2	0.0048	0.044	0.19	ND		0.00174	0.000614	ND		0.00188	0.000662	ND		0.00167	0.00059	ND		0.00171	0.000602	ND		0.00161	0.000567

Table 2.2 - Summary of Soil Analytical Results
177 North Avenue, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:		2	4	8	SB-208 (4-4.5)				SB-209 (2.5-3)				SB-306 (6-6.5)				SB-307 (9.5-10)				SB-308 (3.5-4)			
LAB ID:					L2305142-08				L2305142-09				L2361279-01				L2361842-02				L2361842-01			
COLLECTION DATE:					1/28/2023				1/28/2023				10/16/2023				10/18/2023				10/18/2023			
SAMPLE DEPTH (FT):					4.0-4.5				2.5-3.0				6.0-6.5				9.5-10.0				3.5-4.0			
ANALYTE	CAS	USCO	RRSCO	PGWSCO	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Alpha-BHC	319-84-6	0.02	0.18	0.02	ND		0.000726	0.000206	ND		0.000783	0.000222	ND		0.000698	0.000198	ND		0.000712	0.000202	ND		0.000671	0.00019
Beta-BHC	319-85-7	0.021	0.18	0.09	ND		0.00174	0.000661	ND		0.00188	0.000713	ND		0.00167	0.000635	ND		0.00171	0.000648	ND		0.00161	0.000611
Chlordane	57-74-9	NS	NS	NS	ND		0.0145	0.00577	ND		0.0157	0.00623	ND		0.014	0.00555	ND		0.0142	0.00566	ND		0.0134	0.00533
cis-Chlordane	5103-71-9	0.014	0.65	4.5	ND		0.00218	0.000607	ND		0.00235	0.000655	ND		0.00209	0.000583	ND		0.00214	0.000595	ND		0.00201	0.000561
Delta-BHC	319-86-8	0.04	100	0.1	ND		0.00174	0.000341	ND		0.00188	0.000368	ND		0.00167	0.000328	ND		0.00171	0.000334	ND		0.00161	0.000315
Dieldrin	60-57-1	0.005	0.075	0.1	ND		0.00109	0.000545	ND		0.00118	0.000588	ND		0.00105	0.000523	ND		0.00107	0.000534	ND		0.00101	0.000503
Endosulfan I	959-98-8	4.3	35	65	ND		0.00174	0.000412	ND		0.00188	0.000444	ND		0.00167	0.000396	ND		0.00171	0.000404	ND		0.00161	0.00038
Endosulfan II	33213-65-9	4.3	35	44	ND		0.00174	0.000582	ND		0.00188	0.000628	ND		0.00167	0.00056	ND		0.00171	0.000571	ND		0.00161	0.000538
Endosulfan sulfate	1031-07-8	4.3	35	47	ND		0.000726	0.000346	ND		0.000783	0.000373	ND		0.000698	0.000332	ND		0.000712	0.000339	ND		0.000671	0.000319
Endrin	72-20-8	0.014	5.3	0.06	ND		0.000726	0.000298	ND		0.000783	0.000321	ND		0.000698	0.000286	ND		0.000712	0.000292	ND		0.000671	0.000275
Endrin aldehyde	7421-93-4	NS	NS	NS	ND		0.00218	0.000762	ND		0.00235	0.000823	ND		0.00209	0.000733	ND		0.00214	0.000747	ND		0.00201	0.000704
Endrin ketone	53494-70-5	NS	NS	NS	ND		0.00174	0.000449	ND		0.00188	0.000484	ND		0.00167	0.000431	ND		0.00171	0.00044	ND		0.00161	0.000415
Heptachlor	76-44-8	0.013	0.53	0.38	ND		0.000871	0.000391	ND		0.00094	0.000421	ND		0.000837	0.000375	ND		0.000854	0.000383	ND		0.000805	0.000361
Heptachlor epoxide	1024-57-3	NS	NS	NS	ND		0.00327	0.00098	ND		0.00352	0.00106	ND		0.00314	0.000942	ND		0.0032	0.000961	ND		0.00302	0.000906
Lindane	58-89-9	0.025	0.21	0.05	ND		0.000726	0.000325	ND		0.000783	0.00035	ND		0.000698	0.000312	ND		0.000712	0.000318	ND		0.000671	0.0003
Methoxychlor	72-43-5	NS	NS	NS	ND		0.00327	0.00102	ND		0.00352	0.0011	ND		0.00314	0.000977	ND		0.0032	0.000997	ND		0.00302	0.000939
Toxaphene	8001-35-2	NS	NS	NS	ND		0.0327	0.00915	ND		0.0352	0.00987	ND		0.0314	0.00879	ND		0.032	0.00897	ND		0.0302	0.00846
trans-Chlordane	5103-74-2	NS	NS	NS	ND		0.00218	0.000575	ND		0.00235	0.00062	ND		0.00209	0.000553	ND		0.00214	0.000564	ND		0.00201	0.000531
PCBs (mg/kg)		NS	NS	NS																				
Aroclor 1016	12674-11-2	NS	NS	NS	ND		0.0368	0.00327	ND		0.0394	0.0035	ND		0.0518	0.0046	ND		0.0536	0.00476	ND		0.0499	0.00443
Aroclor 1221	11104-28-2	NS	NS	NS	ND		0.0368	0.00369	ND		0.0394	0.00395	ND		0.0518	0.00519	ND		0.0536	0.00538	ND		0.0499	0.005
Aroclor 1232	11141-16-5	NS	NS	NS	ND		0.0368	0.0078	ND		0.0394	0.00836	ND		0.0518	0.011	ND		0.0536	0.0114	ND		0.0499	0.0106
Aroclor 1242	53469-21-9	NS	NS	NS	ND		0.0368	0.00496	ND		0.0394	0.00532	ND		0.0518	0.00698	ND		0.0536	0.00723	ND		0.0499	0.00672
Aroclor 1248	12672-29-6	NS	NS	NS	ND		0.0368	0.00552	ND		0.0394	0.00592	ND		0.0518	0.00777	ND		0.0536	0.00805	ND		0.0499	0.00748
Aroclor 1254	11097-69-1	NS	NS	NS	ND		0.0368	0.00402	ND		0.0394	0.00432	ND		0.0518	0.00567	ND		0.0536	0.00587	ND		0.0499	0.00546
Aroclor 1260	11096-82-5	NS	NS	NS	0.0151	JP	0.0368	0.0068	ND		0.0394	0.00729	ND		0.0518	0.00957	ND		0.0536	0.00991	ND		0.0499	0.00922
Aroclor 1262	37324-23-5	NS	NS	NS	ND		0.0368	0.00467	ND		0.0394	0.00501	ND		0.0518	0.00658	ND		0.0536	0.00681	ND		0.0499	0.00634
Aroclor 1268	11100-14-4	NS	NS	NS	0.00458	J	0.0368	0.00381	ND		0.0394	0.00409	ND		0.0518	0.00537	ND		0.0536	0.00556	ND		0.0499	0.00517
PCBs, Total	1336-36-3	0.1	1	3.2	0.0197	J	0.0368	0.00327	ND		0.0394	0.0035	ND		0.0518	0.0046	ND		0.0536	0.00476	ND		0.0499	0.00443
Metals (mg/kg)		NS	NS	NS																				
Aluminum, Total	7429-90-5	NS	NS	NS	5780		8.6	2.32	9290		9.14	2.47	8150		8.36	2.26	8890		8.62	2.33	7450		7.97	2.15
Antimony, Total	7440-36-0	NS	NS	NS	1.03	J	4.3	0.327	1.48	J	4.57	0.347	ND		4.18	0.318	ND		4.31	0.327	ND		3.99	0.303
Arsenic, Total	7440-38-2	13	16	16	4.5		0.86	0.179	7		0.914	0.19	1.28		0.836	0.174	1.6		0.862	0.179	1.67		0.797	0.166
Barium, Total	7440-39-3	410	410	820	105		0.86	0.15	509		0.914	0.159	62.7		0.836	0.145	68.4		0.862	0.15	40.8		0.797	0.139
Beryllium, Total	7440-41-7	4.4	43	47	0.276	J	0.43	0.028	0.436	J	0.457	0.03	0.27	J	0.418	0.028	0.241	J	0.431	0.028	0.225	J	0.399	0.026
Cadmium, Total	7440-43-9	2.5	2.5	7.5	0.26	J	0.86	0.084	0.653	J	0.914	0.09	ND		0.836	0.082	0.087	J	0.862	0.084	0.098	J	0.797	0.078
Calcium, Total	7440-70-2	NS	NS	NS	20100		8.6	3.01	14100		9.14	3.2	1010		8.36	2.92	820		8.62	3.02	3300		7.97	2.79
Chromium, Total	7440-47-3	30	110	NS	10.3		0.86	0.083	31.1		0.914	0.088	16.7		0.836	0.08	18.3		0.862	0.083	35.4		0.797	0.077
Cobalt, Total	7440-48-4	NS	NS	NS	3.56		1.72	0.143	6.04		1.83	0.152	4.46		1.67	0.139	4.43		1.72	0.143	7.6		1.59	0.132
Copper, Total	7440-50-8	50	280	1720	22.7		0.86	0.222	84.3		0.914	0.236	14.4		0.836	0.216	12.4		0.862	0.222	28.7		0.797	0.206
Iron, Total	7439-89-6	NS	NS	NS	10200		4.3	0.776	17900		4.57	0.825	13200		4.18	0.754	14000		4.31	0.778	13000		3.99	0.72
Lead, Total	7439-92-1	63	400	450	131		4.3	0.23	626		4.57	0.245	3.66	J	4.18	0.224	3.69	J	4.31	0.231	20.6		3.99	0.214
Magnesium, Total	7439-95-4	NS	NS	NS	2860		8.6	1.32	4070		9.14	1.41	1990		8.36	1.29	2460		8.62	1.33	3520		7.97	1.23
Manganese, Total	7439-96-5	1600	2000	2000	184		0.86	0.137	419		0.914	0.145	384		0.836	0.133	232		0.862	0.137	174		0.797	0.127
Mercury, Total	7439-97-6	0.18	0.3	0.73	0.187		0.076	0.049	7.86		0.756	0.493	ND		0.078	0.051	ND		0.072	0.047	ND		0.075	0.049
Nickel, Total	7440-02-0	30	320	130	7.99		2.15	0.208	13.7		2.28	0.221	13.6		2.09	0.202	12		2.15	0.208	52.1		1.99	0.193
Potassium, Total	7440-09-7	NS	NS	NS	792		215	12.4	2190		228	13.2	2150		209	12	3030		215	12.4	1200		199	11.5
Selenium, Total	7782-49-2	3.9	110	4	0.3	J	1.72	0.222	ND		1.83	0.236	ND		1.67	0.216	ND		1.72	0.222	0.417	J	1.59	0.206
Silver, Total	7440-22-4	2	110	8.3	ND		0.43	0.243	ND		0.457	0.259	ND		0.418	0.236	ND		0.431	0.244	ND		0.399	0.226
Sodium, Total	7440-23-5	NS	NS	NS	195		172	2.71	474		183	2.88	113	J	167	2.63	189		172	2.71	133	J	159	2.51
Thallium, Total	7440-28-0	NS	NS	NS	ND		1.72	0.271	0.428	J	1.83	0.288	1.85		1.67	0.263	1.08	J	1.72	0.271	0.619	J	1.59	0.251
Vanadium, Total	7440-62-2	NS	NS	NS	14.7		0.86	0.174	25.2		0.914	0.186	19.5		0.836	0.17	18.5		0.862	0.175	18.5		0.797	0.162
Zinc, Total	7440-66-6	109	6600	2480	87.7		4.3	0.252	443		4.57	0.268	20		4.18	0.245	25.5		4.31	0.252	20		3.99	0.234
General Chemistry		NS	NS	NS																				
Cyanide, Total	57-12-5	2.3	13	40	ND		1.1	0.23	0.4	J	1.1	0.24	ND		1	0.21	ND		1	0.22	ND		1	0.21
Solids, Total	NONE	NS	NS	NS	87.1		0.1	NA	83.7		0.1	NA	91.5		0.1	NA	89.7		0.1	NA	95.1		0.1	NA

Notes

USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

RSCO: New York NYCRR Part 375 Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

PGWSCO: New York NYCRR Part 375 Protection of Groundwater Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

Exceedance of USCO
Exceedance of RSCO
Exceedance of RRSCO
Exceedance of PGWSCO

J = Estimated
ND = Not Detected
- = Not Tested

Table 2.4 - Summary of Groundwater Analytical Results
466 Main Street, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:			TW-1				TW-201				TW-301				TW-302			
LAB ID:			L2242491-01				L2305142-16				L2361842-03				L2362230-02			
COLLECTION DATE:			8/6/2022				1/28/2023				10/18/2023				10/19/2023			
ANALYTE	CAS	NY-AWQS	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
VOCs (ug/l)																		
1,1,1,2-Tetrachloroethane	630-20-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,1,1-Trichloroethane	71-55-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,1,2,2-Tetrachloroethane	79-34-5	5	ND		0.5	0.17	ND		0.5	0.17	ND		0.5	0.17	ND		1.2	0.42
1,1,2-Trichloroethane	79-00-5	1	ND		1.5	0.5	ND		1.5	0.5	ND		1.5	0.5	ND		3.8	1.2
1,1-Dichloroethane	75-34-3	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,1-Dichloroethene	75-35-4	5	ND		0.5	0.17	ND		0.5	0.17	ND		0.5	0.17	ND		1.2	0.42
1,1-Dichloropropene	563-58-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,2,3-Trichlorobenzene	87-61-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,2,3-Trichloropropane	96-18-4	0.04	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,2,4,5-Tetramethylbenzene	95-93-2	5	ND		2	0.54	ND		2	0.54	ND		2	0.54	ND		5	1.4
1,2,4-Trichlorobenzene	120-82-1	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,2,4-Trimethylbenzene	95-63-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	11		6.2	1.8
1,2-Dibromo-3-chloropropane	96-12-8	0.04	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,2-Dibromoethane	106-93-4	0.0006	ND		2	0.65	ND		2	0.65	ND		2	0.65	ND		5	1.6
1,2-Dichlorobenzene	95-50-1	3	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,2-Dichloroethane	107-06-2	0.6	ND		0.5	0.13	ND		0.5	0.13	ND		0.5	0.13	ND		1.2	0.33
1,2-Dichloroethene, Total	540-59-0		ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,2-Dichloropropane	78-87-5	1	ND		1	0.14	ND		1	0.14	ND		1	0.14	ND		2.5	0.34
1,3,5-Trimethylbenzene	108-67-8	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	2.4	J	6.2	1.8
1,3-Dichlorobenzene	541-73-1	3	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,3-Dichloropropane	142-28-9	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,3-Dichloropropene, Total	542-75-6		ND		0.5	0.14	ND		0.5	0.14	ND		0.5	0.14	ND		1.2	0.36
1,4-Dichlorobenzene	106-46-7	3	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
1,4-Dioxane	123-91-1	0.35	ND		250	61	ND		250	61	ND		250	61	ND		620	150
2,2-Dichloropropane	594-20-7	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
2-Butanone	78-93-3	50	ND		5	1.9	ND		5	1.9	2.8	J	5	1.9	61		12	4.8
2-Hexanone	591-78-6	50	ND		5	1	ND		5	1	ND		5	1	13		12	2.5
4-Methyl-2-pentanone	108-10-1		ND		5	1	ND		5	1	ND		5	1	ND		12	2.5
Acetone	67-64-1	50	ND		5	1.5	3.9	J	5	1.5	18		5	1.5	280		12	3.6
Acrylonitrile	107-13-1	5	ND		5	1.5	ND		5	1.5	ND		5	1.5	ND		12	3.8
Benzene	71-43-2	1	ND		0.5	0.16	ND		0.5	0.16	ND		0.5	0.16	180		1.2	0.4
Bromobenzene	108-86-1	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Bromochloromethane	74-97-5	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Bromodichloromethane	75-27-4	50	ND		0.5	0.19	ND		0.5	0.19	ND		0.5	0.19	ND		1.2	0.48
Bromoform	75-25-2	50	ND		2	0.65	ND		2	0.65	ND		2	0.65	ND		5	1.6
Bromomethane	74-83-9	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Carbon disulfide	75-15-0	60	ND		5	1	ND		5	1	ND		5	1	ND		12	2.5
Carbon tetrachloride	56-23-5	5	ND		0.5	0.13	ND		0.5	0.13	ND		0.5	0.13	ND		1.2	0.34
Chlorobenzene	108-90-7	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Chloroethane	75-00-3	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Chloroform	67-66-3	7	ND		2.5	0.7	ND		2.5	0.7	6		2.5	0.7	ND		6.2	1.8
Chloromethane	74-87-3		ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
cis-1,2-Dichloroethene	156-59-2	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
cis-1,3-Dichloropropene	10061-01-5	0.4	ND		0.5	0.14	ND		0.5	0.14	ND		0.5	0.14	ND		1.2	0.36
Dibromochloromethane	124-48-1	50	ND		0.5	0.15	ND		0.5	0.15	ND		0.5	0.15	ND		1.2	0.37
Dibromomethane	74-95-3	5	ND		5	1	ND		5	1	ND		5	1	ND		12	2.5
Dichlorodifluoromethane	75-71-8	5	ND		5	1	ND		5	1	ND		5	1	ND		12	2.5
Ethyl ether	60-29-7		ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Ethylbenzene	100-41-4	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	26		6.2	1.8
Hexachlorobutadiene	87-68-3	0.5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Isopropylbenzene	98-82-8	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Methyl tert butyl ether	1634-04-4	10	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Methylene chloride	75-09-2	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
n-Butylbenzene	104-51-8	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
n-Propylbenzene	103-65-1	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	4.1	J	6.2	1.8
Naphthalene	91-20-3	10	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	20		6.2	1.8
o-Chlorotoluene	95-49-8	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
o-Xylene	95-47-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	34		6.2	1.8
p-Chlorotoluene	106-43-4	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
p-Diethylbenzene	105-05-5		ND		2	0.7	ND		2	0.7	ND		2	0.7	ND		5	1.8
p-Ethyltoluene	622-96-8		ND		2	0.7	ND		2	0.7	ND		2	0.7	13		5	1.8
p-Isopropyltoluene	99-87-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
p/m-Xylene	179601-23-1	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	54		6.2	1.8
sec-Butylbenzene	135-98-8	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Styrene	100-42-5	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	3.4	J	6.2	1.8
tert-Butylbenzene	98-06-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Tetrachloroethene	127-18-4	5	ND		0.5	0.18	ND		0.5	0.18	ND		0.5	0.18	ND		1.2	0.45
Toluene	108-88-3	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	190		6.2	1.8
trans-1,2-Dichloroethene	156-60-5	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
trans-1,3-Dichloropropene	10061-02-6	0.4	ND		0.5	0.16	ND		0.5	0.16	ND		0.5	0.16	ND		1.2	0.41
trans-1,4-Dichloro-2-butene	110-57-6	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Trichloroethene	79-01-6	5	ND		0.5	0.18	ND		0.5	0.18	ND		0.5	0.18	ND		1.2	0.44
Trichlorofluoromethane	75-69-4	5	ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	ND		6.2	1.8
Vinyl acetate	108-05-4		ND		5	1	ND		5	1	ND		5	1	ND		12	2.5
Vinyl chloride	75-01-4	2	ND		1	0.07	ND		1	0.07	ND		1	0.07	ND		2.5	0.18
Xylenes, Total	1330-20-7		ND		2.5	0.7	ND		2.5	0.7	ND		2.5	0.7	88		6.2	1.8
Total VOCs			-	-	-	-	3.9	-	-	-	26.8	-	-	-	891.9	-	-	-
1,4-Dioxane (ug/l)																		
1,4-Dioxane	123-91-1	0.35	-		-	-	-		-	-	-		-	-	-		-	-
PFAS (ug/l)																		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9		-		-	-	-		-	-	ND		0.64	0.132	ND		0.64	0.132
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4		ND		0.00185	0.00112	ND		0.0122	0.00476	ND		0.64	0.249	ND		0.64	0.249
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	757124-72-4		-		-	-	-		-	-	ND		0.64	0.167	ND		0.64	0.167
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2		ND		0.00185	0.00123	ND		0.0122	0.00413	ND		0.64	0.216	ND		0.64	0.216
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3		-		-	-	-		-	-	ND		4	0.936	ND		4	0.936
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4		-		-	-	-		-	-	ND		4	0.631	ND		4	0.631
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5		-		-	-	-		-	-	ND		0.8	0.264	ND		0.8	0.264
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	919005-14-4		-		-	-	-		-	-	ND		0.64	0.101	ND		0.64	0.101
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1		-		-	-	-		-	-	ND		0.64	0.132	ND		0.64	0.132
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6		-		-	-	-		-	-	ND		0.64	0.0896	ND		0.64	0.0896
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	4151-50-2		-		-	-	-		-	-	ND		0.16	0.0736	ND		0.16	0.0736
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	1691-99-2		-		-	-	-		-	-	ND		1.6	0.196	ND		1.6	0.196
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6		ND		0.00185	0.000745	ND		0.00306	0.00165	ND		0.16	0.0864	ND		0.16	0.0864
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	31506-32-8		-		-	-	-		-	-	ND		0.16	0.0696	ND		0.16	0.0696
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	24448-09-7		-		-	-	-		-	-	ND		1.6	0.376	ND		1.6	0.376
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9		ND		0.00185	0.0006	ND		0.00306	0.00167	ND		0.16	0.0872	ND		0.16	0.0872
Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA)	151772-58-6		-		-	-	-		-	-	ND		0.32	0.189	ND		0.32	0.189
Perfluoro(2-Ethoxyethane)Sulfonic Acid (PFEESA)	113507-82-7		-		-	-	-		-	-	ND		0.32	0.0352	ND		0.32	0.0352
Perfluoro-3-Methoxypropanoic Acid (PFMPA)	377-73-1		-		-	-	-		-	-	ND		0.32	0.0456	ND		0.32	0.0456
Perfluoro-4-Methoxybutanoic Acid (PFMBA)	863090-89-5		-		-	-	-		-	-	ND		0.32	0.0424	ND		0.32	0.0424
Perfluorobutanesulfonic Acid (PFBS)	375-73-5		0.0251		0.00185	0.00022	0.00582		0.00306	0.00102	ND		0.16	0.0536	ND		0.16	0.0536
Perfluorobutanoic Acid (PFBA)	375-22-4		0.0305		0.00185	0.000378	0.0257		0.0122	0.00196	ND		0.64	0.102	ND		0.64	0.102
Perfluorodecanesulfonic Acid (PFDS)	335-77-3		ND		0.00185	0.000908	ND		0.00306	0.000704	ND		0.16	0.0368	ND		0.16	0.0368
Perfluorodecanoic Acid (PFDA)	335-76-2		ND		0.00185	0.000282	ND		0.00306	0.00124	ND		0.16	0.0648	ND		0.16	0.0648
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5		-		-	-	-		-	-	ND		0.16	0.0608	ND		0.16	0.0608
Perfluorododecanoic Acid (PFDoA)	307-55-1		ND		0.00185	0.000345	ND		0.00306	0.00141	ND		0.16	0.0736	ND		0.16	0.0736
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8		ND		0.00185	0.000638	ND		0.00306	0.000827	ND		0.16	0.0432	ND		0.16	0.0432
Perfluoroheptanoic Acid (PFHpA)	375-85-9		0.0193		0.00185	0.000209	0.0138		0.00306	0.000612	ND		0.16	0.032	ND		0.16	0.032
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4		0.00836		0.00185	0.000348	0.0023	J	0.00306	0.000735	ND		0.16	0.0384	ND		0.16	0.0384
Perfluorohexanoic Acid (PFHxA)	307-24-4		0.0243		0.00185	0.000304	0.0164		0.00306	0.000903	ND		0.16	0.0472	ND		0.16	0.0472
Perfluorononanesulfonic Acid (PFNS)	68259-12-1		-		-	-	-		-	-	ND		0.16	0.0496	ND		0.16	0.0496
Perfluorononanoic Acid (PFNA)	375-95-1		0.000741	JF	0.00185	0.000289	ND		0.00306	0.000964	ND		0.16	0.0504	ND		0.16	0.0504
Perfluorooctanesulfonamide (PFOSA)	754-91-6		ND		0.00185	0.000538	ND		0.00306	0.000827	ND		0.16	0.0432	ND		0.16	0.0432
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.0027	0.0106		0.00185	0.000467	0.0213		0.00306	0.00139	ND		0.16	0.0728	ND		0.16	0.0728
Perfluorooctanoic Acid (PFOA)	335-67-1	0.0067	0.0665		0.00185	0.000219	0.0396		0.00306	0.00133	ND		0.16	0.0696	ND		0.16	0.0696
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4		-		-	-	-		-	-	ND		0.16	0.028	ND		0.16	0.028
Perfluoropentanoic Acid (PFPeA)	2706-90-3		0.0208		0.00185	0.000367	0.022		0.00612	0.00164	ND		0.32	0.0856	ND		0.32	0.0856

Table 2.4 - Summary of Groundwater Analytical Results
466 Main Street, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:			TW-1				TW-201				TW-301				TW-302			
LAB ID:			L2242491-01				L2305142-16				L2361842-03				L2362230-02			
COLLECTION DATE:			8/6/2022				1/28/2023				10/18/2023				10/19/2023			
ANALYTE	CAS	NY-AWQS	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7		ND		0.00185	0.00023	ND		0.00306	0.000811	ND		0.16	0.0424	ND		0.16	0.0424
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8		ND		0.00185	0.000303	ND		0.00306	0.00115	ND		0.16	0.06	ND		0.16	0.06
Perfluoroundecanoic Acid (PFUnA)	2058-94-8		ND		0.00185	0.000241	ND		0.00306	0.00133	ND		0.16	0.0696	ND		0.16	0.0696
PFOA/PFOS, Total			0.0771		0.00185	0.000219	0.0609		0.00306	0.00133	-		-	-	-		-	-
SVOCs (ug/l)																		
1,2,4,5-Tetrachlorobenzene	95-94-3	5	ND		10	0.44	ND		10	0.44	ND		13	0.56	ND		10	0.44
1,2,4-Trichlorobenzene	120-82-1	5	ND		5	0.5	ND		5	0.5	ND		6.4	0.64	ND		5	0.5
1,2-Dichlorobenzene	95-50-1	3	ND		2	0.45	ND		2	0.45	ND		2.6	0.58	ND		2	0.45
1,3-Dichlorobenzene	541-73-1	3	ND		2	0.4	ND		2	0.4	ND		2.6	0.52	ND		2	0.4
1,4-Dichlorobenzene	106-46-7	3	ND		2	0.43	ND		2	0.43	ND		2.6	0.55	ND		2	0.43
2,4,5-Trichlorophenol	95-95-4		ND		5	0.77	ND		5	0.77	ND		6.4	0.99	ND		5	0.77
2,4,6-Trichlorophenol	88-06-2		ND		5	0.61	ND		5	0.61	ND		6.4	0.78	ND		5	0.61
2,4-Dichlorophenol	120-83-2	1	ND		5	0.41	ND		5	0.41	ND		6.4	0.52	ND		5	0.41
2,4-Dimethylphenol	105-67-9	50	ND		5	1.8	ND		5	1.8	ND		6.4	2.3	ND		5	1.8
2,4-Dinitrophenol	51-28-5	10	ND		20	6.6	ND		20	6.6	ND		26	8.5	ND		20	6.6
2,4-Dinitrotoluene	121-14-2	5	ND		5	1.2	ND		5	1.2	ND		6.4	1.5	ND		5	1.2
2,6-Dinitrotoluene	606-20-2	5	ND		5	0.93	ND		5	0.93	ND		6.4	1.2	ND		5	0.93
2-Chlorophenol	95-57-8		ND		2	0.48	ND		2	0.48	ND		2.6	0.61	ND		2	0.48
2-Methylphenol	95-48-7		ND		5	0.49	ND		5	0.49	ND		6.4	0.63	2.7	J	5	0.49
2-Nitroaniline	88-74-4	5	ND		5	0.5	ND		5	0.5	ND		6.4	0.64	ND		5	0.5
2-Nitrophenol	88-75-5		ND		10	0.85	ND		10	0.85	ND		13	1.1	ND		10	0.85
3,3'-Dichlorobenzidine	91-94-1	5	ND		5	1.6	ND		5	1.6	ND		6.4	2.1	ND		5	1.6
3-Methylphenol/4-Methylphenol	108-39-4/106-44-5		ND		5	0.48	ND		5	0.48	ND		6.4	0.61	2.7	J	5	0.48
3-Nitroaniline	99-09-2	5	ND		5	0.81	ND		5	0.81	ND		6.4	1	ND		5	0.81
4,6-Dinitro-o-cresol	534-52-1		ND		10	1.8	ND		10	1.8	ND		13	2.3	ND		10	1.8
4-Bromophenyl phenyl ether	101-55-3		ND		2	0.38	ND		2	0.38	ND		2.6	0.48	ND		2	0.38
4-Chloroaniline	106-47-8	5	ND		5	1.1	ND		5	1.1	ND		6.4	1.4	ND		5	1.1
4-Chlorophenyl phenyl ether	7005-72-3		ND		2	0.49	ND		2	0.49	ND		2.6	0.62	ND		2	0.49
4-Nitroaniline	100-01-6	5	ND		5	0.8	ND		5	0.8	ND		6.4	1	ND		5	0.8
4-Nitrophenol	100-02-7		ND		10	0.67	ND		10	0.67	ND		13	0.86	ND		10	0.67
Acetophenone	98-86-2		ND		5	0.53	ND		5	0.53	ND		6.4	0.67	6.1		5	0.53
Benzoic Acid	65-85-0		14	J	50	2.6	ND		50	2.6	ND		64	3.4	15	J	50	2.6
Benzyl Alcohol	100-51-6		ND		2	0.59	ND		2	0.59	ND		2.6	0.75	1.1	J	2	0.59
Biphenyl	92-52-4		ND		2	0.46	ND		2	0.46	ND		2.6	0.59	0.52	J	2	0.46
Bis(2-chloroethoxy)methane	111-91-1	5	ND		5	0.5	ND		5	0.5	ND		6.4	0.64	ND		5	0.5
Bis(2-chloroethyl)ether	111-44-4	1	ND		2	0.5	ND		2	0.5	ND		2.6	0.65	ND		2	0.5
Bis(2-chloroisopropyl)ether	108-60-1	5	ND		2	0.53	ND		2	0.53	ND		2.6	0.67	ND		2	0.53
Bis(2-ethylhexyl)phthalate	117-81-7	5	ND		3	1.5	ND		3	1.5	17		3.8	2	ND		3	1.5
Butyl benzyl phthalate	85-68-7	50	ND		5	1.2	ND		5	1.2	ND		6.4	1.5	ND		5	1.2
Carbazole	86-74-8		ND		2	0.49	ND		2	0.49	ND		2.6	0.63	ND		2	0.49
Di-n-butylphthalate	84-74-2	50	ND		5	0.39	ND		5	0.39	ND		6.4	0.5	ND		5	0.39
Di-n-octylphthalate	117-84-0	50	ND		5	1.3	ND		5	1.3	ND		6.4	1.6	ND		5	1.3
Dibenzofuran	132-64-9		ND		2	0.5	ND		2	0.5	ND		2.6	0.64	ND		2	0.5
Diethyl phthalate	84-66-2	50	ND		5	0.38	ND		5	0.38	ND		6.4	0.49	ND		5	0.38
Dimethyl phthalate	131-11-3	50	ND		5	1.8	ND		5	1.8	ND		6.4	2.3	ND		5	1.8
Hexachlorocyclopentadiene	77-47-4	5	ND		20	0.69	ND		20	0.69	ND		26	0.88	ND		20	0.69
Isophorone	78-59-1	50	ND		5	1.2	ND		5	1.2	ND		6.4	1.5	ND		5	1.2
n-Nitrosodi-n-propylamine	621-64-7		ND		5	0.64	ND		5	0.64	ND		6.4	0.82	ND		5	0.64
NDPA/DPA	86-30-6	50	ND		2	0.42	ND		2	0.42	ND		2.6	0.53	ND		2	0.42
Nitrobenzene	98-95-3	0.4	ND		2	0.77	ND		2	0.77	ND		2.6	0.99	ND		2	0.77
p-Chloro-m-cresol	59-50-7		ND		2	0.35	ND		2	0.35	ND		2.6	0.45	ND		2	0.35
Phenol	108-95-2	1	ND		5	0.57	ND		5	0.57	ND		6.4	0.72	6.6		5	0.57
Total SVOCs			14	-	-	-	-	-	-	-	17	-	-	-	34.72	-	-	-
SVOCs - SIM (ug/l)																		
2-Chloronaphthalene	91-58-7	10	ND		0.2	0.02	ND		0.2	0.02	ND		0.26	0.02	ND		0.2	0.02
2-Methylnaphthalene	91-57-6		ND		0.1	0.02	ND		0.1	0.02	ND		0.13	0.03	3		0.1	0.02
Acenaphthene	83-32-9	20	ND		0.1	0.01	ND		0.1	0.01	ND		0.13	0.02	0.14		0.1	0.01
Acenaphthylene	208-96-8		ND		0.1	0.01	ND		0.1	0.01	ND		0.13	0.02	0.05	J	0.1	0.01
Anthracene	120-12-7	50	ND		0.1	0.01	ND		0.1	0.01	ND		0.13	0.02	0.03	J	0.1	0.01
Benzo(a)anthracene	56-55-3	0.002	0.03	J	0.1	0.02	ND		0.1	0.02	0.1	J	0.13	0.03	ND		0.1	0.02
Benzo(a)pyrene	50-32-8	0	ND		0.1	0.02	ND		0.1	0.02	ND		0.13	0.02	ND		0.1	0.02
Benzo(b)fluoranthene	205-99-2	0.002	ND		0.1	0.01	ND		0.1	0.01	0.03	J	0.13	0.02	ND		0.1	0.01
Benzo(ghi)perylene	191-24-2		ND		0.1	0.01	ND		0.1	0.01	ND		0.13	0.02	ND		0.1	0.01
Benzo(k)fluoranthene	207-08-9	0.002	ND		0.1	0.01	ND		0.1	0.01	0.02	J	0.13	0.01	ND		0.1	0.01
Chrysene	218-01-9	0.002	0.01	J	0.1	0.01	ND		0.1	0.01	0.02	J	0.13	0.02	ND		0.1	0.01
Dibenzo(a,h)anthracene	53-70-3		ND		0.1	0.01	ND		0.1	0.01	ND		0.13	0.02	ND		0.1	0.01
Fluoranthene	206-44-0	50	0.02	J	0.1	0.02	ND		0.1	0.02	0.05	J	0.13	0.03	0.03	J	0.1	0.02
Fluorene	86-73-7	50	ND		0.1	0.01	ND		0.1	0.01	ND		0.13	0.02	0.08	J	0.1	0.01
Hexachlorobenzene	118-74-1	0.04	ND		0.8	0.01	ND		0.8	0.01	ND		1	0.01	ND		0.8	0.01
Hexachlorobutadiene	87-68-3	0.5	ND		0.5	0.05	ND		0.5	0.05	ND		0.64	0.06	ND		0.5	0.05
Hexachloroethane	67-72-1	5	ND		0.8	0.06	ND		0.8	0.06	ND		1	0.08	ND		0.8	0.06
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	ND		0.1	0.01	ND		0.1	0.01	ND		0.13	0.02	ND		0.1	0.01
Naphthalene	91-20-3	10	ND		0.1	0.05	ND		0.1	0.05	0.15		0.13	0.06	11		0.1	0.05
Pentachlorophenol	87-86-5	1	ND		0.8	0.01	ND		0.8	0.01	ND		1	0.02	ND		0.8	0.01
Phenanthrene	85-01-8	50	0.02	J	0.1	0.02	ND		0.1	0.02	0.05	J	0.13	0.03	0.25		0.1	0.02
Pyrene	129-00-0	50	ND		0.1	0.02	ND		0.1	0.02	0.06	J	0.13	0.02	0.03	J	0.1	0.02
Total SVOCs			0.08	-	-	-	-	-	-	-	0.48	-	-	-	14.61	-	-	-
Pesticides (ug/l)																		
4,4'-DDD	72-54-8	0.3	ND		0.029	0.003	ND		0.029	0.003	ND		0.038	0.004	ND		0.029	0.003
4,4'-DDE	72-55-9	0.2	ND		0.029	0.003	ND		0.029	0.003	ND		0.038	0.004	ND		0.029	0.003
4,4'-DDT	50-29-3	0.2	ND		0.029	0.003	ND		0.029	0.003	ND		0.038	0.004	ND		0.029	0.003
Aldrin	309-00-2	0	ND		0.014	0.002	ND		0.014	0.002	ND		0.019	0.002	ND		0.014	0.002
Alpha-BHC	319-84-6	0.01	ND		0.014	0.003	ND		0.014	0.003	ND		0.019	0.004	ND		0.014	0.003
Beta-BHC	319-85-7	0.04	ND		0.014	0.004	ND		0.014	0.004	ND		0.019	0.005	ND		0.014	0.004
Chlordane	57-74-9	0.05	ND		0.143	0.033	ND		0.143	0.033	ND		0.189	0.044	ND		0.143	0.033
cis-Chlordane	5103-71-9		ND		0.014	0.005	ND		0.014	0.005	ND		0.019	0.006	ND		0.014	0.005
Delta-BHC	319-86-8	0.04	ND		0.014	0.003	ND		0.014	0.003	ND		0.019	0.004	ND		0.014	0.003
Dieldrin	60-57-1	0.004	ND		0.029	0.003	ND		0.029	0.003	ND		0.038	0.004	ND		0.029	0.003
Endosulfan I	959-98-8		ND		0.014	0.002	ND		0.014	0.002	ND		0.019	0.003	ND		0.014	0.002
Endosulfan II	33213-65-9		ND		0.029	0.004	ND		0.029	0.004	ND		0.038	0.005	ND		0.029	0.004
Endosulfan sulfate	1031-07-8		ND		0.029	0.003	ND		0.029	0.003	ND		0.038	0.005	ND		0.029	0.003
Endrin	72-20-8	0	ND		0.029	0.003	ND		0.029	0.003	ND		0.038	0.004	ND		0.029	0.003
Endrin aldehyde	7421-93-4	5	ND		0.029	0.006	ND		0.029	0.006	ND		0.038	0.008	ND		0.029	0.006
Endrin ketone	53494-70-5	5	ND		0.029	0.003	ND		0.029	0.003	ND		0.038	0.005	ND		0.029	0.003
Heptachlor	76-44-8	0.04	ND		0.014	0.002	ND		0.014	0.002	ND		0.019	0.003	ND		0.014	0.002
Heptachlor epoxide	1024-57-3	0.03	ND		0.014	0.003	ND		0.014	0.003	ND		0.019	0.004	ND		0.014	0.003
Lindane	58-89-9	0.05	ND		0.014	0.003	ND		0.014	0.003	ND		0.019	0.004	ND		0.014	0.003
Methoxychlor	72-43-5	35	ND		0.143	0.005	ND		0.143	0.005	ND		0.189	0.006	ND		0.143	0.005
Toxaphene	8001-35-2	0.06	ND		0.143	0.045	ND		0.143	0.045	ND		0.189	0.059	ND		0.143	0.045
trans-Chlordane	5103-74-2		ND		0.014	0.004	ND		0.014	0.004	ND		0.019	0.006	ND		0.014	0.004
PCBs (ug/l)																		
Aroclor 1016	12674-11-2	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1221	11104-28-2	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1232	11141-16-5	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1242	53469-21-9	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1248	12672-29-6	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1254	11097-69-1	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1260	11096-82-5	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1262	37324-23-5	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Aroclor 1268	11100-14-4	0.09	ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
PCBs, Total	1336-36-3		ND		0.071	0.061	ND		0.071	0.061	ND		0.357	0.305	ND		0.071	0.061
Metals (ug/l)																		
Aluminum, Total	7429-90-5		14100		10	3.27	125000		10	3.27	99000		10	3.27	91300		20	6.54
Antimony, Total	7440-36-0	3	1.21	J	4	0.42	ND		4	0.42	ND		4	0.42	ND		8	0.85
Arsenic, Total	7440-38-2	25	1.08		0.5	0.16	25.71		0.5	0.16	6.5		0.5	0.16	6.36		1	0.33
Barium, Total	7440-39-3	1000	237.8		0.5	0.17	7864		1	0.17	3221		0.5	0.17	3929		1	0.34
Beryllium, Total	7440-41-7	3	0.44	J	0.5	0.1	9.4		0.5	0.1	6.1		0.5	0.1	5.46		1	0.21
Cadmium, Total	7440-43-9	5	0.11	J	0.2	0.05	8.42		0.2	0.05	4.88		0.2	0.05	2.66		0.4	0.11

Table 2.4 - Summary of Groundwater Analytical Results
466 Main Street, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:			TW-1				TW-201				TW-301				TW-302			
LAB ID:			L2242491-01				L2305142-16				L2361842-03				L2362230-02			
COLLECTION DATE:			8/6/2022				1/28/2023				10/18/2023				10/19/2023			
ANALYTE	CAS	NY-AWQS	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL	Conc	Q	RL	MDL
Calcium, Total	7440-70-2		202000		100	39.4	261000		100	39.4	263000		100	39.4	309000		200	78.8
Chromium, Total	7440-47-3	50	37.19		1	0.17	807.6		1	0.17	700.8		1	0.17	617		2	0.35
Cobalt, Total	7440-48-4		18.82		0.5	0.16	420		0.5	0.16	447.3		0.5	0.16	360.6		5	1.63
Copper, Total	7440-50-8	200	31.54		1	0.38	625.5		1	0.38	2864		1	0.38	414.2		2	0.76
Iron, Total	7439-89-6	300	28700		50	19.1	222000		50	19.1	226000		50	19.1	223000		100	38.2
Lead, Total	7439-92-1	25	7.14		1	0.34	1350		1	0.34	282.2		1	0.34	149.9		2	0.68
Magnesium, Total	7439-95-4	35000	102000		70	24.2	144000		70	24.2	75100		70	24.2	125000		140	48.4
Manganese, Total	7439-96-5	300	947.5		1	0.44	94000		100	44	40800		10	4.4	26730		10	4.4
Mercury, Total	7439-97-6	0.7	ND		0.2	0.09	0.47		0.2	0.09	0.3		0.2	0.09	ND		1	0.45
Nickel, Total	7440-02-0	100	37.84		2	0.55	1208		2	0.55	1273		2	0.55	1025		4	1.11
Potassium, Total	7440-09-7		14200		100	30.9	48400		100	30.9	63000		100	30.9	50700		200	61.8
Selenium, Total	7782-49-2	10	14.6		5	1.73	119		5	1.73	36.4		5	1.73	136		10	3.46
Silver, Total	7440-22-4	50	0.23	J	0.4	0.16	0.4		0.4	0.16	2010		40	16.3	0.59	J	0.8	0.32
Sodium, Total	7440-23-5	20000	314000		100	29.3	64800		100	29.3	170000		100	29.3	182000		200	58.6
Thallium, Total	7440-28-0	0.5	0.49	J	1	0.14	3.61		2	0.14	1.72		1	0.14	2.5		2	0.28
Vanadium, Total	7440-62-2		40.32		5	1.57	136.5		5	1.57	311.4		5	1.57	385.1		50	15.7
Zinc, Total	7440-66-6	2000	54.9		10	3.41	623.2		10	3.41	727.2		10	3.41	476.1		20	6.82
General Chemistry																		
Cyanide, Total	57-12-5	200	ND		5	1	ND		5	1	3	J	5	1	3	J	5	1

Notes
NY-AWQS: New York TOGS 111 Ambient Water Quality Standards & Guidance Values Criteria per Standards & Guidance Values including all addenda through February 2023.
Exceedance of NY-AWQS
J = Estimated
ND = Not Detected
- = Not Tested

Table 2.6 - Summary of Soil Vapor Analytical Results
466 Main Street, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:														SV-1			SV-2			AA-1		
LAB ID:														L2242461-01			L2242461-02			L2242461-03		
COLLECTION DATE:														8/6/2022			8/6/2022			8/6/2022		
SAMPLE MATRIX:														SOIL_VAPOR			SOIL_VAPOR			AIR		
ANALYTE	CAS	NY-IAC-A	NY-SSC-A	NY-IAC-B	NY-SSC-B	NY-IAC-C	NY-SSC-C	NY-IAC-D	NY-SSC-D	NY-IAC-E	NY-SSC-E	NY-IAC-F	NY-SSC-F	Conc Q	RL	MDL	Conc Q	RL	MDL	Conc Q	RL	MDL
VOCs (ug/m3)																						
1,1,1-Trichloroethane	71-55-6			3	100									ND	3.89	-	ND	1.09	-	ND	1.09	-
1,1,2,2-Tetrachloroethane	79-34-5													ND	4.9	-	ND	1.37	-	ND	1.37	-
1,1,2-Trichloroethane	79-00-5													ND	3.89	-	ND	1.09	-	ND	1.09	-
1,1-Dichloroethane	75-34-3													ND	2.89	-	ND	0.809	-	ND	0.809	-
1,1-Dichloroethene	75-35-4	0.2	6											ND	2.83	-	ND	0.793	-	ND	0.793	-
1,2,4-Trichlorobenzene	120-82-1													ND	5.29	-	ND	1.48	-	ND	1.48	-
1,2,4-Trimethylbenzene	95-63-6							2	60					ND	3.51	-	7.82	0.983	-	ND	0.983	-
1,2-Dibromoethane	106-93-4													ND	5.48	-	ND	1.54	-	ND	1.54	-
1,2-Dichlorobenzene	95-50-1													ND	4.29	-	ND	1.2	-	ND	1.2	-
1,2-Dichloroethane	107-06-2													ND	2.89	-	ND	0.809	-	ND	0.809	-
1,2-Dichloropropane	78-87-5													ND	3.3	-	ND	0.924	-	ND	0.924	-
1,3,5-Trimethylbenzene	108-67-8							2	60					ND	3.51	-	8.6	0.983	-	ND	0.983	-
1,3-Butadiene	106-99-0													88.5	1.58	-	15.9	0.442	-	ND	0.442	-
1,3-Dichlorobenzene	541-73-1													ND	4.29	-	ND	1.2	-	ND	1.2	-
1,4-Dichlorobenzene	106-46-7													ND	4.29	-	ND	1.2	-	ND	1.2	-
1,4-Dioxane	123-91-1													ND	2.57	-	ND	0.721	-	ND	0.721	-
2,2,4-Trimethylpentane	540-84-1							2	60					ND	3.33	-	ND	0.934	-	ND	0.934	-
2-Butanone	78-93-3													74	5.25	-	101	1.47	-	ND	1.47	-
2-Hexanone	591-78-6													32.5	2.92	-	35	0.82	-	ND	0.82	-
3-Chloropropene	107-05-1													ND	2.23	-	ND	0.626	-	ND	0.626	-
4-Ethyltoluene	622-96-8													ND	3.51	-	3.52	0.983	-	ND	0.983	-
4-Methyl-2-pentanone	108-10-1													27	7.29	-	24.9	2.05	-	ND	2.05	-
Acetone	67-64-1													297	8.48	-	432	2.38	-	13.5	2.38	-
Benzene	71-43-2							2	60					18.4	2.28	-	23.7	0.639	-	ND	0.639	-
Benzyl chloride	100-44-7													ND	3.69	-	ND	1.04	-	ND	1.04	-
Bromodichloromethane	75-27-4													ND	4.78	-	ND	1.34	-	ND	1.34	-
Bromoform	75-25-2													ND	7.37	-	ND	2.07	-	ND	2.07	-
Bromomethane	74-83-9													ND	2.77	-	ND	0.777	-	ND	0.777	-
Carbon disulfide	75-15-0													81.9	2.22	-	51.4	0.623	-	ND	0.623	-
Carbon tetrachloride	56-23-5	0.2	6											ND	4.49	-	ND	1.26	-	ND	1.26	-
Chlorobenzene	108-90-7													ND	3.28	-	ND	0.921	-	ND	0.921	-
Chloroethane	75-00-3													ND	1.88	-	3.64	0.528	-	ND	0.528	-
Chloroform	67-66-3													ND	3.48	-	ND	0.977	-	ND	0.977	-
Chloromethane	74-87-3													2.93	1.47	-	8.78	0.413	-	1.44	0.413	-
cis-1,2-Dichloroethene	156-59-2	0.2	6											ND	2.83	-	ND	0.793	-	ND	0.793	-
cis-1,3-Dichloropropene	10061-01-5													ND	3.24	-	ND	0.908	-	ND	0.908	-
Cyclohexane	110-82-7							2	60					5.23	2.45	-	13.7	0.688	-	ND	0.688	-
Dibromochloromethane	124-48-1													ND	6.07	-	ND	1.7	-	ND	1.7	-
Dichlorodifluoromethane	75-71-8													ND	3.53	-	2.76	0.989	-	2.46	0.989	-
Ethanol	64-17-5													ND	33.5	-	35	9.42	-	17.8	9.42	-
Ethyl Acetate	141-78-6													12.9	6.41	-	4.97	1.8	-	ND	1.8	-
Ethylbenzene	100-41-4							2	60					ND	3.1	-	7.12	0.869	-	ND	0.869	-
Freon-113	76-13-1													ND	5.46	-	ND	1.53	-	ND	1.53	-
Freon-114	76-14-2													ND	4.98	-	ND	1.4	-	ND	1.4	-
Heptane	142-82-5									6	200			22.3	2.92	-	14.8	0.82	-	ND	0.82	-
Hexachlorobutadiene	87-68-3													ND	7.61	-	ND	2.13	-	ND	2.13	-
Isopropanol	67-63-0													10.8	4.38	-	15.4	1.23	-	8.11	1.23	-
Methyl tert butyl ether	1634-04-4													ND	2.57	-	ND	0.721	-	ND	0.721	-
Methylene chloride	75-09-2			3	100									24.8	6.18	-	ND	1.74	-	ND	1.74	-
n-Hexane	110-54-3									6	200			38.1	2.51	-	20.2	0.705	-	ND	0.705	-
o-Xylene	95-47-6							2	60					ND	3.1	-	9.43	0.869	-	ND	0.869	-
p/m-Xylene	179601-23-1									6	200			7.3	6.21	-	22.4	1.74	-	ND	1.74	-
Styrene	100-42-5													ND	3.04	-	0.988	0.852	-	ND	0.852	-
Tertiary butyl Alcohol	75-65-0													55.8	5.4	-	63.4	1.52	-	ND	1.52	-
Tetrachloroethene	127-18-4			3	100									ND	4.83	-	7.26	1.36	-	ND	1.36	-
Tetrahydrofuran	109-99-9													9.73	5.25	-	5.93	1.47	-	ND	1.47	-
Toluene	108-88-3											10	300	24.8	2.69	-	21.2	0.754	-	3.92	0.754	-
trans-1,2-Dichloroethene	156-60-5													3.32	2.83	-	ND	0.793	-	ND	0.793	-
trans-1,3-Dichloropropene	10061-02-6													ND	3.24	-	ND	0.908	-	ND	0.908	-
Trichloroethene	79-01-6	0.2	6											ND	3.83	-	ND	1.07	-	ND	1.07	-
Trichlorofluoromethane	75-69-4													ND	4.01	-	2.47	1.12	-	1.36	1.12	-
Vinyl bromide	593-60-2													ND	3.12	-	ND	0.874	-	ND	0.874	-
Vinyl chloride	75-01-4					0.2	6							ND	1.82	-	0.657	0.511	-	ND	0.511	-

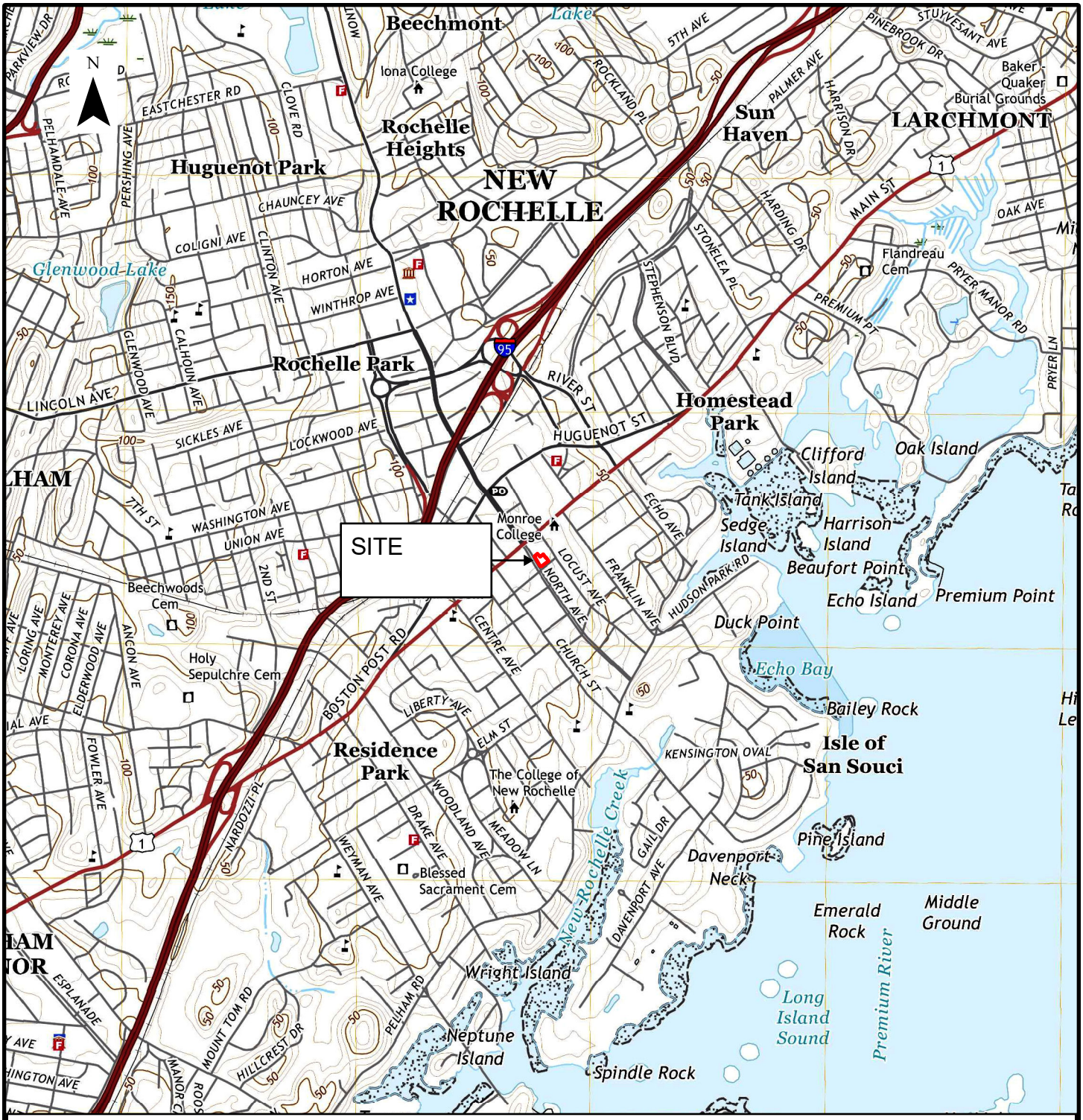
Notes
ug/m^3: Micrograms per cubic meter
Bold: Elevated Concentration
Action Required by NYSDOH Decision Matrix
NY-IAC-A: New York DOH Matrix A Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
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NY-SSC-D: New York DOH Matrix D Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-E: New York DOH Matrix E Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-F: New York DOH Matrix F Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.

Table 2.6 - Summary of Soil Vapor Analytical Results
466 Main Street, New Rochelle, NY; Block 215, Lot 29

SAMPLE ID:														SV-201			SV-202		
LAB ID:														L2304933-01			L2304933-02		
COLLECTION DATE:														1/28/2023			1/28/2023		
SAMPLE MATRIX:														SOIL_VAPOR			SOIL_VAPOR		
ANALYTE	CAS	NY-IAC-A	NY-SSC-A	NY-IAC-B	NY-SSC-B	NY-IAC-C	NY-SSC-C	NY-IAC-D	NY-SSC-D	NY-IAC-E	NY-SSC-E	NY-IAC-F	NY-SSC-F	Conc Q	RL	MDL	Conc Q	RL	MDL
VOCs (ug/m3)																			
1,1,1-Trichloroethane	71-55-6			3	100									ND	1.09	-	ND	2.6	-
1,1,2,2-Tetrachloroethane	79-34-5													ND	1.37	-	ND	3.27	-
1,1,2-Trichloroethane	79-00-5													ND	1.09	-	ND	2.6	-
1,1-Dichloroethane	75-34-3													ND	0.809	-	ND	1.93	-
1,1-Dichloroethene	75-35-4	0.2	6											ND	0.793	-	ND	1.89	-
1,2,4-Trichlorobenzene	120-82-1													ND	1.48	-	ND	3.53	-
1,2,4-Trimethylbenzene	95-63-6							2	60					2.37	0.983	-	2.82	2.34	-
1,2-Dibromoethane	106-93-4													ND	1.54	-	ND	3.66	-
1,2-Dichlorobenzene	95-50-1													ND	1.2	-	ND	2.86	-
1,2-Dichloroethane	107-06-2													ND	0.809	-	ND	1.93	-
1,2-Dichloropropane	78-87-5													ND	0.924	-	ND	2.2	-
1,3,5-Trimethylbenzene	108-67-8							2	60					ND	0.983	-	ND	2.34	-
1,3-Butadiene	106-99-0													3.94	0.442	-	ND	1.05	-
1,3-Dichlorobenzene	541-73-1													ND	1.2	-	ND	2.86	-
1,4-Dichlorobenzene	106-46-7													ND	1.2	-	ND	2.86	-
1,4-Dioxane	123-91-1													ND	0.721	-	ND	1.72	-
2,2,4-Trimethylpentane	540-84-1							2	60					ND	0.934	-	ND	2.22	-
2-Butanone	78-93-3													24.1	1.47	-	56.9	3.51	-
2-Hexanone	591-78-6													ND	0.82	-	ND	1.95	-
3-Chloropropene	107-05-1													ND	0.626	-	ND	1.49	-
4-Ethyltoluene	622-96-8													ND	0.983	-	ND	2.34	-
4-Methyl-2-pentanone	108-10-1													ND	2.05	-	ND	4.88	-
Acetone	67-64-1													35.2	2.38	-	52	5.65	-
Benzene	71-43-2							2	60					4.73	0.639	-	ND	1.52	-
Benzyl chloride	100-44-7													ND	1.04	-	ND	2.46	-
Bromodichloromethane	75-27-4													ND	1.34	-	ND	3.19	-
Bromoform	75-25-2													ND	2.07	-	ND	4.92	-
Bromomethane	74-83-9													ND	0.777	-	ND	1.85	-
Carbon disulfide	75-15-0													2.58	0.623	-	ND	1.48	-
Carbon tetrachloride	56-23-5	0.2	6											ND	1.26	-	ND	2.99	-
Chlorobenzene	108-90-7													ND	0.921	-	ND	2.19	-
Chloroethane	75-00-3													ND	0.528	-	ND	1.26	-
Chloroform	67-66-3													1.91	0.977	-	ND	2.32	-
Chloromethane	74-87-3													ND	0.413	-	ND	0.983	-
cis-1,2-Dichloroethene	156-59-2	0.2	6											ND	0.793	-	ND	1.89	-
cis-1,3-Dichloropropene	10061-01-5													ND	0.908	-	ND	2.16	-
Cyclohexane	110-82-7							2	60					2.08	0.688	-	1.65	1.64	-
Dibromochloromethane	124-48-1													ND	1.7	-	ND	4.06	-
Dichlorodifluoromethane	75-71-8													2.07	0.989	-	ND	2.35	-
Ethanol	64-17-5													34.7	9.42	-	92.7	22.4	-
Ethyl Acetate	141-78-6													5.08	1.8	-	17.8	4.29	-
Ethylbenzene	100-41-4							2	60					**176**	0.869	-	**405**	2.07	-
Freon-113	76-13-1													ND	1.53	-	ND	3.65	-
Freon-114	76-14-2													ND	1.4	-	ND	3.33	-
Heptane	142-82-5									6	200			37.4	0.82	-	8.97	1.95	-
Hexachlorobutadiene	87-68-3													ND	2.13	-	ND	5.08	-
Isopropanol	67-63-0													3.44	1.23	-	8.53	2.93	-
Methyl tert butyl ether	1634-04-4													ND	0.721	-	ND	1.72	-
Methylene chloride	75-09-2			3	100									ND	1.74	-	ND	4.13	-
n-Hexane	110-54-3									6	200			123	0.705	-	7.12	1.68	-
o-Xylene	95-47-6							2	60					**151**	0.869	-	**337**	2.07	-
p/m-Xylene	179601-23-1									6	200			**547**	1.74	-	**1240**	4.14	-
Styrene	100-42-5													ND	0.852	-	ND	2.03	-
Tertiary butyl Alcohol	75-65-0													2.66	1.52	-	ND	3.61	-
Tetrachloroethene	127-18-4			3	100									6.98	1.36	-	8.07	3.23	-
Tetrahydrofuran	109-99-9													ND	1.47	-	ND	3.51	-
Toluene	108-88-3											10	300	56.2	0.754	-	65.6	1.79	-
trans-1,2-Dichloroethene	156-60-5													ND	0.793	-	ND	1.89	-
trans-1,3-Dichloropropene	10061-02-6													ND	0.908	-	ND	2.16	-
Trichloroethene	79-01-6	0.2	6											ND	1.07	-	ND	2.56	-
Trichlorofluoromethane	75-69-4													ND	1.12	-	ND	2.67	-
Vinyl bromide	593-60-2													ND	0.874	-	ND	2.08	-
Vinyl chloride	75-01-4					0.2	6							ND	0.511	-	ND	1.22	-

Notes
ug/m^3: Micrograms per cubic meter
Bold: Elevated Concentration
Action Required by NYSDOH Decision Matrix
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NY-SSC-F: New York DOH Matrix F Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.

Figures



REFERENCE:

UNITED STATES GEOLOGICAL SURVEY (USGS)
MOUNT VERNON, NY USGS QUADRANGLE - 2019

LEGEND:

SITE LOCATION

SCALE: 1" = 2,000'

0 1,000 2,000 4,000 FEET

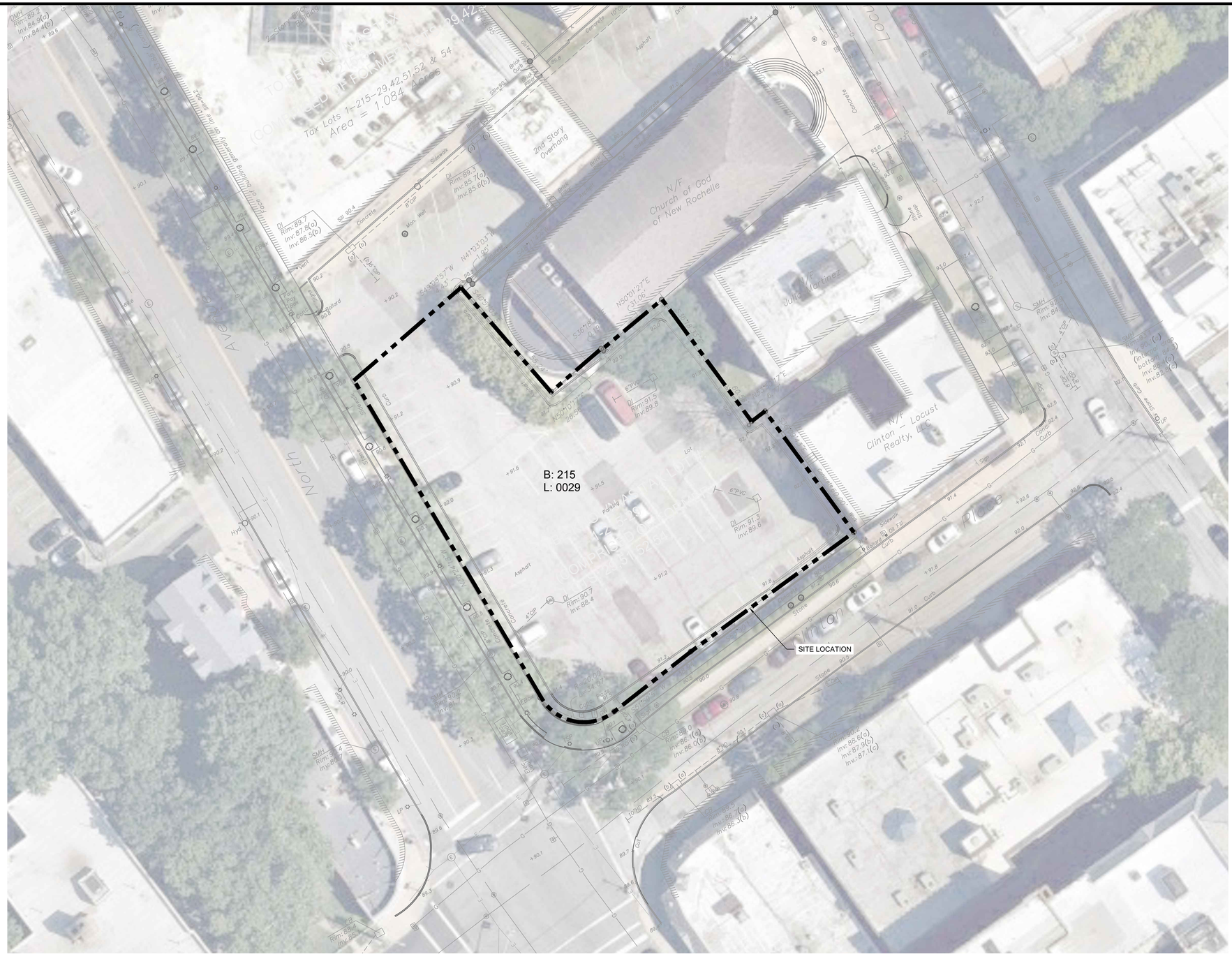
177 NORTH AVENUE
PROPOSED BLOCK 215, LOT 29
NEW ROCHELLE, NY

SITE LOCATION MAP

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

FIG-1.1
DRAWN BY: KBV
CHECKED BY: CM
SCALE: AS NOTED
DATE: 10/9/2025
JOB NO: 12587

Y:\GIS\Project_Numbers\12587\APRX_PROJECT\APRX_Phase1_Prj_No.aprx, 10/9/2025 11:26 AM, Kim Vanderklein, LAYOUT: FIG-1.2



LEGEND:

- SITE BOUNDARY

REFERENCE:

1. AERIAL PHOTOGRAPHY TAKEN FROM 2022 MICROSOFT/BING CORP. 2022 MAXAR, CNES (2022) DISTRIBUTION AIRBUS DS AERIAL IMAGING.

Scale: 1"= 20'

0 10 20 40 60 80

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SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

dwg by: KBV
chk by: CM
scale: AS NOTED
date: 10/09/2025

rev	date	description	by

177 NORTH AVENUE
BLOCK 215, LOT 29 (PORTION)
PHASE II ENVIRONMENTAL SITE ASSESSMENT
NEW ROCHELLE, NEW YORK

title: SITE PLAN

job no. 12587
drawing no. FIG-2.1

1 of 1

N:\CAD\12587\CAD\ENVIRONMENTAL\PHASE II\SOUTH SECTION\12587-SWCPH # SITE ASSESSMENT.DWG 10/09/25 12:18:36PM, kim.vanderlaan, LAYOUT: SITE PLAN



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REFERENCE:

NEW YORK STATE, MICROSOFT, VANTOR, NYS OFFICE OF INFORMATION TECHNOLOGYSERVICES - GIS PROGRAM OFFICE, NYS DEPT OF TAXATION AND FINANCE'S OFFICE OF REAL PROPERTY TAX SERVICES

LEGEND:

- SUBJECT PROPERTY LOCATION
- TAX PARCELS

SCALE: 1" = 30'

0 15 30 60 FEET

dwg by: KBV
chk by: CM
scale: AS NOTED
date: 7/22/2026

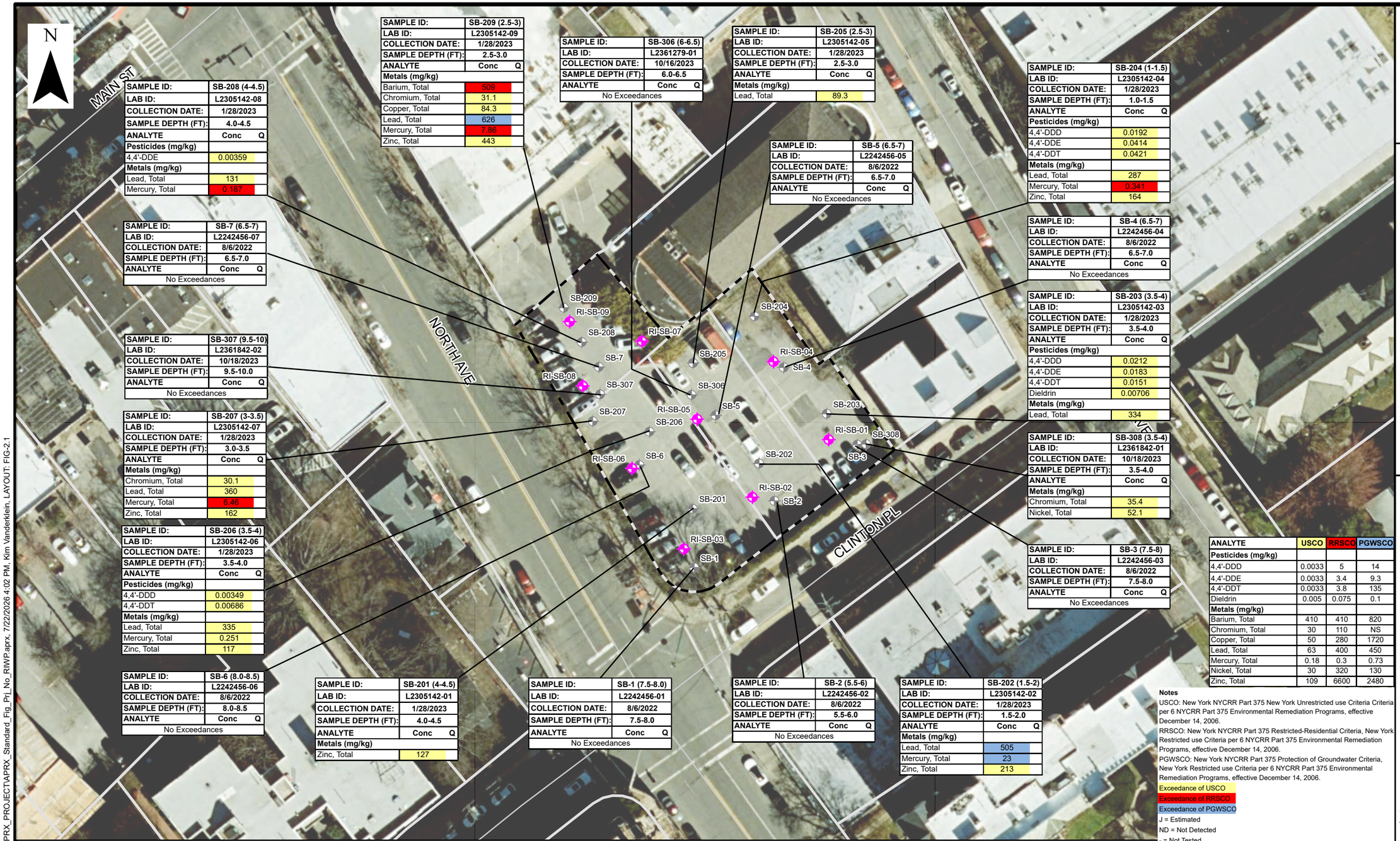
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GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

project: 177 NORTH AVENUE
PROPOSED BLOCK 215, LOT 29
NEW ROCHELLE, NY

title: **REC LOCATION PLAN**

job no.: 12587A
drawing no: FIG-10.1

Y:\GIS\Project_Numbers\12587\APRX_PROJECT\APRX_Phase1_Prj_No.aprx, 7/22/2026 2:25 PM, Kim VanderKlein, LAYOUT: FIG-10.1



SAMPLE ID:	SB-208 (4-4.5)
LAB ID:	L2305142-08
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	4.0-4.5
ANALYTE	Conc Q
Pesticides (mg/kg)	
4,4'-DDE	0.00359
Metals (mg/kg)	
Lead, Total	131
Mercury, Total	0.187

SAMPLE ID:	SB-7 (6.5-7)
LAB ID:	L2242456-07
COLLECTION DATE:	8/6/2022
SAMPLE DEPTH (FT):	6.5-7.0
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-307 (9.5-10)
LAB ID:	L2361842-02
COLLECTION DATE:	10/18/2023
SAMPLE DEPTH (FT):	9.5-10.0
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-207 (3-3.5)
LAB ID:	L2305142-07
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	3.0-3.5
ANALYTE	Conc Q
Metals (mg/kg)	
Chromium, Total	30.1
Lead, Total	360
Mercury, Total	6.46
Zinc, Total	162

SAMPLE ID:	SB-206 (3.5-4)
LAB ID:	L2305142-06
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	3.5-4.0
ANALYTE	Conc Q
Pesticides (mg/kg)	
4,4'-DDD	0.00349
4,4'-DDT	0.00686
Metals (mg/kg)	
Lead, Total	335
Mercury, Total	0.251
Zinc, Total	117

SAMPLE ID:	SB-6 (8.0-8.5)
LAB ID:	L2242456-06
COLLECTION DATE:	8/6/2022
SAMPLE DEPTH (FT):	8.0-8.5
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-209 (2.5-3)
LAB ID:	L2305142-09
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	2.5-3.0
ANALYTE	Conc Q
Metals (mg/kg)	
Barium, Total	509
Chromium, Total	31.1
Copper, Total	84.3
Lead, Total	626
Mercury, Total	7.86
Zinc, Total	443

SAMPLE ID:	SB-306 (6-6.5)
LAB ID:	L2361279-01
COLLECTION DATE:	10/16/2023
SAMPLE DEPTH (FT):	6.0-6.5
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-205 (2.5-3)
LAB ID:	L2305142-05
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	2.5-3.0
ANALYTE	Conc Q
Metals (mg/kg)	
Lead, Total	89.3

SAMPLE ID:	SB-5 (6.5-7)
LAB ID:	L2242456-05
COLLECTION DATE:	8/6/2022
SAMPLE DEPTH (FT):	6.5-7.0
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-201 (4-4.5)
LAB ID:	L2305142-01
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	4.0-4.5
ANALYTE	Conc Q
Metals (mg/kg)	
Zinc, Total	127

SAMPLE ID:	SB-1 (7.5-8.0)
LAB ID:	L2242456-01
COLLECTION DATE:	8/6/2022
SAMPLE DEPTH (FT):	7.5-8.0
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-2 (5.5-6)
LAB ID:	L2242456-02
COLLECTION DATE:	8/6/2022
SAMPLE DEPTH (FT):	5.5-6.0
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-202 (1.5-2)
LAB ID:	L2305142-02
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	1.5-2.0
ANALYTE	Conc Q
Metals (mg/kg)	
Lead, Total	505
Mercury, Total	23
Zinc, Total	213

SAMPLE ID:	SB-204 (1-1.5)
LAB ID:	L2305142-04
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	1.0-1.5
ANALYTE	Conc Q
Pesticides (mg/kg)	
4,4'-DDD	0.0192
4,4'-DDE	0.0414
4,4'-DDT	0.0421
Metals (mg/kg)	
Lead, Total	287
Mercury, Total	0.341
Zinc, Total	164

SAMPLE ID:	SB-4 (6.5-7)
LAB ID:	L2242456-04
COLLECTION DATE:	8/6/2022
SAMPLE DEPTH (FT):	6.5-7.0
ANALYTE	Conc Q
No Exceedances	

SAMPLE ID:	SB-203 (3.5-4)
LAB ID:	L2305142-03
COLLECTION DATE:	1/28/2023
SAMPLE DEPTH (FT):	3.5-4.0
ANALYTE	Conc Q
Pesticides (mg/kg)	
4,4'-DDD	0.0212
4,4'-DDE	0.0183
4,4'-DDT	0.0151
Dieldrin	0.00706
Metals (mg/kg)	
Lead, Total	334

SAMPLE ID:	SB-308 (3.5-4)
LAB ID:	L2361842-01
COLLECTION DATE:	10/18/2023
SAMPLE DEPTH (FT):	3.5-4.0
ANALYTE	Conc Q
Metals (mg/kg)	
Chromium, Total	35.4
Nickel, Total	52.1

SAMPLE ID:	SB-3 (7.5-8)
LAB ID:	L2242456-03
COLLECTION DATE:	8/6/2022
SAMPLE DEPTH (FT):	7.5-8.0
ANALYTE	Conc Q
No Exceedances	

ANALYTE	USCO	RRSCO	PGWSCO
Pesticides (mg/kg)			
4,4'-DDD	0.0033	5	14
4,4'-DDE	0.0033	3.4	9.3
4,4'-DDT	0.0033	3.8	135
Dieldrin	0.005	0.075	0.1
Metals (mg/kg)			
Barium, Total	410	410	820
Chromium, Total	30	110	NS
Copper, Total	50	280	1720
Lead, Total	63	400	450
Mercury, Total	0.18	0.3	0.73
Nickel, Total	30	320	130
Zinc, Total	109	6600	2480

Notes

USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

PGWSCO: New York NYCRR Part 375 Protection of Groundwater Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

Exceedance of USCO

Exceedance of RRSCO

Exceedance of PGWSCO

J = Estimated

ND = Not Detected

- = Not Tested

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LEGEND:

RI-SB-01 — PROPOSED REMEDIAL INVESTIGATION SOIL BORING NO. AND APPROX. LOCATION

SB-01 — SOIL SAMPLE NO. AND APPROX. LOCATION

SITE LOCATION

NY TAX PARCELS

SCALE: 1" = 50'

0 25 50 100 FEET

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dwg by: KBV
chk by: CM
scale: AS NOTED
date: 7/22/2026

project: 177 NORTH AVENUE
BLOCK 215, LOT 29 (PORTION)
PROPOSED BLOCK 215, LOT 29
NEW ROCHELLE, NY

title: LOCATION OF PROPOSED SOIL BORINGS

job no.: 12587
drawing no: FIG-3.1

Y:\GIS\Project_Numbers\12587\APRX_PROJECT\APRX_Standard_Fig_Prj_No_RIWP.aprx, 7/22/2026 4:02 PM, Kim VanderKlein, LAYOUT: FIG-2.1



SAMPLE ID:	TW-302	
LAB ID:	L2362230-02	
COLLECTION DATE:	10/19/2023	
ANALYTE	Conc	Q
VOCs (ug/l)		
1,2,4-Trimethylbenzene	11	
2-Butanone	61	
Acetone	280	
Benzene	180	
Ethylbenzene	26	
Naphthalene	20	
o-Xylene	34	
p/m-Xylene	54	
Toluene	190	
SVOCs (ug/l)		
Phenol	6.6	
SVOCs - SIM (ug/l)		
Naphthalene	11	
Metals (ug/l)		
Barium, Total	3929	
Beryllium, Total	5.46	
Chromium, Total	617	
Copper, Total	414.2	
Iron, Total	223000	
Lead, Total	149.9	
Magnesium, Total	125000	
Manganese, Total	26730	
Nickel, Total	1025	
Selenium, Total	136	
Sodium, Total	182000	
Thallium, Total	2.5	

SAMPLE ID:	TW-201	
LAB ID:	L2305142-16	
COLLECTION DATE:	1/28/2023	
ANALYTE	Conc	Q
PFAS (ug/l)		
PFOS	0.0213	
PFOA	0.0396	
Metals (ug/l)		
Arsenic, Total	25.71	
Barium, Total	7864	
Beryllium, Total	9.4	
Cadmium, Total	8.42	
Chromium, Total	807.6	
Copper, Total	625.5	
Iron, Total	222000	
Lead, Total	1350	
Magnesium, Total	144000	
Manganese, Total	94000	
Nickel, Total	1208	
Selenium, Total	119	
Sodium, Total	64800	
Thallium, Total	3.61	

SAMPLE ID:	TW-1	
LAB ID:	L2242491-01	
COLLECTION DATE:	8/6/2022	
ANALYTE	Conc	Q
PFAS (ug/l)		
PFOS	0.0106	
PFOA	0.0665	
SVOCs - SIM (ug/l)		
Benzo(a)anthracene	0.03	J
Chrysene	0.01	J
Metals (ug/l)		
Iron, Total	28700	
Magnesium, Total	102000	
Manganese, Total	947.5	
Selenium, Total	14.6	
Sodium, Total	314000	

SAMPLE ID:	TW-301	
LAB ID:	L2361842-03	
COLLECTION DATE:	10/18/2023	
ANALYTE	Conc	Q
SVOCs (ug/l)		
Bis(2-ethylhexyl)phthalate	17	
SVOCs - SIM (ug/l)		
Benzo(a)anthracene	0.1	J
Benzo(b)fluoranthene	0.03	J
Benzo(k)fluoranthene	0.02	J
Chrysene	0.02	J
Metals (ug/l)		
Barium, Total	3221	
Beryllium, Total	6.1	
Chromium, Total	700.8	
Copper, Total	2864	
Iron, Total	226000	
Lead, Total	282.2	
Magnesium, Total	75100	
Manganese, Total	40800	
Nickel, Total	1273	
Selenium, Total	36.4	
Silver, Total	2010	
Sodium, Total	170000	
Thallium, Total	1.72	

ANALYTE	NY-AWQS
VOCs (ug/l)	
1,2,4-Trimethylbenzene	5
2-Butanone	50
Acetone	50
Benzene	1
Ethylbenzene	5
Naphthalene	10
o-Xylene	5
p/m-Xylene	5
Toluene	5
PFAS (ug/l)	
PFOS	0.0027
PFOA	0.0067
SVOCs (ug/l)	
Bis(2-ethylhexyl)phthalate	5
Phenol	1
SVOCs - SIM (ug/l)	
Benzo(a)anthracene	0.002
Benzo(b)fluoranthene	0.002
Benzo(k)fluoranthene	0.002
Chrysene	0.002
Naphthalene	10
Metals (ug/l)	
Arsenic, Total	25
Barium, Total	1000
Beryllium, Total	3
Cadmium, Total	5
Chromium, Total	50
Copper, Total	200
Iron, Total	300
Lead, Total	25
Magnesium, Total	35000
Manganese, Total	300
Nickel, Total	100
Selenium, Total	10
Silver, Total	50
Sodium, Total	20000
Thallium, Total	0.5

Notes
NY-AWQS: New York TOGS 111 Ambient Water Quality Standards & Guidance Values Criteria per Standards & Guidance Values including all addenda through February 2023.
Exceedance of NY-AWQS
J = Estimated
ND = Not Detected
- = Not Tested
PFOS = Perfluorooctanesulfonic Acid
PFOA = Perfluorooctanoic Acid

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LEGEND:
- PROPOSED REMEDIAL INVESTIGATION GROUNDWATER POINT NO. AND APPROX. LOCATION
- TEMPORARY GROUNDWATER WELL SAMPLE NO. AND LOCATION
- SITE LOCATION
- NY TAX PARCELS

SCALE: 1" = 50'
0 25 50 100 FEET

dwg by: KBV
chk by: CM
scale: AS NOTED
date: 10/9/2025

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project: 177 NORTH AVENUE
BLOCK 215, LOT 29 (PORTION)
PROPOSED BLOCK 215, LOT 29
NEW ROCHELLE, NY

title: **LOCATION OF PROPOSED GROUNDWATER MONITORING WELLS**

job no.: 12587
drawing no:
FIG-3.2

Y:\GIS\Project_Numbers\12587\APRX_PROJECT\APRX_Standard_Fig_Prj_No_RIWP.aprx, 10/9/2025 12:15 PM, Kim VanderKlein, LAYOUT: FIG-2.1



SAMPLE ID:	SV-201	
LAB ID:	L2304933-01	
COLLECTION DATE:	1/28/2023	
SAMPLE MATRIX:	SOIL_VAPOR	
ANALYTE	Conc	RL
VOCs (ug/m3)		
1,2,4-Trimethylbenzene	2.37	0.983
1,3-Butadiene	3.94	0.442
2-Butanone	24.1	1.47
Acetone	35.2	2.38
Benzene	4.73	0.639
Carbon disulfide	2.58	0.623
Chloroform	1.91	0.977
Cyclohexane	2.08	0.688
Dichlorodifluoromethane	2.07	0.989
Ethanol	34.7	9.42
Ethyl Acetate	5.08	1.8
Ethylbenzene	**176**	0.869
Heptane	37.4	0.82
Isopropanol	3.44	1.23
n-Hexane	123	0.705
o-Xylene	**151**	0.869
p/m-Xylene	**547**	1.74
Tertiary butyl Alcohol	2.66	1.52
Tetrachloroethene	6.98	1.36
Toluene	56.2	0.754

SAMPLE ID:	SV-1	
LAB ID:	L2242461-01	
COLLECTION DATE:	8/6/2022	
SAMPLE MATRIX:	SOIL_VAPOR	
ANALYTE	Conc	RL
VOCs (ug/m3)		
1,3-Butadiene	88.5	1.58
2-Butanone	74	5.25
2-Hexanone	32.5	2.92
4-Methyl-2-pentanone	27	7.29
Acetone	297	8.48
Benzene	18.4	2.28
Carbon disulfide	81.9	2.22
Chloromethane	2.93	1.47
Cyclohexane	5.23	2.45
Ethyl Acetate	12.9	6.41
Heptane	22.3	2.92
Isopropanol	10.8	4.38
Methylene chloride	24.8	6.18
n-Hexane	38.1	2.51
p/m-Xylene	7.3	6.21
Tertiary butyl Alcohol	55.8	5.4
Tetrahydrofuran	9.73	5.25
Toluene	24.8	2.69
trans-1,2-Dichloroethene	3.32	2.83

ANALYTE	NY-IAC-B	NY-SSC-B	NY-IAC-D	NY-SSC-D	NY-IAC-E	NY-SSC-E	NY-IAC-F	NY-SSC-F
VOCs (ug/m3)								
1,2,4-Trimethylbenzene			2	60				
1,3-Butadiene								
2-Butanone								
2-Hexanone								
4-Methyl-2-pentanone								
Acetone								
Benzene			2	60				
Carbon disulfide								
Chloroform								
Chloromethane								
Cyclohexane			2	60				
Dichlorodifluoromethane								
Ethanol								
Ethyl Acetate								
Ethylbenzene			2	60				
Heptane					6	200		
Isopropanol								
Methylene chloride	3	100						
n-Hexane					6	200		
o-Xylene			2	60				
p/m-Xylene					6	200		
Tertiary butyl Alcohol								
Tetrachloroethene	3	100						
Tetrahydrofuran								
Toluene							10	300
trans-1,2-Dichloroethene								

Notes
ug/m^3: Micrograms per cubic meter
Bold: Elevated Concentration
Action Required by NYSDOH Decision Matrix
NY-IAC-B: New York DOH Matrix B Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-IAC-D: New York DOH Matrix D Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-IAC-E: New York DOH Matrix E Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-IAC-F: New York DOH Matrix F Indoor Air Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-B: New York DOH Matrix B Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.
NY-SSC-D: New York DOH Matrix D Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-E: New York DOH Matrix E Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.
NY-SSC-F: New York DOH Matrix F Sub-slab Vapor Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, February, 2024.

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LEGEND:
- PROPOSED REMEDIAL INVESTIGATION SOIL VAPOR POINT NO. AND APPROX. LOCATION
- SOIL VAPOR SAMPLE NO. AND APPROX. LOCATION
- SITE LOCATION
- NY TAX PARCELS

SCALE: 1" = 50'
0 25 50 100 FEET

dwg by: KBV
chk by: CM
scale: AS NOTED
date: 10/9/2025

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959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

project: 177 NORTH AVENUE
BLOCK 215, LOT 29 (PORTION)
PROPOSED BLOCK 215, LOT 29
NEW ROCHELLE, NY

title: LOCATION OF PROPOSED SOIL VAPOR POINTS

job no.: 12587
drawing no: FIG-3.3

Y:\GIS\Project_Numbers\12587\APRX_PROJECT\APRX_Standard_Fig_Prl_No_RIWP.aprx, 10/9/2025 12:16 PM, Kim Vanderklein, LAYOUT: FIG-2.1

Appendix B:

Quality Assurance Project Plan

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Geotechnical
Environmental
Site Civil

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973.808.9050
www.sesi.org

QUALITY ASSURANCE PROJECT PLAN
For

Description
177 North Avenue
New Rochelle, Westchester County, NY

Prepared for:

177 North Avenue Owner LLC

SESI Project No:
12587A

Date:
July 2026

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LIST OF ACRONYMS

Acronym	Definition
AAS	Absorption Spectroscopy
ASP	Analytical Service Protocol
BCP	Brownfield Cleanup Program
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Accreditation Program
GC/MS	Gas Chromatography/Mass Spectrometry
HAS	Hollow-stem Auger
HDPE	High-Density Polyethylene
LDPE	Low-density Polyethylene
LFPS	Low Flow Purging Sampling
MDL	Method Detection Limit
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	Polychlorinated Biphenyls
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PPE	Personal Protective Equipment
PTFE	Polytetrafluoroethylene
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RIWP	Remedial Investigation Work Plan
SESI	SESI Consulting Engineers, Inc.
TIC	Tentatively Identified Compound
TCL	Target Compound List
VOC	Volatile Organic Compound
USEPA	United States Environmental Protection Agency

1.0 PROJECT DESCRIPTION

This document presents the quality assurance project plan (QAPP) for the Remedial Investigation Workplan (RIWP) for the proposed development of the property located at 466 Main Street, New Rochelle, Westchester County, New York (the Site). The Site consists of a 0.433-acre area parcel and is identified as proposed Block 215, Lot 42 on the Westchester County tax map. The Site is located in a residential and commercial area and is bounded by commercial development and Main Street beyond to the north, Clinton Place and mixed-use commercial beyond to the south, a church and mixed-use commercial and residential building to the east, and North Avenue and commercial and retail beyond to the west.

The Site is improved with a parking lot accessible via an entrance on North Avenue. The Site has been developed as a parking lot since at least 1940.

2.0 PROJECT ORGANIZATION

The RIWP will be conducted by Soils Engineering Services, Inc. (SESI), on behalf of 177 North Main Owner 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, PE

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.

2.1 PROJECT ENGINEER

Andrew Schweitzer, PE

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

2.3 PROJECT MANAGER

TBD

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 INVESTIGATION PROGRAM MANAGER

TBD

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

TBD

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

TBD

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, January 2005) Category B deliverables are required for all samples.

Detection limits set by NYSDEC-ASP (January 2005) 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 Alconox® detergent, 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 titrimetric 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 depend 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 will include soil, groundwater and soil vapor. Soil samples will be collected from split spoon sampling or macrocore devices retrieved from soil borings. Groundwater samples will be collected from groundwater monitoring wells using low flow purging techniques. Soil vapor samples will be collected from vapor points screened in the vadose zone using Summa Canisters.

4.1.1 DRILLING/SAMPLING PROCEDURES

Soil and groundwater samples will be collected by means of a soil boring program. Soil borings shall be completed using the hollow stem auger drilling methods, direct push methods, 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.

Soil samples will be collected from soil borings and analyzed in accordance with the NYSDEC-approved Work Plan. Monitoring wells for groundwater sample collection will be installed in select completed soil borings. Either hollow stem auger (HSA) or direct push drilling methods may be utilized for monitoring well completion.

Samples of the encountered overburden materials shall be collected continuously during drilling so that a complete soil profile is examined and described by the SESI field geologist. The sampling method employed shall be ASTM D-1586/Split Barrel Sampling using a standard 2-foot long, 2-inch outside diameter split- spoon sampler with a 140-pound hammer, in cases where HSA methods are used. Upon retrieval of the sampling barrel, the collected sample shall be placed in glass jars and labeled, stored on site (on ice in a cooler if necessary), and transmitted to the appropriate testing laboratory or storage facility. Chain-of-custody procedures will be practiced following Section 15, EPA-600/4-82-029, Handbook for Sampling and Sample Preservation of Water and Waste Waters.

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 ensure 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.

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 Draft NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (April 2023).

The groundwater samples will be analyzed for PFAS using USEPA Method 1633A. 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.

4.3 SOIL VAPOR SAMPLING

Soil vapor sampling will be conducted in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in New York State (October 2006, amended in May 2017 and February 2024). Soil vapor samples will be collected in the vadose zone from shallow (5 feet) well points. Each vapor point will be installed in a shallow boring drilled either by hand-operated equipment (e.g. hand auger or percussion hammer drill), or by a small truck-mounted drill rig. Drilling equipment used shall be based on soil conditions, and the method that provides the most practical approach.

Each vapor point will consist of an inert sampling tube (polyethylene, stainless steel, or Teflon®) with a 6-inch screened section at the bottom through which soil vapors can be sampled. The screen slot size will be 0.0075 inches. A sampling zone will be created around the screened section by backfilling with 1 to 2 feet of porous coarse sand or glass beads, and at least three feet of bentonite will be placed above the porous sampling zone to form a seal from the surface. Native clean soil will be packed around the remaining annulus to the ground surface.

Each designated soil vapor sampling location will be purged of a minimum of three volumes using a low volume pump, and then attached to a regulator, and secured with a clamp. The regulator will then be attached to a 1-liter summa canister.

The regulator will be set to collect a soil vapor sample at a flow rate of less than 0.2 liters per minute. After the summa canister is filled, the valve will be closed.

Each canister will be listed according to a specific sample I.D. on a chain of custody form. Sample canisters will be delivered to the laboratory within 24 hours and analyzed for VOCs by method TO-15. The detection limit for VOCs will be 1 $\mu g/m^3$ or less.

The soil vapor sampling effort will include the use of inert helium tracer gas to verify that the soil vapor samples are not diluted by ambient air. The atmosphere around the sampling tube will be enriched with the tracer gas, and the soil vapor sample will be collected in the presence of the enriched tracer atmosphere. This will be accomplished by placing an inverted plastic pail over the sampling point and filling the pail with the tracer gas via a small tube penetrating the site of the pail. Refer to NYSDOH Guidance for Evaluating Soil Vapor Intrusion in New York State (October 2006 amended in May 2017 and February 2024).

Weather conditions in the 48 hours prior to the test, and during the test, will be noted, including average wind speed, precipitation, temperature, and barometric pressure.

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-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-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.

7.3 PESTICIDE AND PCB COMPOUNDS

The sample preservation procedures for gas chromatography for pesticides and PCB's will be as described in the NYSDEC-ASP methods (Section D-IV). The analysis of standard mixes, blanks and spiked samples will be performed at the prescribed frequency with adherence to the 72-hour requirement described in the method.

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 July 2023 guidance on emergent contaminant sampling, the analytical procedure for soil and groundwater sampling of PFAS is Modified EPA Method 1633A. 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	Ice to 4°C	7 days (until extraction) 40 days (extracted)
Pesticides – USEPA 8081B	2	1-liter amber glass bottle	Ice to 4°C	7 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	2	1-liter amber glass bottle	Ice to 4°C	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 Ice to 4°C	14 days
Metals(2) – 6010C or D, Mercury 7470A	1	1-liter, plastic bottle	Nitric acid to pH <2 NaOH for cyanide Ice to 4°C	180 days Mercury: 28 days
Cyanide – SM 4500-CN-E	1	1-liter, plastic	Sodium Hydroxide to pH >12 Ice to 4°C	14 days
PFAS Compounds – USEPA Method 1633A	2	500 ml HDPE or Polypropylene with non-Teflon lid	Chilled to 0 - 6 °C	14 days
Soil, Sediment, Solid Waste Samples				
VOCs – USEPA 8260C or D	3	15-gram EnCore samplers	Chilled to 0 - 6°C	14 days
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270D SIM if RL cannot be reached	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction, 40 days extracted)
Pesticides – USEPA 8081B	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	none
Metals(2) – 6010C or D, Mercury 7471B	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	180 days Cyanide: 14 days Mercury: 28 days

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE(1)	HOLDING TIME
PFAS Compounds – USEPA Method 1633A	2	500 ml HDPE or Polypropylene with non-Teflon lid	Chilled to 0 - 6°C	28 days
Soil Vapor / Indoor Air Samples				
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.
    a. 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

	PFAS	Reporting Limit — Groundwater (ng/l)
41	Perfluorohexadecanoic acid (PFHxDA)[1]	~
	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

	PFAS	Reporting Limit — Soil (ng/g)
37	N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)	2.0
38	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) (9CL-PF3ONS)	0.8
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, November 2022

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.

[1] This compound was not listed in the EPA Method 1633 2nd draft and currently no known values exist

Appendix C:

Emerging Contaminant Sampling Plan

SESI
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Geotechnical
Environmental
Site Civil

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Soil and Groundwater Sampling Plan for Emerging Contaminants
For

Proposed Mixed-Use Development
177 North Avenue
New Rochelle, Westchester County, NY

Prepared for:

177 North Avenue Owner LLC

July 2026

SESI Project No:
12587A

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TABLE 2.1 PFAS COMPOUNDS LIST

LIST OF ACRONYMS

Acronym	Definition
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Accreditation Program
HDPE	High-Density Polyethylene
LDPE	Low-density Polyethylene
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
ng/L	Nanogram per liter
NYSDEC	New York State Department of Environmental Conservation
PFAS	Per and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PTFE	Polytetrafluoroethylene
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
TAL	Target Analyte List
TCL	Target Compound List
ug/kg	micrograms pers kilogram
USEPA	United States Environmental Protection Agency

1.0 PROJECT DESCRIPTION

This document presents the Soil and Groundwater Plan for Emerging Contaminants for the Remedial Investigation Work Plan for the proposed development at 177 North Avenue, New Rochelle, Westchester County, New York (the "Site"). The Site is identified as a parcel to be consolidated as Block 215, Lot 42 on the Westchester County tax map and totals approximately 0.433-acres in size. The Subject Property is improved by a parking lot accessible via an entrance on North Avenue.

The Site is located in a residential and commercial area and is bounded by commercial development and Main Street beyond to the north, Clinton Place and mixed-use commercial beyond to the south, a church and mixed-use commercial and residential building to the east, and North Avenue and commercial and retail beyond to the west. The closest notable surface water body is the Long Island Sound located approximately 0.49 miles east of the Subject Property.

2.0 SOIL SAMPLING PLAN

The sampling will be performed in accordance with the New York State Department of Environmental Conservation (NYSDEC) Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs, dated April 2023. The soil samples will be sent via chain of custody to an ELAP-certified laboratory and analyzed for TCL/TAL+30, 1,4-dioxane and the per and polyfluoroalkyl substances (PFAS) compounds listed in Table 2.1. The soil samples will be analyzed for PFAS using Draft Method 1633A. Reporting limits for each PFAS compound will not exceed 0.5 micrograms per kilogram (ug/kg). NYSDEC will be informed if detection limits on certain PFAS compounds cannot be met by the laboratory. Category B deliverables and an electronic data deliverable will be completed. A data usability summary report (DUSR) will be prepared by a data validator for all the analyses including PFAS and 1,4-dioxane. The method detection limit (MDL) for 1,4-dioxane will be no higher than 0.1 mg/kg (ppm).

Because PFAS compounds must be analyzed at concentrations in the ng/kg range, precautions must be taken to prevent cross-contamination during sampling events. Field sampling equipment that is used at multiple sites or sampling locations could become highly contaminated with PFAS. Soil sampling at this Site will involve the use of non-dedicated equipment, such as a Geoprobe direct push drill rig, which could be a source of cross-contamination. Decontamination procedures outlined in this document will be followed to avoid cross contamination and equipment will be verified as PFAS-free. Special care and consideration will be given to the field sampling equipment when stored and handled outside the Site boundaries or between different sample locations.

Items that may be directly in contact with the soil, including spoons, bowls, and direct push equipment, including any split spoon or sampling barrels, have a high likelihood of cross-contamination occurring if the proper decontamination procedures are not followed. These items should be known to be PFAS free. Items that will not directly contact the soil, including field books, Post-It® Notes, aluminum foil, recycled paper towels, binders, or spiral hard cover notebook, can be a source of PFAS contamination. Every effort will be made to ensure these items are PFAS-free.

For the sampling equipment, the following items, materials, and procedures will be used for decontamination:

- Municipal drinking water may be used for decontamination if it is known to be PFAS-free. Commercially available deionized water in a high-density polyethylene (HDPE) container may also be used for decontamination.
- Standard two step decontamination using Alconox® detergent and PFAS-free triple water rinse will be performed for the sampling equipment.
- Sampling equipment may be scrubbed with polyethylene or a polyvinyl chloride (PVC) brush to remove particulates.
- The sampling equipment components will not come in contact with material that may potentially contain PFAS such as aluminum foil, low density polyethylene (LDPE), polytetrafluoroethylene (PTFE, Teflon®) or other fluoropolymers.
- Soil sampling equipment will be decontaminated between each sampling point and at the conclusion of the workday. This is to ensure sampling equipment is decontaminated ahead of time for the next sampling event.

Equipment rinsate blanks will be collected daily for the equipment that comes in contact with the soil samples and is decontaminated and reused. If all the sampling materials are disposable, no field blanks will be collected. Field duplicates will be collected on a frequency of one (1) per 20 samples. One matrix spike and matrix spike duplicate (MS/MSD) will also be collected on a frequency of one (1) per 20 samples. A trip blank will accompany each laboratory shipment which includes analysis for volatile organic compounds.

3.0 GROUNDWATER SAMPLING PLAN

The sampling will be performed in accordance with the NYSDEC Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs, dated April 2023, the NYSDEC July 2018 letter on Groundwater Sampling for Emerging Contaminants, and the PFAS Groundwater Samples from Monitoring Well Sample Protocols Revision 1.2 August 9, 2019. The groundwater samples will be sent via chain of custody in a cooler at 4 degrees C to an ELAP-certified laboratory and analyzed for TCL/TAL+30, 1,4-dioxane and the PFAS compounds listed in Table 2.1. The groundwater samples will be analyzed for PFAS using Modified USEPA Draft Method 1633A. Reporting limits for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) will not exceed 2 nanogram per liter (ng/L). Category B deliverables and an electronic data deliverable will be completed. A DUSR will be prepared by a data validator for all the analyses including PFAS and 1,4-dioxane. The MDL for 1,4-dioxane will be no higher than 0.35 µg/l (ppb). In order to get the appropriate detection limit, the lab will run EPA Method 8270 in "selective ion monitoring" (SIM) mode for 1,4-dioxane.

PFAS are very persistent in the environment and in the human body. There is evidence that exposure to PFAS can lead to adverse human health effects. EPA established the health advisory levels for PFAS in drinking water at 4 parts per trillion. 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).

4.0 SOIL SAMPLE COLLECTION AND HANDLING

The following considerations will be observed:

- No fabric softener will be used on clothing to be worn by the sampling personnel in the field. Clothing that contains PTFE material (including GORE-TEX®) or that has been waterproofed with PFAS-containing materials will be avoided.
- Cosmetics, moisturizers, hand cream, unauthorized sunscreen, insect repellant or other related products will not be used by the sampling staff on sampling days.
- Food and drink packaging materials such as pre-wrapped food or snacks (i.e. candy bars, microwave popcorn, etc.) will not be used in the sampling and staging areas.
- Sampling will be conducted with powderless nitrile gloves. The gloves will be changed frequently any time there is an opportunity for cross-contamination during sampling, including, but not limited to:
    a. Immediately prior to sample collection
    b. Each time sampling equipment is placed in and then removed from soil at a new location
    c. Handling of any sample, including quality assurance/quality control (QA/QC) samples
    d. After the handling of any non-dedicated sampling equipment
    e. After contact with non-decontaminated surfaces
    f. After decontamination of sampling equipment
    g. When judged necessary by field personnel

- HDPE or polypropylene sample bottles with Teflon®-free caps, provided by the laboratory will be used. Sample containers will not come in contact with material that may potentially contain PFAS.
- Bottles will only be opened immediately prior to sampling.

- Dust and fibers will be kept out of sample bottles.
- The sample caps will never be placed directly on the ground during sampling. If the sampling staff must set the sample bottle cap down during sample collection and a second member of the sampling crew (wearing a fresh pair of powderless nitrile gloves) is not available, the cap will be set on a clean surface (cotton sheeting, HDPE sheeting, triple rinsed cooler lid, etc.).
- Regular size Sharpie® and thicker markers will be avoided. Fine and Ultra-Fine point Sharpie® markers may be used. Ballpoint pens may be used when labeling sample containers. If ballpoint pens do not write on the sample container labels, preprinted labels from the laboratory may be used.
- Sample bottles, coolers, sample labels and a chain of custody form will be provided by the analytical laboratory.

PFAS samples will be collected prior to collecting non-PFAS samples.

5.0 SAMPLE SHIPMENT

In the absence of a formal USEPA guidance for PFAS sample storage, the documentation in USEPA Draft Method 1633A will be used as a guide for thermal preservation and holding times for soil or other samples. Samples will be chilled during storage and shipment and will not exceed 50°F (10º C) during the first 48 hours after collection.

The following procedures will be used by SESI for sample shipment:

- Regular ice will be used to cool and maintain the samples at or below 42.8°F (6°C). Chemical or blue ice may be used if it is known to be PFAS-free and the samples can be cooled and maintained at or below 42.8°F (6°C) during collection and through transit to the laboratory.
- The coolers will be periodically checked to ensure samples are well iced and at the proper temperature. Refresh with regular ice if needed. The ice may be double bagged in LDPE resealable storage bags. LDPE may be used if an equipment blank demonstrates the LDPE is PFAS-free.
- Chain of Custody and other forms will be single bagged in LDPE (e.g. Ziploc®) storage bags and taped to the inside of the cooler lid. LDPE may be used if an equipment blank demonstrates the LDPE is PFAS-free.

- The cooler(s) will be taped closed with a custody seal and picked up by the laboratory within 24 hrs.

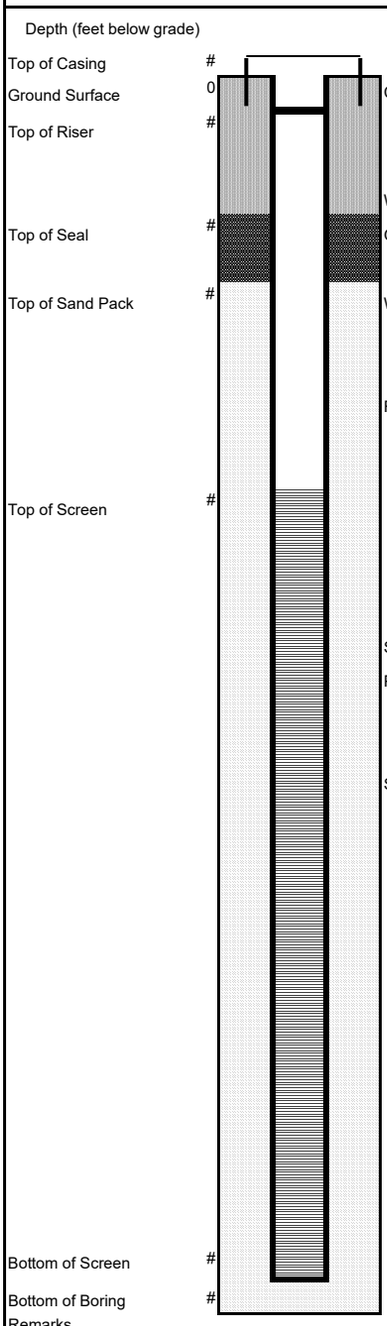
Appendix D:

Typical Boring/Well Construction Log

SESI CONSULTING ENGINEERS	PROJECT NAME:		MONITORING WELL NO.	
	PROJECT LOCATION:		JOB NO.	
			GROUND ELEVATION:	

BORING BY:	DATE STARTED		DEVELOPMENT PERIOD		INSIDE CASING DIAMETER (in)	
INSPECTOR:	DATE COMPLETED		DEVELOPMENT METHOD		BOREHOLE DIAMETER (in)	
NJ DEP PERMIT NO.:	DATE DEVELOPED		DEVELOPMENT RATE	# gpm	INITIAL WATER LEVEL (ft):	

WELL CONSTRUCTION	DEPTH (ft)	Sample	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	P.I.D.
	0								



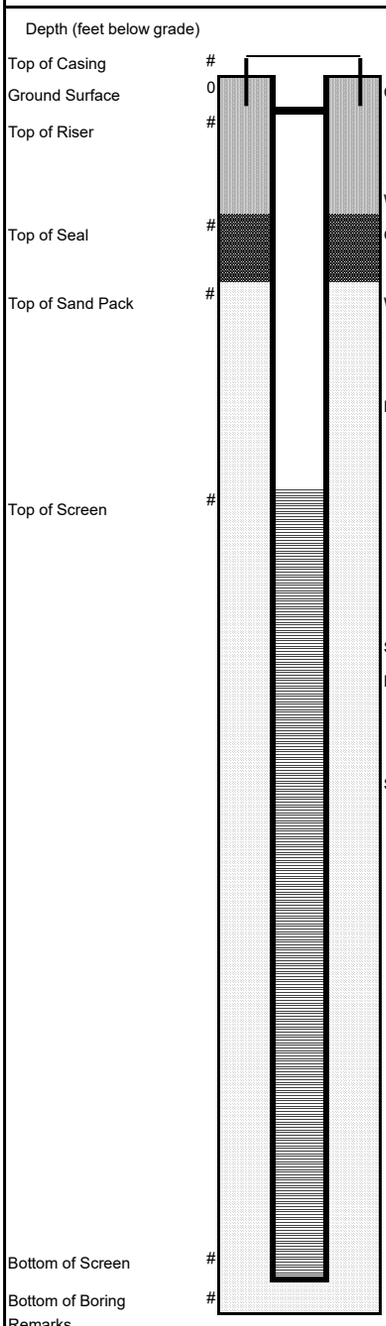
Approximate Change in Strata: _____ Inferred Change in Strata: _ _ _ _ _ _ _ _ _ _ _ _ _

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.

SESI CONSULTING ENGINEERS	PROJECT NAME:		MONITORING WELL NO.	
	PROJECT LOCATION:		JOB NO.	
			GROUND ELEVATION:	

BORING BY:	DATE STARTED		DEVELOPMENT PERIOD		INSIDE CASING DIAMETER (in)	
INSPECTOR:	DATE COMPLETED		DEVELOPMENT METHOD		BOREHOLE DIAMETER (in)	
NJ DEP PERMIT NO.:	DATE DEVELOPED		DEVELOPMENT RATE	# gpm	INITIAL WATER LEVEL (ft):	

WELL CONSTRUCTION	DEPTH (ft)	Sample	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	P.I.D.
	0								



	45								
	50								
	55								
	60								
	25								
	65								
	70								
	75								

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 E:

Health and Safety Plan (HASP)

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Environmental
Site Civil

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HEALTH AND SAFETY PLAN
For

Proposed Mixed-Use Development
177 North Avenue
New Rochelle, Westchester County, NY

Prepared for:

177 North Avenue Owner LLC
July 2026

SESI Project No:
12587A

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Disclaimer: This Health and Safety Plan (HASP) is based upon information provided, 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 Client listed above, 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

177 North Avenue Owner LLC
177 North Avenue
New Rochelle, NY
SESI Project NO.: 12587A

Prepared by:

_____

Andrew Schweitzer, PE
SESI – Senior Project Manager

Approved by:

_____

Fuad Dahan, PE
SESI - Principal

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LIST OF ACRONYMS

Acronym	Definition
ACGIH	American Conference of Governmental Industrial Hygienists
COC	Contaminants(s) of Concern
CRZ	Contamination Reduction Zone
EMS	Emergency Medical Services
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
NIOSH	National Institute for Occupational Safety and Health
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PEL	Permissible Exposure Limit
PFD	Personal Flotation Device
PID	Photoionization Detector
PM	Project Manager
PO	Project Officer
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
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
UST	Underground Storage Tank
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 include Metals and Pesticides. 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	≤ 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	≥ 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to ≤ 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 Excavation, Drilling, Soil Grouting)	Modified Level D/Level C
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 remedial action 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 health and safety plan (HASP) for the Remedial Investigation Work Plan (RIWP) for the proposed development of the property located at 177 North Avenue, New Rochelle, Westchester County, New York (the Site). The Site consists of a portion of a 0.433-acre area parcel and is identified as proposed Block 215 Lot 42 on the Westchester County tax map. The Site is located in a residential and commercial area and is bounded by commercial development and Main Street beyond to the north, Clinton Place and mixed-use commercial beyond to the south, a church and mixed-use commercial and residential building to the east, and North Avenue and commercial and retail beyond to the west.

The Site is improved with a parking lot accessible via an entrance on North Avenue. The Site has been developed since at least 1940.

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;
- Soil Borings and Monitoring Well Installation;
- Excavation of contaminated soil "hot spots";
- Earthwork and grading;
- Chemical sampling of soil and 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 surfaces, soils, groundwater, 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.

Table 1 – Key Safety Personnel

SESI Personnel		
Role	**Name**	**Address/Telephone No.**
Project Officer (PO)	Fuad Dahan, PE	Parsippany, NJ/973-747-9567
Project Manager (PM)	Andrew Schweitzer, PE	Parsippany, NJ/973-518-87510
Senior Project Engineer (SPE)	Andrew Schweitzer, PE	Parsippany, NJ/973-518-8751
Health and Safety Manager (HSM)	Justin Protasiewicz	Parsippany, NJ/973-998-1764
Site Safety Officer (SSO)	TBD	
Field Supervisor (FS)	TBD	
Field Personnel	TBD	
Subcontractors		
Company/Role	**Name**	**Address/Telephone No.**
Drilling Subcontractor - TBD	TBD	TBD
Analytical Lab - TBD	TBD	TBD

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.

Table 2 – PPE Selection Matrix

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

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 ≤ 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
Benzene	≥ 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	≤ 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	≥ 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to ≤ 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 ≤ 5 ppm	Normal operations
	> 5 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area

Parameter	Reading	Action
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
90ºF (32.2ºC) or above	After each 45 minutes of work	After each 15 minutes of work
87.5º - 90ºF (30.8º-32.2ºC)	After each 60 minutes of work	After each 30 minutes of work
82.5º - 87.5ºF (28.1º - 30.8ºC)	After each 90 minutes of work	After each 60 minutes of work
77.5º - 82.5ºF (25.3º - 28.1ºC)	After each 120 minutes of work	After each 90 minutes of work
72.5º - 77.5ºF (30.8º - 32.2ºC)	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

Estimated Wind Speed (in mph)	**Actual Temperature Reading (ºF)**											
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
	Equivalent Chill Temperature (ºF)											
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 greater than 40 mph have little additional effect.)	**LITTLE DANGER Maximum danger of false sense of security.**				**INCREASING DANGER Danger from freezing of exposed flesh within one minute.**			**GREAT DANGER Flesh may freeze within 30 seconds.**				
	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 multi-conductor 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

Existing information for Site:
__X__ Detailed _____ Preliminary _____ None

Hazardous/Contaminated Material Form(s):

__X__ Solid __X__ Liquid _____Sludge ___Gas X Vapor

Containment Type(s):
_____ Drum _____ Tank _____ Pit __X__ Debris
_____ Pond _____Lagoon Other:

Hazardous Material Characteristics:
__X__ Volatile _____ Corrosive _____ Reactive _____ Radioactive
_____ Ignitable __X__ Toxic _____ Unknown

Routes of Exposure:
__X__ Oral __X__ Dermal __X__ Eye __X__ Respiratory

9.1.2 POTENTIAL HEALTH AND SAFETY HAZARDS

__X__ Heat
__X__ Cold
_____ Confined space entry
_____ Oxygen depletion
_____ Asphyxiation
__X__ Excavation
__X__ Cave-ins
__X__ Falls, slippage
__X__ Heavy equipment
_____ Other: Potential Ignition Hazard.

_____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__ 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 excavation 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 EXCAVATION AND CUT/FILL OPERATIONS

9.2.3.1 EXCAVATION/TRENCHING

Description of Tasks

This task includes the excavation of contaminated soils and superficial debris. Excavation depths vary across the site.

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.

Controls

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 excavation work, shall be determined prior to opening an excavation. 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 excavation.

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

Cave-Ins – Project personnel in an excavation shall be protected from cave-ins by an adequate protective system, except when:

- Excavations are made entirely in stable rock or excavations are less than five feet in depth and examination of the ground by the SSO provides no indication of a potential cave-in.
- Protective systems shall have the capacity to resist, without failure, all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

Project personnel shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least two feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by the SSO for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the SSO prior to the start of work and as needed throughout operations. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when project personnel exposure can be reasonably anticipated.

Where the SSO finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed personnel shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Excavation Egress – A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are four feet or more in depth so as to require no more than 25 feet or lateral travel for project 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 contaminated soil is excavated from below the Site's surface, the material will be stockpiled, dried, and either transported offsite or relocated and backfilled on site.

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, contaminated 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. 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 excavation 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 soil boring 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 System Voltage	**Minimum Required Clearance**
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 soil samples for subsequent field and laboratory analysis. The physical hazards of soil 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. A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

9.2.6 UST CLOSURE

9.2.6.1 WORKING IN CONFINED SPACES

Description of Tasks
Working in confined spaces in not anticipated for this project.

Hazard Identification
Hazard identification such as the entrance into confined spaces will be evaluated if necessary.

Controls
All personnel required to enter into confined or enclosed spaces must be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of required protective and emergency equipment. The PO shall comply with all specific regulations that apply to work in dangerous or potentially dangerous areas.

9.2.6.2 WORKING WITH COMPRESSED AIR

Description of Tasks
The proposed method of purging the USTs includes the injection of compressed gas into the tank and attached piping network.

Hazard Identification
Uncontrolled release of the highly pressured air can cause injury to FP during this task. Cylinders must also be properly managed to ensure they are not compromised during storage and/or use.

Controls
Pressure Regulation – Compressed air used for cleaning purposes shall be reduced to less than 30 pounds per square inch and then only with effective chip guarding and personal protective equipment.

Cylinder Storage – Valve protection caps shall be in place and secured when compressed gas cylinders are transported, moved, or stored. Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved. Compressed gas cylinders shall be secured in an upright position at all times, except if necessary for short periods of time

when cylinders are actually being hoisted or carried. Cylinders shall be placed in a location where they cannot become part of an electrical circuit.

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. COCs at the site include VOCs, SVOCs, metals, PCBs, pesticides, and PFAS.

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: Soil		
Metals	**Maximum**	**Applicable**

	Concentration (mg/kg)	Monitoring Instrument
Barium	509	Not Applicable
Lead	626	Not Applicable
Mercury	23	Not Applicable
Media: Groundwater		
VOCs	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
1,2,4-Trimethylbenzene	11	PID
2-Butanone	61	PID
Acetone	280	PID
Benzene	180	PID
Ethylbenzene	26	PID
Naphthalene	20	PID
o-Xylene	34	PID
p/m-Xylene	54	PID
Toluene	190	PID
SVOCs	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Bis(2-ethylhexyl)phthalate	17	Not Applicable
Phenol	6.6	Not Applicable
PAHs	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Benzo(a)anthracene	0.1	Not Applicable
Benzo(b)fluoranthene	0.03	Not Applicable
Benzo(k)fluoranthene	0.02	Not Applicable
Chrysene	0.02	Not Applicable
Naphthalene	11	Not Applicable
PFAS	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
PFOS	0.0213	Not Applicable
PFOA	0.0665	Not Applicable
Metals	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Arsenic	25.71	Not Applicable
Barium	7,864	Not Applicable
Beryllium	9.4	Not Applicable
Cadmium	8.42	Not Applicable
Chromium	807.6	Not Applicable
Copper	2,864	Not Applicable
Iron	226,000	Not Applicable

Lead	1,350	Not Applicable
Magnesium	144,000	Not Applicable
Manganese	94,000	Not Applicable
Nickel	1,273	Not Applicable
Selenium	136	Not Applicable
Silver	2,010	Not Applicable
Sodium	314,000	Not Applicable
Thallium	3.61	Not Applicable
Media: Soil Vapor		
VOCs	**Maximum Concentration (ug/m^3)**	**Applicable Monitoring Instrument**
Ethylbenzene	176	PID
o-Xylene	151	PID
p/m-Xylene	547	PID

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.

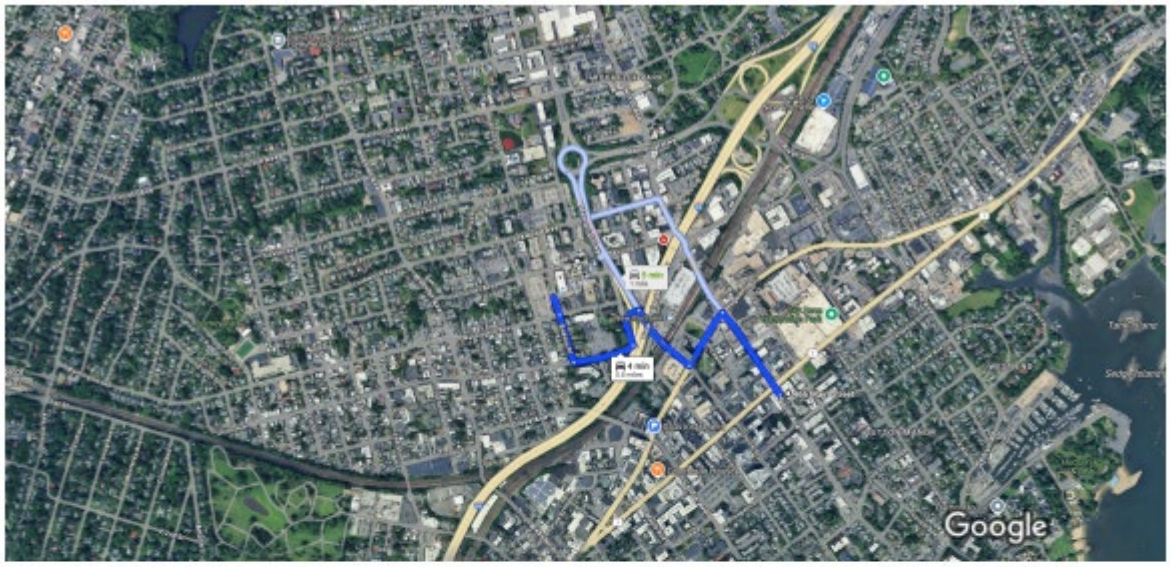
Table 7 – Emergency Contacts

Local Emergency Contacts	**Telephone No.**
EMERGENCY	911
Montefiore New Rochelle Hospital	(914) 632-5000
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 Hotline	(800) 424-8802
Center for Disease Control	(800) 311-3435
Utility Mark-Out	(800) 962-7962

10.6.1 Directions to Hospital

Montefiore New Rochelle Hospital
16 Guion Pl, New Rochelle, NY 10801
(914) 632-5000

Fig-1: Direction to Hospital



Imagery ©2025 Google, Imagery ©2025 Airbus, Maxar Technologies, Map data ©2025 Google 500 ft

via North Ave Fastest route now, avoids road closure on Burling Ln.	4 min 0.8 mile
via North Ave and Lockwood Ave	4 min 0.7 mile
via Memorial Hwy	5 min 1.0 mile

Explore nearby Montefiore New Rochelle 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 SAFETY DATA SHEETS

Safety Data Sheets (SDS) 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

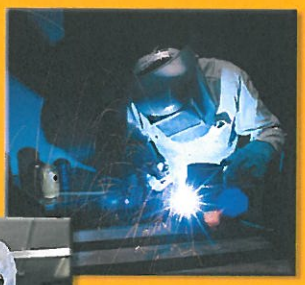
Attachment 2:
OSHA Poster

Job Safety and Health

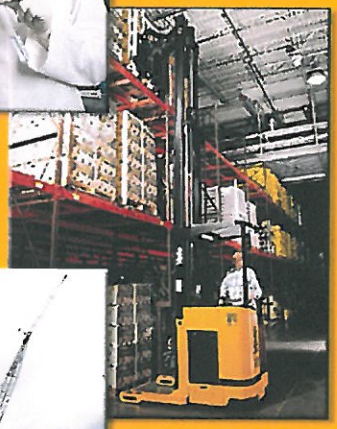
It's the law!

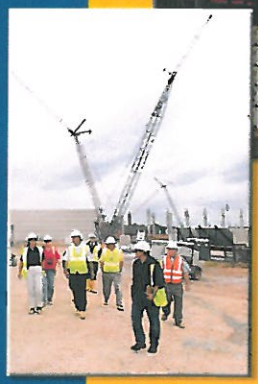
OSHA®

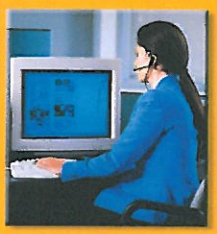
Occupational Safety and Health Administration
U.S. Department of Labor











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 3165-02 2012R

Attachment 3:
Field Change Request Form

HEALTH & SAFETY PLAN
CHANGE NOTICE

Pages _____ of _____

Project: H&S-CN

1) HASP VERSION: _____ SECTION: _____ PAGE (s): _____

RE: --- Change to existing HASP Anticipated Revision Date: _____
--- Addition to existing HASP
--- Other: _____
_____CONT._____

2) PROPOSED CHANGE: _____
_____
_____
_____

3) REASON FOR PROPOSED CHANGE(s):
--- Required by SPEC or Change Order --- Other: _____
--- Disposition of Deficiency _____CONT._____
--- Change in Regulatory or Other Requirements
--- Operational Experience

4) EXHIBITS ATTACHED ____ NO ____ YES (If YES, describe) _____
_____CONT._____

5) PMK APPROVALS PROJECT MANAGER: _____ Date: _____
SITE MANAGER: _____ Date: _____
H&S MANAGER: _____ Date: _____

Client Approval Required: ____ NO ____ YES (If YES, date submitted) _____

6) CLIENT APPROVAL _____ APPROVED _____ REMANDED _____ REJECTED

Comments: _____
_____
_____ CONT._____

Client Representative: _____Date: _____

7) DISTRIBUTION AFTER APPROVAL

X HASP UPDATE LIST --- OTHER: _____
X CLIENT _____
X PROJECT FILES _____

8) PREPARED BY: _____Date: _____
Title: _____

Attachment 4:
Injury Report Form

OSHA's Form 301
Injury and Illness Incident Report

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.

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

Form approved OMB no. 1218-0176

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

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

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

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

Completed by _____

Title _____

Phone (_____)_____-_____ Date ____/ ____/ ____

Information about the employee

1) Full name _____

2) Street _____

City _____ State _____ ZIP _____

3) Date of birth ____/ ____/ ____

4) Date hired ____/ ____/ ____

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional _____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ ZIP _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the *Log* _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ____/ ____/ ____

12) Time employee began work _____ AM / PM

13) Time of event _____ AM / PM ☐ Check if time cannot be determined

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 carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

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."

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 tunnel syndrome."

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.*

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.

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 first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to 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 your local OSHA office for help.

Establishment name _____

City _____ State _____

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
								Remained at Work				(M)					
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
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____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
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Page totals ➤						____	____	____	____	____	____	____	____	____	____	____	____

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

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 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.

Injury (1) Skin disorder (2) Respiratory condition (3) Poisoning (4) Hearing loss (5) All other illnesses (6)

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

Summary of Work-Related Injuries and Illnesses

Year 20__ __

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

Form approved OMB no. 1218-0176

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 to verify that the entries are complete and accurate before completing this summary.

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 had no cases, write "0."

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

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)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)		
(1) Injuries	_____	(4) Poisonings	_____
		(5) Hearing loss	_____
(2) Skin disorders	_____	(6) All other illnesses	_____
(3) Respiratory conditions	_____		

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

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

__ __ __ __

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

__ __ __ __ __ __

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 _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

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

( ) - / /
Phone Date

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

Attachment 6:

Safety Data Sheets

SAFETY DATA SHEET

Creation Date 01-Feb-2005 **Revision Date** 24-Dec-2021 **Revision Number** 5

1. Identification

Product Name **1,2,4-Trimethylbenzene**

Cat No. : **AC140090000; AC140090010; AC140090025; AC140090100; AC140090250**

CAS No 95-63-6
Synonyms Pseudocumene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Warning

Hazard Statements

Flammable liquid and vapor
Causes skin irritation
Causes serious eye irritation
Harmful if inhaled
May cause respiratory irritation



Precautionary Statements
Prevention
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
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)
Toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Benzene, 1,2,4-trimethyl-	95-63-6	> 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. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.
Ingestion	Clean mouth with water and drink afterwards plenty of water.
Most important symptoms and effects	Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.
Unsuitable Extinguishing Media	No information available
Flash Point	48 °C / 118.4 °F
Method -	No information available
Autoignition Temperature	500 °C / 932 °F

Explosion Limits

Upper	6.4%
Lower	0.9%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Keep in suitable, closed containers for disposal. Soak up with inert absorbent material. Remove all sources of ignition. Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

Storage. Keep away from heat, sparks and flame. Flammables area. Keep container tightly closed in a dry and well-ventilated place. Incompatible Materials. Oxidizing agent.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Benzene, 1,2,4-trimethyl-			TWA: 25 ppm TWA: 125 mg/m^3	

Legend

NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-44 °C / -47.2 °F
Boiling Point/Range	168 °C / 334.4 °F @ 760 mmHg
Flash Point	48 °C / 118.4 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.4%
Lower	0.9%
Vapor Pressure	7 mmHg @ 44.4 °C
Vapor Density	4.15 (Air = 1.0)
Specific Gravity	0.880
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	500 °C / 932 °F

Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C9 H12
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability No information available.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.

Incompatible Materials Oxidizing agent

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Benzene, 1,2,4-trimethyl-	LD50 = 3280 mg/kg (Rat)	LD50 > 3160 mg/kg (Rabbit)	LC50 = 18 g/m³ (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Benzene, 1,2,4-trimethyl-	95-63-6	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Benzene, 1,2,4-trimethyl-	Not listed	LC50: 7.19 - 8.28 mg/L, 96h flow-through (Pimephales promelas)	Not listed	EC50: = 6.14 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Benzene, 1,2,4-trimethyl-	3.63

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 UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Technical Name Benzene, 1,2,4-trimethyl-
Hazard Class 3
Packing Group III

TDG

UN-No UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Hazard Class 3
Packing Group III

IATA

UN-No UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No UN1993
Proper Shipping Name Flammable liquid, n.o.s.
Hazard Class 3
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Benzene, 1,2,4-trimethyl-	95-63-6	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed

'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Benzene, 1,2,4-trimethyl-	95-63-6	X	-	202-436-9	X	X	X	X	X	KE-34410

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Benzene, 1,2,4-trimethyl-	95-63-6	> 95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzene, 1,2,4-trimethyl-	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

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Benzene, 1,2,4-trimethyl-	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Benzene, 1,2,4-trimethyl-	95-63-6	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Benzene, 1,2,4-trimethyl-	95-63-6	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 01-Feb-2005
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 4.16
Revision Date 06/21/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 2-Butanone

Product Number : 443468
Brand : Sigma-Aldrich
Index-No. : 606-002-00-3

CAS-No. : 78-93-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

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

1.4 Emergency telephone number

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

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

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.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

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

P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
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

3.1 Substances

Synonyms	:	Methyl ethyl ketone MEK Ethyl methyl ketone
Formula	:	C_4H_8O
Molecular weight	:	72.11 g/mol
CAS-No.	:	78-93-3
EC-No.	:	201-159-0
Index-No.	:	606-002-00-3
Registration number	:	01-2119457290-43-XXXX

Hazardous components

Component	Classification	Concentration
Ethyl methyl ketone		
	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336	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
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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 Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture
Flash back possible over considerable distance., Container explosion may occur under fire conditions.

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
Use personal protective equipment. 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 non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national 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
Store under inert gas. 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.

Hygroscopic.
Storage class (TRGS 510): 3: Flammable liquids

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
Ethyl methyl ketone	78-93-3	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		
		STEL	300 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		
		TWA	200 ppm 590 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	300 ppm 885 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	200 ppm 590 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		PEL	200 ppm 590 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	300 ppm 885 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
	-	methyl ethyl ketone	2 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

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

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

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 292 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, 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, 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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-87 °C (-125 °F)
f)	Initial boiling point and boiling range	80 °C (176 °F) - lit.
g)	Flash point	-3 °C (27 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 10.1 %(V) Lower explosion limit: 1.8 %(V)
k)	Vapour pressure	95 hPa (71 mmHg) at 20 °C (68 °F)
l)	Vapour density	2.49 - (Air = 1.0)
m)	Relative density	0.805 g/mL at 25 °C (77 °F)
n)	Water solubility	soluble
o)	Partition coefficient: n-octanol/water	log Pow: 0.29
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

Surface tension	24.6 mN/m at 20 °C (68 °F)
Relative vapour density	2.49 - (Air = 1.0)

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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Exposure to moisture
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Strong reducing 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
LD50 Oral - Rat - 2,737 mg/kg

LC50 Inhalation - Mouse - 4 h - 32,000 mg/m3

LC50 Inhalation - Mammal - 38,000 mg/m3

LD50 Dermal - Rabbit - 6,480 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Irritating to eyes.
(OECD Test Guideline 405)

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 on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: EL6475000

Central nervous system depression, Gastrointestinal disturbance, narcosis

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 400 mg/l - 96 h
	LC50 - Pimephales promelas (fathead minnow) - 3,130 - 3,320 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - > 520 mg/l - 48 h
	EC50 - Daphnia magna (Water flea) - 7,060 mg/l - 24 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. 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: 1193 Class: 3 Packing group: II
Proper shipping name: Ethyl methyl ketone
Reportable Quantity (RQ): 5000 lbsReportable Quantity (RQ): 5000 lbsReportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1193 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ETHYL METHYL KETONE

IATA

UN number: 1193 Class: 3 Packing group: II
Proper shipping name: Ethyl methyl ketone

15. REGULATORY INFORMATION

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

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, Acute Health Hazard, Chronic Health Hazard

Reportable Quantity	D035 lbs
	F005 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Ethyl methyl ketone	78-93-3	1993-02-16

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Ethyl methyl ketone	78-93-3	1993-02-16

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.

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
STOT SE	Specific target organ toxicity - single exposure

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.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.16 Revision Date: 06/21/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 05/28/2017
Print Date 06/29/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Acetone

Product Number : 650501
Brand : SIGALD
Index-No. : 606-001-00-8

CAS-No. : 67-64-1

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

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
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

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.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

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.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
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

Repeated exposure may cause skin dryness or cracking.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_3H_6O
Molecular weight	:	58.08 g/mol
CAS-No.	:	67-64-1
EC-No.	:	200-662-2
Index-No.	:	606-001-00-8

Hazardous components

Component	Classification	Concentration
Acetone		
	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336	<= 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
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

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
Use personal protective equipment. 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.

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
Derived No Effect Level (DNEL)

Application Area	Exposure routes	Health effect	Value
Workers	Skin contact	Long-term systemic effects	186mg/kg BW/d
Consumers	Ingestion	Long-term systemic effects	62mg/kg BW/d
Consumers	Skin contact	Long-term systemic effects	62mg/kg BW/d
Workers	Inhalation	Acute systemic effects	2420 mg/m3
Workers	Inhalation	Long-term systemic effects	1210 mg/m3

Consumers	Inhalation	Long-term systemic effects	200 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	33.3 mg/kg
Marine water	1.06 mg/l
Fresh water	10.6 mg/l
Marine sediment	3.04 mg/kg
Fresh water sediment	30.4 mg/kg
Onsite sewage treatment plant	100 mg/l

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: 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: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, 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

Impervious clothing, 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 (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engine protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available

d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -94 °C (-137 °F)
f)	Initial boiling point and boiling range	56 °C (133 °F) at 1013 hPa
g)	Flash point	-17.0 °C (1.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 13 %(V) Lower explosion limit: 2 %(V)
k)	Vapour pressure	533.3 hPa at 39.5 °C (103.1 °F) 245.3 hPa at 20.0 °C(68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.791 g/mL at 25 °C (77 °F)
n)	Water solubility	completely miscible
o)	Partition coefficient: n-octanol/water	log Pow: -0.24
p)	Auto-ignition temperature	465.0 °C (869.0 °F)
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

Surface tension	23.2 mN/m at 20.0 °C (68.0 °F)

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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Bases, Oxidizing agents, Reducing agents, Acetone reacts violently with phosphorous oxychloride.

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
LD50 Oral - Rat - 5,800 mg/kg(Acetone)
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Tremor. Behavioral:Headache. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.
LC50 Inhalation - Rat - 8 h - 50,100 mg/m3(Acetone)
Remarks: Drowsiness Dizziness Unconsciousness
LD50 Dermal - Guinea pig - 7,426 mg/kg(Acetone)
No data available(Acetone)

Skin corrosion/irritation
Skin - Rabbit(Acetone)
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit(Acetone)
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
- Guinea pig(Acetone)
Result: Does not cause skin sensitisation.

Germ cell mutagenicity

No data available(Acetone)

Carcinogenicity
This product is or contains a component that is not classifiable as to its classification.(Acetone)
(Acetone)
(Acetone)

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(Acetone)

No data available(Acetone)

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.(Acetone)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Acetone)

Additional Information
RTECS: AL3150000

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

Kidney - Irregularities - Based on Human Evidence
Skin - Dermatitis - Based on Human Evidence

Kidney - Irregularities - Based on Human Evidence(Acetone)
Skin - Dermatitis - Based on Human Evidence(Acetone)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 5,540 mg/l - 96 h(Acetone)
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 8,800 mg/l - 48 h(Acetone)
Toxicity to algae	Remarks: No data available

12.2 Persistence and degradability

Biodegradability: Result: 91 % - Readily biodegradable.
(OECD Test Guideline 301B)

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility in soil

No data available(Acetone)

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: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone
Reportable Quantity (RQ) : 5000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1090 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ACETONE

IATA
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone

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, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	

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.

16. OTHER INFORMATION

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

H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.

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: 6.1 Revision Date: 05/28/2017 Print Date: 06/29/2019

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; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H302, H331, 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. 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

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

		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	inorganic arsenic plus methylated metabolites	35µg As/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	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.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: light grey, black
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 817 °C (1,503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C (1,135 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	5.727 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat Exposure to air may affect product quality.

10.5 Incompatible materials
Strong oxidizing agents

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

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - 763 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

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 other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

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

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Reportable Quantity (RQ): 1 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

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

Pennsylvania Right To Know Components

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

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

New Jersey Right To Know Components

	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
Arsenic	7440-38-2	2007-09-28

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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

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

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.

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.

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 parameters	Basis
Barium	7440-39-3	TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Eye irritation Muscular stimulation Skin irritation Gastrointestinal irritation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. NIOSH Recommended 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 classifiable as a human carcinogen		

		TWA	0.5 mg/m3	USA. NIOSH Recommended 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)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 725 °C (1337 °F) - lit.
f)	Initial boiling point and boiling range	1,640 °C (2,984 °F) - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available

i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	3.6 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
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)

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

	CAS-No.	Revision Date
Barium	7440-39-3	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.

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.I:	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

Benzene Safety Data Sheets

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SAFETY DATA SHEETS

According to the UN GHS revision 8

Creation
Revision

SECTION 1: Identification

1.1 GHS Product identifier

Product name Benzene

1.2 Other means of identification

Product number -
Other names Benzole; Fenzen; Benzeen

1.3 Recommended use of the chemical and restrictions on use

Identified uses Hydrocarbons (contain hydrogen and carbon atoms), Volatile organic compounds
Uses advised against no data available

1.4 Supplier's details

Company Echemi.com
Address Echemi.com
Telephone Echemi.com

1.5 Emergency phone number

Emergency phone number Echemi.com
Service hours Monday to Friday, 9am-5pm (Standard time zone: UTC/GMT +8 hours).

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Flammable liquids, Category 2
Skin irritation, Category 2
Eye irritation, Category 2
Aspiration hazard, Category 1
Germ cell mutagenicity, Category 1B
Carcinogenicity, Category 1A
Specific target organ toxicity â□□ repeated exposure, Category 1

2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word Danger
Hazard statement(s)
H225 Highly flammable liquid and vapour
H315 Causes skin irritation
H319 Causes serious eye irritation
H304 May be fatal if swallowed and enters airways
H340 May cause genetic defects
H350 May cause cancer
H372 Causes damage to organs through prolonged or repeated exposure

Precautionary statement(s)
Prevention
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof [electrical/ventilating/lighting/...] equipment.
P242 Use non-sparking tools.
P243 Take action to prevent static discharges.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...

TOP
RFQ
Help

	P264 Wash ... thoroughly after handling. P203 Obtain, read and follow all safety instructions before use. P260 Do not breathe dust/fume/gas/mist/vapours/spray. P270 Do not eat, drink or smoke when using this product.
Response	P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse affected areas with water [shower]. P370+P378 In case of fire: Use ... to extinguish. P302+P352 IF ON SKIN: Wash with plenty of water/... P321 Specific treatment (see ... on this label). P332+P317 If skin irritation occurs: Get medical help. P362+P364 Take off contaminated clothing and wash it before reuse. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy Continue rinsing. P301+P316 IF SWALLOWED: Get emergency medical help immediately. P331 Do NOT induce vomiting. P318 IF exposed or concerned, get medical advice. P319 Get medical help if you feel unwell.
Storage	P403+P235 Store in a well-ventilated place. Keep cool. P405 Store locked up.
Disposal	P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3 Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Benzene	Benzene	71-43-2	200-753-7	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Refer for medical attention.

Following skin contact

Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth. Do NOT induce vomiting. Refer for medical attention .

4.2 Most important symptoms/effects, acute and delayed

Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction, nausea, and vomiting. Coma and possible death. (USCG, 1999)

4.3 Indication of immediate medical attention and special treatment needed, if necessary

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, ba mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting o patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temp medical attention. Benzene and Related Compounds

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

Approach fire from upwind to avoid hazardous vapors. Use water spray, dry chemical, foam, or carbon dioxide. Use water spray to keep fire-exposed containers cool.

5.2 Specific hazards arising from the chemical

Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. (USCG, 1999)

5.3 Special protective actions for fire-fighters

Use foam, water spray, carbon dioxide, powder. In case of fire: keep drums, etc., cool by spraying with water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Remove all ignition sources. Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT wasl into sewer. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert abso Then store and dispose of according to local regulations.

6.2 Environmental precautions

Remove all ignition sources. Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT wasl into sewer. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert abso Then store and dispose of according to local regulations.

6.3 Methods and materials for containment and cleaning up

For spills on water, contain with booms or barriers, use surface acting agents to thicken spilled materials. Remove trapped materials with suction hoses.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g., by grounding). Handling in a well ventilated place. Wear suitable protective clothing. Avoid co with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

7.2 Conditions for safe storage, including any incompatibilities

Fireproof. Separated from food and feedstuffs, oxidants and halogens. Store in an area without drain or sewer access.Keep in well closed containers in a cool place and away from fi

SECTION 8: Exposure controls/personal protection

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8.1 Control parameters

Occupational Exposure limit values

TLV: 0.5 ppm as TWA; 2.5 ppm as STEL; (skin); A1 (confirmed human carcinogen); BEI issued.EU-OEL: 3.25 mg/m3, 1 ppm as TWA; (skin).MAK: carcinogen category: 1; germ mutagen group: 3A; skin absorption (H)

Biological limit values

no data available

8.2 Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Liquid.
Colour	Clear, colourless.
Odour	Aromatic odor
Melting point/freezing point	5.49 Â°C. Atm. press.:1 013 hPa.
Boiling point or initial boiling point and boiling range	80.09 Â°C. Atm. press.:1 013.5 hPa.
Flammability	Highly flammable.
Lower and upper explosion limit/flammability limit	Lower flammable limit: 1.2% by volume; Upper flammable limit: 7.8% by volume
Flash point	-11 Â°C. Atm. press.:1 013.5 hPa.
Auto-ignition temperature	498 Â°C. Atm. press.:1 013.5 hPa.
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	dynamic viscosity (in mPa s) = 0.604. Temperature:25.0Â°C.
Solubility	1 to 5 mg/mL at 64Â° F (NTP, 1992)
Partition coefficient n-octanol/water	log Pow = 2.13. Temperature:25 Â°C.
Vapour pressure	10 kPa. Temperature:20 Â°C.;100 kPa. Temperature:79.7 Â°C.
Density and/or relative density	0.876 g/cmÂ³. Temperature:20 Â°C.
Relative vapour density	2.77 (vs air)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concentration.
Reacts violently with oxidants, nitric acid, sulfuric acid and halogens. This generates fire and explosion hazard. Attacks plastics and rubber.
See Explosion Hazards.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

A dangerous fire hazard when exosed to heat or flame. ... Ignites on contact with sodium peroxide + water, dioxygenyl tetrafluoroborate, iodine heptafluoride, and dioxygen difluori vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.,Benzene vapors are he than air. They will spread along the ground and collect and stay in poorly-ventilated, low-lying, or confined areas (e.g., sewers, basements, and tanks).Hazardous concentrations may develop quickly in enclosed, poorly-ventilated, or low-lying areas. Keep out of these areas. Stay upwind.Benzene liquid is less dense than water and will float on the surface of water.BENZENE reacts vigorously with allyl chloride or other alkyl halides even at -70Â° C in the presence of ethyl aluminum dichloride or ethyl aluminum sesquichloride. Explos have been reported [NFPA 491M 1991]. Ignites in contact with powdered chromic anhydride [Mellor 11:235 1946-47]. Incompatible with oxidizing agents such as nitric acid. Mixtu with bromine trifluoride, bromine pentafluoride, iodine pentafluoride, iodine heptafluoride and other interhalogens can ignite upon heating [Bretherick 5th ed. 1995]. Benzene and c halides yield HCl as a byproduct (Hagedorn, F. H. Gelbke, and Federal Republic of Germany. 2002. Nitriles. In Ullmann's Encyclopedia of Industrial Chemistry. Wiley-VCH Verlag & Co. KGaA.). The reaction of benzene and trichloroacetonitrile evolves toxic chloroform and HCl gases. (Hagedorn, F., H.-P. Gelbke, and Federal Republic of Germany. 2002. Nit Ullmann's Encyclopedia of Industrial Chemistry. Wiley-VCH Verlag GmbH & Co. KGaA.).

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Reacts violently with iodine pentafluoride.

10.6 Hazardous decomposition products

no data available

SECTION 11: Toxicological information

Acute toxicity

Oral: LD50 - rat (male) - > 2 000 mg/kg bw. Remarks:Young and older adults had LD50 of 3.8 (2.9-4.8) and 5.6 (4.0-7.8) mL/kg respectively.
Inhalation: LC50 - rat (female) - 13 700 ppm.
Dermal: LD50 - guinea pig and rabbit - > 9.4 mL/kg bw.

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

TOP
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Germ cell mutagenicity

no data available

Carcinogenicity

NTP: Known to be a human carcinogen. EPA: Known human carcinogen. IARC: Carcinogenic to humans

Reproductive toxicity

There is some evidence from human epidemiological studies of reproductive and developmental toxicity of benzene, however the data do not provide conclusive evidence of a link b exposure and effect (4). Animal studies have provided limited evidence that exposure to benzene may affect reproductive organs, however these effects were only observed at expos levels over the maximum tolerated dose . Adverse effects on the fetus, including low birth weight, delayed bone formation, and bone marrow damage, have been observed where pre animals were exposed to benzene by inhalation.

STOT-single exposure

The substance is irritating to the eyes, skin and respiratory tract. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause e on the central nervous system. This may result in lowering of consciousness. Exposure far above the OEL could cause unconsciousness and death. If swallowed the substance easily the airways and could result in aspiration pneumonitis.

STOT-repeated exposure

The substance defats the skin, which may cause dryness or cracking. The substance may have effects on the central nervous system and immune system. The substance may have efl the bone marrow. This may result in anaemia. This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. See Notes.

Aspiration hazard

A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20Â°C.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish: LC50 - Oncorhynchus mykiss (previous name: Salmo gairdneri) - 5.3 mg/L - 96 h.
Toxicity to daphnia and other aquatic invertebrates: EC50 - Daphnia magna - 10 mg/L - 48 h.
Toxicity to algae: EC50 - Pseudokirchneriella subcapitata (previous names: Raphidocelis subcapitata, Selenastrum capricornutum) - 32 mg/L - 72 h.
Toxicity to microorganisms: IC50 - Nitrosomonas sp. - 13 mg/L - 24 h.

12.2 Persistence and degradability

AEROBIC: Benzene present at 100 mg/L, reached 40% of its theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test(1). Benzene reac 24% of its theoretical oxygen demand in a non-acclimated microbial population after 15 days(2). Aerobic biodegradation of benzene was studied in pre-equilibrated soil-water slurry microcosms(3). Using an enriched aerobic bacterial culture, benzene began to degrade 12 hrs after incubation in an aqueous(soil-free) solution with 50% of benzene degrading after and almost complete degradation within 90 hrs. Using a pre-equilibrated soil-water slurry microcosm, benzene did not begin to degrade until 3 days after application and reached co degradation after about 12 days(3).

12.3 Bioaccumulative potential

Benzene has BCFs ranging from 1.1-20(1). According to a classification scheme(2), this BCF range suggests the potential for bioconcentration in aquatic organisms is low. The upta elimination rate constants for benzene in fathead minnows were studied(3). Fathead minnows were found to have an average uptake rate of 7 L/kg/hr with an average elimination rat 0.384/hr which corresponds to a BCF of 19(3). In a study of BCF values for various aquatic species, benzene was found to have a BCF value of 3.5 in eels(4), 4.4 in pacific (4.3 in goldfish(6).

12.4 Mobility in soil

An experimentally derived log Koc of 1.93 (Koc = 85) was obtained via reverse phase HPLC (high performance liquid chromatography) with a cyanopropyl column and a n ol water(1). According to a classification scheme(2), this estimated Koc value suggests that benzene is expected to have high mobility in soil. The sorption equilibrium for benzene in a soil/water mixture (ratio soil/water 0.12 kg/l) took 72 hrs(3). The Koc for benzene has also been experimentally determined to be 79(4).

12.5 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

14.1 UN Number

ADR/RID: UN1114 (For reference only, please check.) IMDG: UN1114 (For reference only, please check.) IATA: UN1114 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: BENZENE (For reference only, please check.) IMDG: BENZENE (For reference only, please check.) IATA: BENZENE (For reference only, please check.

14.3 Transport hazard class(es)

ADR/RID: 3 (For reference only, please check.) IMDG: 3 (For reference only, please check.) IATA: 3 (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID: II (For reference only, please check.) IMDG: II (For reference only, please check.) IATA: II (For reference only, please check.)

14.5 Environmental hazards

ADR/RID: No IMDG: No IATA: No

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

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Chemical name	Common names and synonyms	CAS number	EC nu
Benzene	Benzene	71-43-2	200-7
European Inventory of Existing Commercial Chemical Substances (EINECS)			List
EC Inventory			List
United States Toxic Substances Control Act (TSCA) Inventory			List
China Catalog of Hazardous chemicals 2015			List
New Zealand Inventory of Chemicals (NZIoC)			List
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			List
Vietnam National Chemical Inventory			List
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			List
Korea Existing Chemicals List (KECL)			List

SECTION 16: Other information

Information on revision

Creation Date July 15, 2019
Revision Date July 15, 2019

Abbreviations and acronyms

CAS: Chemical Abstracts Service
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
IMDG: International Maritime Dangerous Goods
IATA: International Air Transportation Association
TWA: Time Weighted Average
STEL: Short term exposure limit
LC50: Lethal Concentration 50%
LD50: Lethal Dose 50%
EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home
HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm
IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/
eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple
ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp
ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg
Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp
ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

Use of alcoholic beverages enhances the harmful effect.Depending on the degree of exposure, periodic medical examination is suggested.The odour warning when the exposure limi is exceeded is insufficient.Benzene causes acute myeloid leukaemia/acute non-lymphocytic leukaemia. Also, a positive association has been observed between exposure to benzene acute lymphocytic leukaemia, chronic lymphocytic leukaemia, multiple myeloma, and non-Hodgkin lymphoma.

Disclaimer: 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 b 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 pr supplier shall not be held liable for any damage resulting from handling or from contact with the above product.

TOP

Benzene is included in Hydrocarbons and Derivatives category. See more Benzene price and marketing trends

Buy Benzene of different grades for your demands from various manufactures and traders.

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Related Products

Benzene | Benzene | Benzene 99% kanbei | Benzene 99.9% Colorless

Pure benzene 99% Liquid Dideu

Industry News

•What Is Inorganic Benzene? Differences, Si... | •What You Need to Know About Benzene in ... | •Get to know whether benzene is a hydrocar... | •Go Up And Go Up! PET Rose

•Where Is Benzene Found in Everyday Life? ...

More Safety Data Sheets

Dibenzoselenophene 5-oxide SDS | D-Alanine SDS | 4-IODOISOQUINOLINE SDS | Methyl 6,11-dihydro-11-oxoc

3-Chloro-6-(1-piperazinyl)pyridazine SDS | 6,7-Dihydro-5H-quinolin-8-one SDS | 1-BOC-PIPERAZINE SDS | ETC 1002 SDS

EUK 207 SDS | 1H-Pyrrole-3-carboxylic acid, 5-formyl-2,4-d...

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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[<I>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.

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]acephenanthrylene	205-99-2	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

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

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

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

Control of environmental exposure

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 163 - 165 °C (325 - 329 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
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

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 invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h(Benz[e]acephenanthrylene)

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.

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

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	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.

H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

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.

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

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[<I>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.

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

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzo[k]fluoranthene	207-08-9	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment
Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 215 - 217 °C (419 - 423 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available

m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
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

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)

Reportable Quantity (RQ) : 5000 lbs

no
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
Benzo[k]fluoranthene		

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
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/16/2018 Print Date: 01/21/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 07/25/2018
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benz[<I>a</>]anthracene

Product Number : B2209
Brand : Aldrich
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 # : +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)
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,2-Benzanthracene Tetraphene
Formula	:	$C_{18}H_{12}$
Molecular weight	:	228.29 g/mol
CAS-No.	:	56-55-3
EC-No.	:	200-280-6
Index-No.	:	601-033-00-9

Hazardous components

Component	Classification	Concentration
Benz[a]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

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

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Nature of decomposition products not known.

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.
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
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 157 - 159 °C (315 - 318 °F)
f)	Initial boiling point and boiling range	437.6 °C (819.7 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available

n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
LD50 Intravenous - Rat - > 200 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

NTP: 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 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
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.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods
IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

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

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

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28

16. OTHER INFORMATION

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

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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 6.1 Revision Date: 07/25/2018 Print Date: 06/22/2019

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.
P308 + P313	IF exposed or concerned: 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

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; 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	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. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
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 parameters	Basis
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	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram 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)
		Beryllium sensitization Chronic beryllium disease (berylliosis) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram 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)
		Beryllium sensitization Chronic beryllium disease (berylliosis)		

		Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		C	0.0005 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		PEL	0.0002 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	0.025 mg/m3	California permissible exposure 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

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
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,278 °C (2,332 °F) - lit.
f)	Initial boiling point and boiling range	2,970 °C (5,378 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.85 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
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

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

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Berylium foil	7440-41-7	2008-10-10

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.
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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.8 Revision Date: 01/11/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 5.9
Revision Date 05/25/2016
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Bis(2-ethylhexyl) phthalate

Product Number : P6699
Brand : Sigma
Index-No. : 607-317-00-9

CAS-No. : 117-81-7

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)
Reproductive toxicity (Category 1B), H360

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)
H360 May damage fertility or the unborn child.

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

Endocrine disrupting chemical(s)

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{24}H_{38}O_4$
Molecular weight	:	390.56 g/mol
CAS-No.	:	117-81-7
EC-No.	:	204-211-0
Index-No.	:	607-317-00-9
Registration number	:	01-2119484611-38-XXXX

Hazardous components

Component	Classification	Concentration
bis(2-Ethylhexyl) phthalate Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Repr. 1B; H360	<= 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
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

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
bis(2-Ethylhexyl) phthalate	117-81-7	TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lower Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

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: 0.2 mm
Break through time: 480 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 120 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 respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-50.0 °C (-58.0 °F)
f)	Initial boiling point and boiling range	384.0 °C (723.2 °F)
g)	Flash point	207.0 °C (404.6 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Lower explosion limit: 0.3 %(V)
k)	Vapour pressure	1.6 hPa (1.2 mmHg) at 93.0 °C (199.4 °F)
l)	Vapour density	No data available
m)	Relative density	0.98 g/cm3
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition	390.0 °C (734.0 °F)

	temperature	
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
LD50 Oral - Rat - 30,000 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 25,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation
Maximisation Test - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

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.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (bis(2-Ethylhexyl) phthalate)

NTP: Reasonably anticipated to be a human carcinogen (bis(2-Ethylhexyl) phthalate)

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
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: TI0350000

Effects due to ingestion may include:, Gastrointestinal disturbance

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - > 0.67 mg/l - 96 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - > 0.32 mg/l - 96 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 0.17 mg/l - 96 h
	LC50 - Lepomis macrochirus (Bluegill) - > 0.20 mg/l - 96 h
	NOEC - other fish - > 0.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 0.16 mg/l - 48 h

12.2 Persistence and degradability

Biodegradability	Result: - Readily biodegradable (OECD Test Guideline 301)

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 100 d - 0.014 mg/l Bioconcentration factor (BCF): 113 Remarks: Does not bioaccumulate.

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
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. 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: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (bis(2-Ethylhexyl) phthalate)
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

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

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

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. bis(2-Ethylhexyl) phthalate	CAS-No. 117-81-7	Revision Date 2009-02-01
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. bis(2-Ethylhexyl) phthalate	CAS-No. 117-81-7	Revision Date 2009-02-01

16. OTHER INFORMATION

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

H360	May damage fertility or the unborn child.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	1
Reactivity Hazard:	0

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.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.9 Revision Date: 05/25/2016 Print Date: 06/28/2019

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.
P308 + P313	IF exposed or concerned: 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

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; 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	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. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
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 parameters	Basis
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	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram 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)
		Beryllium sensitization Chronic beryllium disease (berylliosis) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram 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)
		Beryllium sensitization Chronic beryllium disease (berylliosis)		

		Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		C	0.0005 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		PEL	0.0002 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	0.025 mg/m3	California permissible exposure 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

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
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,278 °C (2,332 °F) - lit.
f)	Initial boiling point and boiling range	2,970 °C (5,378 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.85 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
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

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

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Berylium foil	7440-41-7	2008-10-10

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.
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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.8 Revision Date: 01/11/2018 Print Date: 06/28/2019

Fisher Scientific

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
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

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

5. Fire-fighting measures

Unsuitable Extinguishing Media Carbon dioxide (CO2)

Flash Point Not applicable
Method - No information available

Autoignition Temperature Not applicable
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.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	1	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for 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/m³	(Vacated) TWA: 1 mg/m³ TWA: 1 mg/m³	IDLH: 250 mg/m³ TWA: 0.5 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Chromium	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder
Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	1857.2 °C / 3375 °F

Boiling Point/Range	2640 °C / 4784 °F
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	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 Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation 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	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Chromium	Not listed	LC50: 14.3 mg/l/96 H (Pimephales promelas)	Not listed	EC50: 0.07 mg/l/48 H

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

- **UN-No** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **Proper technical name** Chromium
- **Hazard Class** 9
- **Packing Group** III

TDG Not regulated

- **UN-No** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **Hazard Class** 9
- **Packing Group** III

IATA

- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

IMDG/IMO

- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Chromium	X	X	-	231-157-5	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
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	CWA - Hazardous Substances	CWA - Reportable Quantities	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 5.10
Revision Date 01/10/2018
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : CHRYSENE, 98%

Product Number : 245186
Brand : Aldrich

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

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

1.4 Emergency telephone number

Emergency Phone # : +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 : $C_{18}H_{12}$

Molecular weight : 228.29 g/mol

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

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.
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 Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen with unknown relevance to humans		
Chrysene	218-01-9	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C		

		See Appendix A		
		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-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: solid

		Colour: white, light yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	253.0 °C (487.4 °F)
f)	Initial boiling point and boiling range	448.0 °C (838.4 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.73
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - > 320 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Chrysene)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	OSHA specifically regulated carcinogen (Chrysene)

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: 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 invertebrates	EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life 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. (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
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
Chrysene	218-01-9	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Chrysene	218-01-9	2007-09-28

16. OTHER INFORMATION

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

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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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.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.10 Revision Date: 01/10/2018 Print Date: 06/22/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 03/12/2019
Print Date 06/22/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Copper

Product Number : 31284
Brand : Aldrich
CAS-No. : 7440-50-8

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 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

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

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

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : Cu
Molecular weight : 63.55 g/mol
CAS-No. : 7440-50-8
EC-No. : 231-159-6

Component	Classification	Concentration

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Copper,		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

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.

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

Copper oxides

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

Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions

No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Keep in suitable, closed containers for disposal.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas. Air sensitive.
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

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Copper,	7440-50-8	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Irritation Gastrointestinal metal fume fever		
		TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Irritation Gastrointestinal metal fume fever		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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operates as MilliporeSigma in the US and Canada

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Wire Colour: light red
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,083.4 °C (1,982.1 °F)
f)	Initial boiling point and boiling range	2,567 °C 4,653 °F
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	8.940 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 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, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Copper oxides
In the event of fire: see section 5

SECTION 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 - 3.5 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

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
No data available
No data available

Specific target organ toxicity - single exposure
No data available

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Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GL5325000

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

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

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

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

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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
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

New Jersey Right To Know Components

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

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: 06/22/2019

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Version 5.12
Revision Date 04/20/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Ethylbenzene

Product Number : 296848
Brand : Sigma-Aldrich
Index-No. : 601-023-00-4

CAS-No. : 100-41-4

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
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, Inhalation (Category 4), H332
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure (Category 2), H373
Aspiration hazard (Category 1), H304
Acute aquatic toxicity (Category 2), H401

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.

Precautionary statement(s)

P201	Obtain special instructions before use.

P202	Do not handle until all safety precautions have been read and understood.
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.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
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 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
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

3.1 Substances

Formula	:	C_8H_{10}
Molecular weight	:	106.17 g/mol
CAS-No.	:	100-41-4
EC-No.	:	202-849-4
Index-No.	:	601-023-00-4

Hazardous components

Component	Classification	Concentration
Ethylbenzene		
	Flam. Liq. 2; Acute Tox. 4; Carc. 2; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H225, H304, H332, H351, H373, H401	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
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
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
Use personal protective equipment. 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. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national 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.

hygroscopic

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
Ethylbenzene	100-41-4	TWA	20.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Cochlear impair Kidney damage (nephropathy) Upper Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	125.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125.000000 ppm 545.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Cochlear impair Kidney damage (nephropathy) Upper Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		TWA	100 ppm 435 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125 ppm 545 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

		TWA	100 ppm 435 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	125 ppm 545 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	5 ppm 22 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	30 ppm 130 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
Ethylbenzene	100-41-4	Sum of mandelic acid and phenyl glyoxylic acid	0.7g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Ethylbenzene		In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		Not critical			
		Sum of mandelic acid and phenyl glyoxylic acid	0.15g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

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

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

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, 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, 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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. 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: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -95 °C (-139 °F) - lit.
f)	Initial boiling point and boiling range	136 °C (277 °F) - lit.
g)	Flash point	15.0 °C (59.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 6.7 %(V) Lower explosion limit: 1 %(V)
k)	Vapour pressure	13.3 hPa (10.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.867 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.2 g/l at 25 °C (77 °F) - slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.6 at 20 °C (68 °F)
p)	Auto-ignition temperature	432.0 °C (809.6 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	0.773 mm2/s at 20 °C (68 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	71.2 mN/m at 23 °C (73 °F)

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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

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
LD50 Oral - Rat - male and female - 3,500 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 15,433 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Moderate skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Hamster
ovary
Result: negative

Mouse - male and female
Result: negative

Carcinogenicity

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Ethylbenzene)
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

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Additional Information

Repeated dose toxicity	Rat - male and female - NOAEL : 75 mg/kg - OECD Test Guideline 407

RTECS: DA0700000

Central nervous system depression, Nausea, Headache, Vomiting, Ataxia., Tremors

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 4.2 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 1.8 - 2.4 mg/l - 48 h
Toxicity to algae	static test EC50 - Skeletonema costatum (marine diatom) - 4.9 mg/l - 72 h

12.2 Persistence and degradability

Biodegradability: aerobic - Exposure time 28 d
Result: 70 - 80 % - Readily biodegradable.

12.3 Bioaccumulative potential

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

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

12.6 Other adverse effects

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

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

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: 1175 Class: 3 Packing group: II
Proper shipping name: Ethylbenzene
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1175 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ETHYLBENZENE

IATA

UN number: 1175 Class: 3 Packing group: II
Proper shipping name: Ethylbenzene

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
Ethylbenzene	100-41-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-09-28

16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.

HMIS Rating

Health hazard:	1
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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.12 Revision Date: 04/20/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006
Version 6.0 Revision Date 10.11.2016
Print Date 21.01.2019
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Iron Metal Clinical

Product Number : NIST937
Brand : Sigma-Aldrich
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

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 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

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

2.2 Label elements

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

SECTION 4: First aid measures

4.1 Description of first aid measures

No data available

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
No data available

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
No data available

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
For personal protection see section 8.

6.2 Environmental precautions
No data available

6.3 Methods and materials for containment and cleaning up
No data available

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
No data available

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

8.2 Exposure controls
No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	No data available
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation

Serious eye damage/eye irritation

Respiratory or skin sensitisation

Germ cell mutagenicity

Carcinogenicity

Reproductive toxicity

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure

Aspiration hazard

Additional Information
RTECS: Not available

SECTION 12: Ecological information

12.1 Toxicity

12.2 Persistence and degradability

12.3 Bioaccumulative potential

12.4 Mobility in soil

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

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

14.1 UN number

ADR/RID: -	IMDG: -	IATA: -

14.2 UN proper shipping name

ADR/RID:	Not dangerous goods
IMDG:	Not dangerous goods
IATA:	Not dangerous goods

14.3 Transport hazard class(es)

ADR/RID: -	IMDG: -	IATA: -

14.4 Packaging group

ADR/RID: -	IMDG: -	IATA: -

14.5 Environmental hazards

ADR/RID: no	IMDG Marine pollutant: no	IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

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 RE 1; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H372, 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

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

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	See 1910.1025		
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 Nervous System impairment Hematologic effects Peripheral Nervous System impairment 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 Appendix 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

c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 327.4 °C (621.3 °F) - lit.
f)	Initial boiling point and boiling range	1,740 °C (3,164 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong 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

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

Stomach - Irregularities - Based on Human Evidence

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 other aquatic invertebrates	mortality LOEC - Daphnia (water flea) - 0.17 mg/l - 24 h
	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

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

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Lead	7439-92-1	2009-02-01
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Lead	7439-92-1	2009-02-01

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.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.

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.

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

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

	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

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).

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 point	Melting point/range: 648 °C (1198 °F) - lit.
f)	Initial boiling point and boiling range	1,090 °C (1,994 °F) - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	1 hPa at 621 °C (1150 °F)
l)	Vapour density	No data available
m)	Relative density	1.74 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available

o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	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.

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.

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(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))

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
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

	CAS-No.	Revision Date
Magnesium (non pyrophoric)	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.

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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.0 Revision Date: 01/31/2017 Print Date: 06/28/2019

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.

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 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.

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

Component	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC)		
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		

		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) varies		
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		
		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Not classifiable as a human carcinogen varies		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Not classifiable as a human carcinogen varies		

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

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, 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)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,244 °C (2,271 °F) - lit.
f)	Initial boiling point and boiling range	1,962 °C (3,564 °F) - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	7.3 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
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)

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 other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 40 mg/l - 48 h(Manganese)

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)

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

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
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.I:	W

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.

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

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 + P340 + 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 RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, 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. 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 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

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	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)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) 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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. 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

b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C (673.9 °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	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
l)	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: 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

Relative vapour density	6.93 - (Air = 1.0)

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, 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

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

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.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
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.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
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

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	CAS-No. 7439-97-6	Revision Date 2013-12-20

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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.15 Revision Date: 03/05/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : <I>m</>-Xylene

Product Number : 134902
Brand : Aldrich
Index-No. : 601-022-00-9

CAS-No. : 108-38-3

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)
Flammable liquids (Category 3), H226

Acute toxicity, Dermal (Category 4), H312

Skin irritation (Category 2), H315

Eye irritation (Category 2A), H319

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

Aspiration hazard (Category 1), H304

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)

H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.

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.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ 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 + P312	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.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
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

3.1 Substances

Synonyms	:	1,3-Dimethylbenzene
Formula	:	C_8H_{10}
Molecular weight	:	106.17 g/mol
CAS-No.	:	108-38-3
EC-No.	:	203-576-3
Index-No.	:	601-022-00-9

Hazardous components

Component	Classification	Concentration

m-Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312, H315, H319, H335, 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
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

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
Use personal protective equipment. 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. Discharge into the environment must be avoided.

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.
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.
Storage class (TRGS 510): 3: Flammable liquids

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
m-Xylene	108-38-3	TWA	100 ppm 435 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 655 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	The value in mg/m3 is approximate.		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
m-Xylene	108-38-3	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

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

Skin protection

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

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, 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.

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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. 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: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -48 °C (-54 °F) - lit.
f)	Initial boiling point and boiling range	138 - 139 °C (280 - 282 °F) - lit.
g)	Flash point	25.0 °C (77.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	Upper explosion limit: 7 %(V)

	flammability or explosive limits	Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	8.0 hPa at 20.0 °C (68.0 °F) 21.3 hPa at 37.7 °C(99.9 °F)
l)	Vapour density	No data available
m)	Relative density	0.868 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 3.2 at 20 °C (68 °F)
p)	Auto-ignition temperature	465.0 °C (869.0 °F) 528.0 °C (982.4 °F)
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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

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
LD50 Oral - Rat - male - 6,602 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male - 4 h - 6700 ppm
(Directive 67/548/EEC, Annex V, B.2.)
LD50 Dermal - Rabbit - male - 12,126 mg/kg
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Severe eye irritation - 24 h

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

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: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (m-Xylene)

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 on OSHA's list of regulated carcinogens.

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
Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Additional Information
RTECS: ZE2275000

Liver injury may occur., Kidney injury may occur., Blood disorders, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Fish - 11.23 mg/l - 96 h(m-Xylene) (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available(m-Xylene)
Toxicity to algae	Remarks: No data available(m-Xylene)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

12.4 Mobility in soil
No data available(m-Xylene)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

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: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

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
m-Xylene	108-38-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	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.

H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

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.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/17/2018 Print Date: 06/22/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 05/26/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Naphthalene

Product Number : 147141
Brand : Aldrich
Index-No. : 601-052-00-2

CAS-No. : 91-20-3

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)
Flammable solids (Category 2), H228

Acute toxicity, Oral (Category 4), H302

Carcinogenicity (Category 2), H351

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)

H228	Flammable solid.
H302	Harmful if swallowed.
H351	Suspected of causing 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.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting equipment.
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.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
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

Molecular weight	:	128.17 g/mol
CAS-No.	:	91-20-3
EC-No.	:	202-049-5
Index-No.	:	601-052-00-2

Hazardous components

Component	Classification	Concentration
Naphthalene		
	Flam. Sol. 2; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H228, H302, H351, 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
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

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
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. 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 wet-brushing and place in container for disposal according to local regulations (see section 13). 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 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.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.
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 parameters	Basis
Naphthalene	91-20-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Hemolytic anemia Upper Respiratory Tract irritation Cataract Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	10 ppm 50 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	15 ppm 75 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10 ppm 50 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		PEL	0.1 ppm 0.5 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
Naphthalene	91-20-3	1-Naphthol + 2-Naphthol			ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

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, 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 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: flakes, granules Colour: white
b)	Odour	aromatic
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 80 - 82 °C (176 - 180 °F) - lit.
f)	Initial boiling point and boiling range	218 °C (424 °F) - lit.
g)	Flash point	80.0 °C (176.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 5.9 %(V) Lower explosion limit: 0.9 %(V)
k)	Vapour pressure	1.3 hPa at 53.0 °C (127.4 °F) 0.04 hPa at 25.0 °C(77.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.085 g/cm3 at 24.7 °C (76.5 °F)
n)	Water solubility	0.0308 g/l at 25 °C (77 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.4 at 25 °C (77 °F)
p)	Auto-ignition temperature	526.0 °C (978.8 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	1.05 mm2/s at 81.5 °C (178.7 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	31.8 mN/m at 100.0 °C (212.0 °F)

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, flames and sparks.

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
LD50 Oral - Rat - 490.0 mg/kg
LC50 Inhalation - Rat - male and female - 4 h - > 0.4 mg/l
(OECD Test Guideline 403)
LD50 Dermal - Rabbit - 20,000 mg/kg
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation

Respiratory or skin sensitisation
Maximisation Test - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative

Rat - male
Result: negative

Carcinogenicity

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Naphthalene)
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

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

Repeated dose toxicity - Rat - male and female - Oral - No observed adverse effect level - 100 mg/kg - Lowest observed adverse effect level - 400 mg/kg
RTECS: QJ0525000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer., Naphthalene is retinotoxic and systemic absorption of its vapors above 15ppm, may result in:, cataracts, optic neuritis, corneal injury, Eye irritation, Ingestion may provoke the following symptoms:, hemolytic anemia, hemoglobinuria, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Convulsions, anemia, Kidney injury may occur., Seizures., Coma.

Heart -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 7.9 mg/l - 96 h(Naphthalene) (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 2.16 mg/l - 48 h(Naphthalene)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d(Naphthalene) Result: 2 % - Not readily biodegradable.

12.3 Bioaccumulative potential

Bioaccumulation	Fish(Naphthalene) Bioconcentration factor (BCF): 427 - 1,158

12.4 Mobility in soil
No data available(Naphthalene)

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
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: 1334 Class: 4.1 Packing group: III

Proper shipping name: Naphthalene, refined
Reportable Quantity (RQ) : 100 lbs

Marine pollutant: no
Poison Inhalation Hazard: No

IMDG
UN number: 1334 Class: 4.1 Packing group: III EMS-No: F-A, S-G
Proper shipping name: NAPHTHALENE, REFINED
Marine pollutant : yes

IATA
UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, refined

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
Naphthalene	91-20-3	2007-03-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Naphthalene	91-20-3	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
Naphthalene	91-20-3	2007-09-28

16. OTHER INFORMATION

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

H228	Flammable solid.
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	2

NFPA Rating

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	2

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.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/26/2018 Print Date: 06/28/2019

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 + P340 + 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 RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, 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. 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 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

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	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)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) 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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. 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

b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C (673.9 °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	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
l)	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: 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

Relative vapour density	6.93 - (Air = 1.0)

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, 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

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

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.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
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.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
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

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	CAS-No. 7439-97-6	Revision Date 2013-12-20

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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.15 Revision Date: 03/05/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 08/07/2018
Print Date 06/29/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : <I>o</>-Xylene

Product Number : 95660
Brand : Sigma-Aldrich
Index-No. : 601-022-00-9

CAS-No. : 95-47-6

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)
Flammable liquids (Category 3), H226

Acute toxicity, Inhalation (Category 4), H332

Acute toxicity, Dermal (Category 4), H312

Skin irritation (Category 2), H315

Eye irritation (Category 2A), H319

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

Aspiration hazard (Category 1), H304

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)

H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312 + H332	Harmful in contact with skin or if inhaled.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.

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.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
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

3.1 Substances

Synonyms	:	1,2-Dimethylbenzene
Formula	:	C_8H_{10}
Molecular weight	:	106.17 g/mol
CAS-No.	:	95-47-6
EC-No.	:	202-422-2
Index-No.	:	601-022-00-9

Hazardous components

Component	Classification	Concentration
o-Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312 + H332, H315, H319, H335, 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
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

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
Use personal protective equipment. 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. Discharge into the environment must be avoided.

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.
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.
Storage class (TRGS 510): 3: Flammable liquids

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
o-Xylene	95-47-6	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
o-Xylene	95-47-6	Methylhippuric acids	1,500.0000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

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

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

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, 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.

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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. 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: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -26 - -23 °C (-15 - -9 °F) - lit.
f)	Initial boiling point and boiling range	143 - 145 °C (289 - 293 °F) - lit.
g)	Flash point	31.0 °C (87.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 6.7 %(V) Lower explosion limit: 0.9 %(V)
k)	Vapour pressure	21.3 hPa at 37.7 °C (99.9 °F)

l)	Vapour density	No data available
m)	Relative density	0.879 g/mL at 20 °C (68 °F)
n)	Water solubility	0.1705 g/l at 25 °C (77 °F) - partly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.12 at 20 °C (68 °F)
p)	Auto-ignition temperature	464.0 °C (867.2 °F)
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

Surface tension	29.8 mN/m at 25.0 °C (77.0 °F)

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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
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
LC50 Inhalation - Rat - male - 6 h - 18,800 mg/m3
Dermal: No data available
LD50 Intraperitoneal - Mouse - 1,364 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
- Mouse

Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
Ames test
Salmonella typhimurium
Result: negative

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
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
May be fatal if swallowed and enters airways.

Additional Information
RTECS: ZE2450000

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

Nerves. -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 16.10 mg/l - 96 h(o-Xylene)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d(o-Xylene) Result: 69.67 % - Not readily biodegradable. (OECD Test Guideline 301F) Remarks: The 10 day time window criterion is not fulfilled.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(o-Xylene)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. 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.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

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
o-Xylene	95-47-6	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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

H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H312 + H332	Harmful in contact with skin or if inhaled.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

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.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 08/07/2018 Print Date: 06/29/2019

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
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.

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.
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

Formula : $C_8HF_{17}O_3S$

Molecular Weight : 500.13 g/mol

Hazardous components

Component		Classification	Concentration
Heptadecafluorooctane-1-sulphonic acid			
CAS-No. EC-No. Index-No.	1763-23-1 217-179-8 607-624-00-8	Acute Tox. 4; Skin Corr. 1B; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; Aquatic Acute 2; Aquatic Chronic 2; H302 + H332, H314, H351, H360, H362, H372, H411	30 - 60 %

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.

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.

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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Colour: light red
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	no data available
g)	Flash point	no data available
h)	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
l)	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

q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

Inhalation: no data available

Dermal: no data available

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

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

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

	CAS-No.	Revision Date
Water	7732-18-5	
Heptadecafluorooctane-1-sulphonic acid	1763-23-1	2009-07-17

New Jersey Right To Know Components

	CAS-No.	Revision Date
Water	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

Reactivity Hazard: 0

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.

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

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	Harmful if swallowed or if inhaled.
H318	Causes serious eye damage.
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 (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	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

SECTION 3: Composition/information on ingredients

3.1 Substances

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

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

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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

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	2.6 at 1 g/l
e)	Melting point/freezing point	Melting point/range: 55 - 56 °C (131 - 133 °F) - lit.
f)	Initial boiling point and boiling range	189 °C 372 °F at 981 hPa - lit.

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g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	0.69 hPa at 25 °C (77 °F)
l)	Vapour density	No data available
m)	Relative density	0.900 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 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
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. 335-67-1	Revision Date

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

New Jersey Right To Know Components

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

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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SAFETY DATA SHEET

Version 5.11
Revision Date 07/28/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Phenol

Product Number : W322318
Brand : Aldrich
Index-No. : 604-001-00-2

CAS-No. : 108-95-2

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 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Germ cell mutagenicity (Category 2), H341
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 3), H402
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)

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H314	Causes severe skin burns and eye damage.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs through prolonged or repeated exposure.
H402	Harmful to aquatic life.
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.
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 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
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.
P362	Take off contaminated clothing and wash before reuse.
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

Vesicant., Rapidly absorbed through skin.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Hydroxybenzene
Formula	:	C_6H_6O
Molecular weight	:	94.11 g/mol
CAS-No.	:	108-95-2
EC-No.	:	203-632-7
Index-No.	:	604-001-00-2
Registration number	:	01-2119471329-32-XXXX

Hazardous components

Component	Classification	Concentration
Phenol		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Muta. 2; STOT RE 2; Aquatic Acute 3; Aquatic Chronic 2; H301 + H311 + H331, H314, H341, H373, H402, H411	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
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. 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
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.

Handle and store under inert gas. Light sensitive.
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

Component	CAS-No.	Value	Control parameters	Basis
Phenol	108-95-2	TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Lung damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	5 ppm 19 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		C	15.6 ppm 60 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption 15 minute ceiling value		
		TWA	5 ppm 19 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation The value in mg/m3 is approximate.		
		PEL	5 ppm 19 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
Aromatic compound	-	Phenol	250mg/g Creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	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: 0.2 mm
Break through time: 56 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, 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
c)	Odour Threshold	No data available
d)	pH	6.0
e)	Melting point/freezing point	Melting point/range: 40 - 43 °C (104 - 109 °F) - lit.
f)	Initial boiling point and boiling range	182 °C (360 °F) - lit.
g)	Flash point	79.0 °C (174.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.6 %(V) Lower explosion limit: 1.7 %(V)
k)	Vapour pressure	6.3 hPa (4.7 mmHg) at 55.0 °C (131.0 °F) 0.5 hPa (0.4 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.071 g/mL at 25 °C (77 °F)

n)	Water solubility	84 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 1.46
p)	Auto-ignition temperature	715.0 °C (1,319.0 °F)
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

Surface tension	38.2 mN/m at 50.0 °C (122.0 °F)

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, Strong bases, Strong 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
LD50 Oral - Rat - 410.0 - 650.0 mg/kg

LD50 Oral - Rat - 317.0 mg/kg
Remarks: Behavioral:Convulsions or effect on seizure threshold.

LC50 Inhalation - Rat - 8 h - 900 mg/m3

LD50 Dermal - Rabbit - 630.0 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
In vitro tests showed mutagenic effects

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
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: SJ3325000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Circulatory collapse, tachypnea, paralysis, Convulsions, Coma., necrosis of mouth and G.I. Tract, Jaundice, respiratory failure, cardiac arrest 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 - Leuciscus idus (Golden orfe) - 14.00 - 25.00 mg/l - 48 h
	LC50 - Carassius auratus (goldfish) - 36.10 - 68.80 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 56 mg/l - 48 h
Toxicity to algae	EC50 - Chlorella vulgaris (Fresh water algae) - 370.00 mg/l - 96 h

12.2 Persistence and degradability

Biodegradability	Result: - Readily biodegradable.

12.3 Bioaccumulative potential

Bioaccumulation	Danio rerio (zebra fish) - 5 h - 2 mg/l Bioconcentration factor (BCF): 17.5 Remarks: Does not bioaccumulate.

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 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: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1671 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: PHENOL, SOLID
Marine pollutant:yes

IATA

UN number: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid

15. REGULATORY INFORMATION

SARA 302 Components

The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

SARA 313 Components

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

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Dam.	Serious eye damage
H301	Toxic if swallowed.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs through prolonged or repeated exposure.
H402	Harmful to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Muta.	Germ cell mutagenicity
Skin Corr.	Skin corrosion
STOT RE	Specific target organ toxicity - repeated exposure

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.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.11 Revision Date: 07/28/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.2
Revision Date 07/25/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : <I>p</>-Xylene

Product Number : 296333
Brand : Sigma-Aldrich
Index-No. : 601-022-00-9

CAS-No. : 106-42-3

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)
Flammable liquids (Category 3), H226

Acute toxicity, Inhalation (Category 4), H332

Acute toxicity, Dermal (Category 4), H312

Skin irritation (Category 2), H315

Acute aquatic toxicity (Category 2), H401

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H226	Flammable liquid and vapour.
H312 + H332	Harmful in contact with skin or if inhaled.
H315	Causes skin irritation.
H401	Toxic to aquatic life.

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.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	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.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
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	:	1,4-Dimethylbenzene
Formula	:	C_8H_{10}
Molecular weight	:	106.17 g/mol
CAS-No.	:	106-42-3
EC-No.	:	203-396-5
Index-No.	:	601-022-00-9

Hazardous components

Component	Classification	Concentration
p-Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Aquatic Acute 2; H226, H312 + H332, H315, H401	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

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

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

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
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

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
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. 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. Discharge into the environment must be avoided.

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.
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.
Storage class (TRGS 510): 3: Flammable liquids

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
p-Xylene	106-42-3	TWA	100 ppm 435 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 655 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	The value in mg/m3 is approximate.		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
p-Xylene	106-42-3	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

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

Skin protection

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

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, 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.

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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. 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, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 12 - 13 °C (54 - 55 °F) - lit.
f)	Initial boiling point and boiling range	138 °C (280 °F) - lit.
g)	Flash point	25.0 °C (77.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	21.3 hPa at 37.7 °C (99.9 °F) 12.0 hPa at 20.0 °C(68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.861 g/cm3 at 20 °C (68 °F)
n)	Water solubility	0.2 g/l
o)	Partition coefficient: n-octanol/water	log Pow: 3.15
p)	Auto-ignition temperature	529.0 °C (984.2 °F)
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

Surface tension 28.3 mN/m at 20.0 °C (68.0 °F)

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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

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
LD50 Oral - Rat - 5,000 mg/kg
LD50 Oral - Rat - male - 3,523 mg/kg
LC50 Inhalation - Rat - 4 h - 4550 ppm
Remarks: Lungs, Thorax, or Respiration:Chronic pulmonary edema. Liver:Other changes. Blood:Changes in cell count (unspecified).
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Moderate skin irritation - 4 h

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (p-Xylene)

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
No data available
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: ZE2625000

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 2.60 mg/l - 96 h(p-Xylene)
	LC50 - Carassius auratus (goldfish) - 18.00 mg/l - 24 h(p-Xylene)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 35.50 - 63.10 mg/l - 48 h(p-Xylene)
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 3.20 - 4.40 mg/l - 72 h(p-Xylene)

12.2 Persistence and degradability

Biodegradability	Result: 87.8 % - Readily biodegradable.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(p-Xylene)

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
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: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ) : 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

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
p-Xylene	106-42-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

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.

H226	Flammable liquid and vapour.
H312	Harmful in contact with skin.
H312 + H332	Harmful in contact with skin or if inhaled.
H315	Causes skin irritation.
H332	Harmful if inhaled.
H401	Toxic to aquatic life.

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.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.2 Revision Date: 07/25/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Revision Date 26-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Selenium**

Cat No. : **AC419270000; AC419271000; AC419275000**

CAS No 7782-49-2
Synonyms None

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 3
Acute Inhalation Toxicity - Dusts and Mists	Category 3
Specific target organ toxicity - (repeated exposure)	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
May cause damage to organs through prolonged or repeated exposure
Toxic if swallowed or if inhaled



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Response
Get medical attention/advice if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
May cause long lasting harmful effects to aquatic life

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Selenium	7782-49-2	> 99.5

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature Not applicable
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 with air.

Hazardous Combustion Products
None known.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.
Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only under a chemical fume hood. Do not breathe (dust, vapor, mist, gas). Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep under nitrogen. Incompatible Materials. Acids. Strong oxidizing agents. Fluorine. oxygen. Metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Selenium	TWA: 0.2 mg/m³	(Vacated) TWA: 0.2 mg/m³	IDLH: 1 mg/m³ TWA: 0.2 mg/m³	TWA: 0.2 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection A NIOSH/MSHA approved air purifying dust or mist respirator or European Standard EN 149.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid Granules
Appearance	Dark grey
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	217 - 222 °C / 422.6 - 431.6 °F
Boiling Point/Range	685 °C / 1265 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 345 °C
Vapor Density	Not applicable
Specific Gravity	4.810
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Se
Molecular Weight	78.96

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Acids, Strong oxidizing agents, Fluorine, oxygen, Metals

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Selenium	LD50 = 6700 mg/kg (Rat)	Not listed	>5.67 mg/l (Rat) 4hr

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Selenium	7782-49-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Selenium	Not listed	LC50: > 100 mg/L, 96h semi-static (Oncorhynchus mykiss)	Not listed	Not listed

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN3283
Hazard Class	6.1
Packing Group	III

TDG

UN-No	UN3283
Hazard Class	6.1
Packing Group	III

IATA

UN-No	UN3283
Proper Shipping Name	SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class	6.1
Packing Group	III

IMDG/IMO

UN-No	UN3283
Proper Shipping Name	SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class	6.1
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Selenium	7782-49-2	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Selenium	7782-49-2	X	-	231-957-4	X	X		X	X	KE-30924

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Selenium	7782-49-2	> 99.5	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Selenium	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Selenium	100 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Selenium	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Selenium	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Selenium	7782-49-2	Not applicable	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Selenium	7782-49-2	Not applicable	Not applicable	Not applicable	Annex I - Y25

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 26-Dec-2021
Print Date 26-Dec-2021

Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 3.12
Revision Date 05/04/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Silver

Product Number : 85131
Brand : Aldrich

CAS-No. : 7440-22-4

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
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 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)
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P391 Collect spillage.
P501 Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Ag
Molecular weight : 107.87 g/mol

CAS-No. : 7440-22-4
EC-No. : 231-131-3

Hazardous components

Component	Classification	Concentration
Silver		
	Aquatic Acute 1; Aquatic Chronic 1; 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.

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
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

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

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Air sensitive. 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 parameters	Basis
Silver	7440-22-4	TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Argyria		
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Argyria		
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Argyria		
		TWA	0.01 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.01 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 960 °C (1,760 °F) - lit.
f)	Initial boiling point and boiling range	2,212 °C (4,014 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available

k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxygen, Strong acids and strong bases

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Silver/silver 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

LD50 Oral - Rat - male - > 5,000 mg/kg

Inhalation: No data available

Inhalation: No data available

Dermal: No data available

Dermal: No data available

No data available

No data available

Skin corrosion/irritation
No data available

No data available

Serious eye damage/eye irritation
No data available

No data available

Respiratory or skin sensitisation
No data available

No data available

Germ cell mutagenicity
No data available

No data available

Carcinogenicity

Carcinogenicity - Rat - Unreported
Tumorigenic:Tumors at site or application.

Carcinogenicity classification not possible from current data.

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
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

May cause argyria (a slate-gray or bluish discoloration of the skin and deep tissues due to the deposit of insoluble albuminate of silver).

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment

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

12.6 Other adverse effects

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

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Silver)
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.
Marine pollutant:yes

IATA

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s.

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
Silver	7440-22-4	1993-04-24

SARA 311/312 Hazards

No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date

Silver	7440-22-4	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.

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
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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.12 Revision Date: 05/04/2017 Print Date: 06/28/2019

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	:	Tl
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 + H330, H412	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

In case of eye contact
Flush eyes with water as a precaution.

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

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
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 parameters	Basis
Thallium	7440-28-0	TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Alopecia Adopted values or notations enclosed 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 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Peripheral neuropathy Gastrointestinal damage 2015 Adoption Danger of cutaneous absorption		
		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Peripheral neuropathy Gastrointestinal damage		

		Danger of cutaneous absorption varies		
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Peripheral neuropathy Gastrointestinal damage Danger of cutaneous absorption varies		
		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

		Colour: light grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 303 °C (577 °F) - lit.
f)	Initial boiling point and boiling range	1,457 °C (2,655 °F) - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air sensitive.

10.5 Incompatible materials
Strong acids, Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - thallium 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 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 th angina-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)

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

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
Thallium	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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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.3
Revision Date 03/06/2019
Print Date 06/22/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Toluene

Product Number : 244511
Brand : Sigma-Aldrich
Index-No. : 601-021-00-3
CAS-No. : 108-88-3

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

SECTION 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
Skin irritation (Category 2), H315
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure (Category 2), H373
Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 2), H401

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

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operates as MilliporeSigma in the US and Canada

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
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.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
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): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
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

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_7H_8
Molecular weight	:	92.14 g/mol
CAS-No.	:	108-88-3
EC-No.	:	203-625-9

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Index-No. : 601-021-00-3

Component	Classification	Concentration
Toluene		
	Flam. Liq. 2; Skin Irrit. 2; Repr. 2; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H225, H315, H361d, H336, H373, H304, H401 Concentration limits: 20 %: STOT SE 3, H336;	<= 100 %

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

SECTION 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
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

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

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

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5.4 Further information
Use water spray to cool unopened containers.

SECTION 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. 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. Discharge into the environment must be avoided.

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.

SECTION 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.

Handle and store under inert gas.
Storage class (TRGS 510): 3: Flammable liquids

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

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Component	CAS-No.	Value	Control parameters	Basis
Toluene	108-88-3	TWA	100 ppm 375 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	150 ppm 560 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z37.12-1967		
		CEIL	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		Peak	500 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Visual impairment Female reproductive Pregnancy loss 2018 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 375 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 560 mg/m3	USA. NIOSH Recommended Exposure Limits

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Toluene	108-88-3	Toluene	0.02 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Toluene	0.03 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		o-Cresol	0.3mg/g Creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	2.89 mg/kg

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Marine water	0.68 mg/l
Fresh water	0.68 mg/l
Marine sediment	16.39 mg/kg
Fresh water sediment	16.39 mg/kg
Sewage treatment plant	13.61 mg/l
Aquatic intermittent release	0.68 mg/l

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: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, 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, 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 multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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operates as MilliporeSigma in the US and Canada

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.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	aromatic
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -93 °C (-135 °F)
f)	Initial boiling point and boiling range	110 - 111 °C 230 - 232 °F
g)	Flash point	4.0 °C (39.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.2 %(V)
k)	Vapour pressure	29.1 hPa at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.865 g/mL at 25 °C (77 °F)
n)	Water solubility	0.5 g/l at 15 °C (59 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	535.0 °C (995.0 °F)
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

SECTION 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
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

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

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 5,580 mg/kg
(Tested according to Directive 92/69/EEC.)
LC50 Inhalation - Rat - male and female - 4 h - 25.7 mg/l
(OECD Test Guideline 403)
LD50 Dermal - Rabbit - 12,124 mg/kg
Remarks: (ECHA)
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 4 h
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
In vitro mammalian cell gene mutation test
Mouse lymphoma test
Result: negative
Ames test
S. typhimurium
Result: negative

Rat - Bone marrow
Result: negative
(ECHA)

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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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
Suspected of damaging the unborn child.

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness. - Central nervous system

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure. - Central nervous system

Aspiration hazard
Aspiration hazard, Aspiration may cause pulmonary oedema and pneumonitis.

Additional Information
RTECS: XS5250000

Drowsiness, irritant effects, Dizziness, Convulsions, Headache, Nausea, Vomiting, Circulatory collapse, somnolence, inebriation, Unconsciousness, respiratory arrest, CNS disorders, respiratory paralysis, death
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

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 5.8 mg/l - 96 h Remarks: (ECOTOX Database)
	NOEC - Pimephales promelas (fathead minnow) - 5.44 mg/l - 7 d
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h Remarks: (ECOTOX Database)
Toxicity to algae	EC50 - Chlorella vulgaris (Fresh water algae) - 245.00 mg/l - 24 h Remarks: (ECOTOX Database)
	EC50 - Pseudokirchneriella subcapitata (green algae) - 10.00 mg/l - 24 h Remarks: (ECOTOX Database)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 20 d Result: 86 % - Readily biodegradable. Remarks: (IUCLID)

12.3 Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d - 0.05 mg/l(Toluene)

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Bioconcentration factor (BCF): 90

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.
No data available

SECTION 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.

SECTION 14: Transport information

DOT (US)
UN number: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1294 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: TOLUENE

IATA
UN number: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene

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

CAS-No. Revision Date

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Toluene	108-88-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Toluene	108-88-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Toluene	108-88-3	2007-07-01

California Prop. 65 Components

, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.Toluene	CAS-No. 108-88-3	Revision Date 2009-02-01

SECTION 16: Other information

Further information
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Version: 6.3 Revision Date: 03/06/2019 Print Date: 06/22/2019

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Appendix F:

Community Air Monitoring Plan

SESI
CONSULTING ENGINEERS

Geotechnical
Environmental
Site Civil

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Parsippany, NJ 07054
973.808.9050
www.sesi.org

Community Air Monitoring Plan
For

Proposed Mixed-Use Development
177 North Avenue
New Rochelle, Westchester County, NY

Prepared for:

177 North Avenue Owner LLC
July 2026

SESI Project No:
12587A

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LIST OF ACRONYMS

Acronym	Definition
CAMP	Community Air Monitoring Plan
mcg/m^3	micrograms per cubic meter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PID	Photoionization Detector
PM-10	Less than 10 micrometers
ppm	Parts Per Million
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This document presents a Community Air Monitoring Plan (CAMP) for the Remedial Investigation Workplan (RIWP) for the proposed development of the property located at 466 Main Street, New Rochelle, Westchester County, New York (the Site). The Site consists of a 0.433-acre area parcel and is identified as proposed Block 215, Lot 42 on the Westchester County tax map. The Site is located in a residential and commercial area and is bounded by commercial development and Main Street beyond to the north, Clinton Place and mixed-use commercial beyond to the south, a church and mixed-use commercial and residential building to the east, and North Avenue and commercial and retail beyond to the west.

The Site is improved with a parking lot accessible via an entrance on North Avenue. The Site has been developed since at least 1940.

2.0 OBJECTIVES

The objective of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that may arise during all ground intrusive activities, and potentially contaminated soil and material handling and staging. In addition, the CAMP is intended to ensure that dust and contaminants are not leaving the work zone.

3.0 METHODS

The CAMP will include continuous monitoring for particulate matter (e.g., airborne “dust”) and volatile organic compounds (VOCs) during the planned demolition and remediation activities. Any CAMP exceedances will be reported to the NYSDEC and NYSDOH on the same business day and as soon as possible. Notification of the exceedance will be sent via email along with the reason for the exceedance, the measure(s) taken to address the exceedance, and if the exceedance was resolved. In addition, the following NYSDEC and NYSDOH personnel will be provided weekly CAMP data summaries for review.

Name	Contact Information
NYSDEC Project Manager	TBD
NYSDOH Project Manager	TBD

3.1 CONTINUOUS MONITORNG

Continuous monitoring for particulates and VOCs will be conducted during all ground intrusive activities including soil borings, monitoring well installations, and soil vapor probe installations.

3.2 PERIODIC MONITORING

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

4.0 VOC MONITORNG, RESPONSE LEVELS, AND ACTIONS

VOC Monitoring, Response Levels, and Actions Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using a photoionization detector (PID) equipped with a 10.6 ev lamp. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment

should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

3.3 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

4.0 SPECIAL REQUIREMENTS FOR WORK WITHIN 20 FEET OF POTENTIALLY EXPOSED INDIVIDUAL STRUCTURES

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the

occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 ug/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 ug/m^3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Appendix G:

Community Participation Plan