REMEDIAL INVESTIGATION WORK PLAN

LOUISIANA AVE LANDFILL AUTO WRECKING
PROJECT 7 SITE
FLATLANDS AVENUE
Brooklyn, New York
NYSDEC BCP No. TBD

Prepared for:

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CERTIFICATION

I, Amanda Forsburg, certify that I am currently a Qualified Environmental Professional as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation.

Amanda M. Forsburg

Amanda Forsburg, CHMM

1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) was prepared on behalf of IUV Phase 2B Owner, LLC (the Applicant) for the property located to the northwest and west of the Christian Cultural Center building, along Flatlands Avenue between Louisiana Avenue and Malta Street in Brooklyn, New York (the Site). The objective of the proposed Remedial Investigation (RI) is to further investigate potential on-Site sources and extents of soil, soil vapor, and groundwater impacts identified in Langan's 15 January 2026 Due Diligence Phase II Environmental Investigation (Phase II EI) Report prepared for the Applicant. Results of previous investigation and areas of concern identified in the Phase II report are described in detail in Section 2.6 of this RIWP. Proposed investigation activities will be completed in the vicinity of the Former On-Site Automotive Dismantling/Wrecking area on the Site, to further investigate the presence of contaminated fill and incinerator ash historically placed at the Site, to complete a Site-wide assessment, and to determine the extent of contamination in groundwater, soil, and soil vapor.

The following work scope has been developed to meet the investigation requirements of the NYSDEC Brownfield Cleanup Program in accordance with the requirements of Environmental Conservation Law (ECL) Article 27-1415(2). This RIWP was developed in accordance with the process and requirements identified in the NYSDEC Division of Environmental Remediation (DER)-10 *Technical Guidance for Site Investigation and Remediation* (May 2010) Section 3.3 "Investigation Work Plans" and the New York State Department of Health (NYSDOH) "Guidance for Evaluating Soil Vapor Intrusion in the State of New York, with updates" (October 2006).

2.0 SITE BACKGROUND

2.1 Site Description

The approximately 45,677-square-foot or 1.049-acre Site is located to the northwest and west of the Christian Cultural Center building on Flatlands Avenue in Brooklyn, New York, and is designated as New York City Tax Block 4430, portion of Lot 1. A RP602 form has been filed with the New York City Department of Finance (NYCDOF) to reapportion this portion of Lot 1 into future Lot 101. The Site has not yet been assigned a new address since it was recently subdivided into its own lot; however, it is anticipated that the Site will have a Louisiana Avenue and/or Flatlands Avenue address. A Site Location Plan is provided as Figure 1 and a Tax Map is provided as Figure 2. The Site currently consists of an asphalt paved parking lot and landscaped entryway associated with the Christian Cultural Center located adjacent to the east. A figure showing the Site boundary and adjacent properties is provided as Figure 3. The Site is bounded by

Flatlands Avenue to the north; an asphalt-paved parking lot and the Christian Cultural Center to the east; an asphalt paved parking lot associated with the Christian Cultural Center to the south; and Louisiana Avenue to the west.

According to the New York City Department of City Planning (NYCDCP) zoning map effective 19 March 2024 the Site is currently zoned by the New York City Department of City Planning as R7-2 with a commercial overlay (C2-4) which is identified as a residential district that allows for the development of medium-density buildings.

2.2 Surrounding Property Land Use

According to records maintained online by New York City Department of City Planning NYC Zoning & Land Use Map (ZoLa) and aerial/street-view observations provided by Google Maps, surrounding properties include commercial, industrial, and automotive uses to the north, parking lots and the CCC building to the east and south, and commercial uses to the west. The following is a summary of surrounding property usage:

Direction	Adjacent Properties			Surrounding Properties
	Block No.	Lot No.	Description	
North	4408	1	Flatlands Avenue followed a two-story self-storage building (12015 Flatlands Avenue)	Industrial / manufacturing and commercial buildings
	4409	37	Flatlands Avenue followed by a flea market (12025 Flatlands Avenue)	
East	4430	1	Christian Cultural Center (CCC) Church facility and an asphalt paved parking lot for the CCC building	An active construction Site (35 Inspiration Lane (formerly known as 12074 Flatlands Avenue) followed by Pennsylvania Avenue
South	4430	1	CCC Church facility and an asphalt paved parking lot for the CCC building	Residential building complexes
West	8235	48	Louisiana Avenue followed by a shopping center with two one-story buildings and an associated paved parking lot (430 Louisiana Avenue)	Commercial buildings, Fresh Creek Nature Preserve
	8235	53	Louisiana Avenue followed by a one-story shopping center (11110 Flatlands Avenue)	

Public infrastructure (storm drains, sewers, and underground utility lines) exists within the street to the north of the Site.

Sensitive receptors, as defined in DER-10, located within a half-mile of the Site include those listed below:

Number	Name (Approximate distance from Site)	Address
1	Brooklyn Public Library After School Program, Spring Creek Branch (approximately 0.22-miles northeast of the Site)	12143 Flatlands Avenue Brooklyn, NY 11207
2	The Science and Medicine Middle School (approximately 0.24-miles southwest of the Site)	965 East 107 Street Brooklyn, NY 11236
3	The Fresh Creek School (approximately 0.29-miles to the northwest of the Site)	875 Williams Avenue Brooklyn, NY 11207
4	PS 306 Ethan Allen (approximately 0.30-miles northeast of the Site)	970 Vermont Street Brooklyn, NY 11207
5	A Plus Kidz Academy (approximately 0.32-miles southwest of the Site)	10510 Flatlands Avenue Brooklyn, NY 11236
6	Breukelen Head Start/Early Childhood Development Center (approximately 0.33-miles west of the Site)	715-717 East 105 Street Brooklyn, NY 11236
7	Starrett Early Learning Center (approximately 0.34-miles southeast of the Site)	1325 Pennsylvania Avenue Brooklyn, NY 11239
8	P.S 346 Abe Stark (approximately 0.40-miles to the southeast of the Site)	1400 Pennsylvania Avenue Brooklyn, NY 11207
9	Be'er Hagolah Institute Elementary School (approximately 0.40-miles southeast of the Site)	671 Louisiana Avenue Brooklyn, NY 11239

2.3 Site Physical Conditions

2.3.1 Topography

Based on a Boundary and Topographic Survey prepared by Control Point Associates Inc. PC, the Site slopes from south to north with elevations ranging from approximately 18.7 to 11.3 North American Vertical Datum of 1988 (NAVD88).

2.3.2 Geology

Historical topographic maps reveal that the Site consisted of marshland associated with Jamaica Bay. Based on subsurface conditions encountered during the May 2018 and October 2025 Phase II EIs, stratigraphy of the Site consists of an up to 6-inch layer of asphalt underlain by between approximately 11 to 22 feet of fill, consisting of dark to light brown sand containing

trace to some gravel, silt, trace wood, metal, brick, and concrete, followed by grayish brown sand. The thinner layer of fill material was identified in the northern portion of the Site.

The "Surficial Geologic Map of New York" by the New York State Museum State Geological Survey indicates that the surficial geology at the site consists of outwash sand and gravel which is generally a well-rounded and stratified layer of coarse to fine gravel with sand. According to the "NYS Geological Survey Map & Chart Series Number 15" by the New York State Museum Publications Department, geology at the site consists of coastal plain deposits of the Monmouth Group, Matawan Group, and the Magothy Formation.

2.3.3 Hydrogeology

Groundwater flow is typically topographically influenced, as shallow groundwater tends to originate in areas of topographic highs and flow toward areas of topographic lows, such as rivers, stream valleys, ponds, and wetlands. A broader, interconnected hydrogeologic network often governs groundwater flow at depth or in the bedrock aquifer. Groundwater depth and flow direction are also subject to hydrogeologic and anthropogenic variables such as precipitation, evaporation, extent of vegetation cover, coverage by impervious surfaces, and subsurface structures. Other factors influencing groundwater include depth to bedrock, the presence of anthropogenic fill, and variability in local geology and groundwater sources or sinks. Groundwater in New York City is not used as a potable water source. Potable water provided to the City of New York is derived from surface impoundments in the Croton, Catskill, and Delaware watersheds.

Static groundwater level was measured between 15.12 feet bgs and 18.80 feet bgs at two-inch permanent groundwater monitoring wells installed during the October 2025 Phase II EI. The nearest surface water body is Fresh Creek and the Jamaica Bay, and it is expected that regional groundwater generally flows to the south.

2.3.4 Wetlands

Langan reviewed United States Fish and Wildlife National Wetland Inventory (NWI) and New York State Freshwater Wetlands maps. Based on these documents no mapped wetlands are listed on the Site. The nearest wetlands is Fresh Creek Basin (Estuarine and Marine Deepwater habitat), located approximately 500 feet to the southwest of the Site.

NYSDEC DER-10 requires an on-Site and off-Site Fish and Wildlife Resources Impact Analysis (FWRIA) if certain criteria are met. Based on the requirements stipulated in Section 3.10 and Appendix 3C of DER-10, a FWRIA for the Site is not required.

2.4 Proposed Development Plan

The Site is part of a master planned community with internal streets that will be maintained by the Volunteer/developer. The proposed future use of the Site consists of construction of a multi-story affordable housing building on the southern portion of the Site. The building will also include a community facility. The northern portion of the Site will include a publicly accessible landscaped area and entryway. Construction for the redevelopment is proposed to begin in early 2027. Remediation will be completed during the new building foundation excavation and construction.

2.5 Environmental History

Based on Langan's January 2026 Phase I Environmental Site Assessment (ESA), the Site was filled in during the early 1900's with ash and waste from the city solid waste incinerator and was undeveloped until the early 1950's. The Site was then operated as an auto junkyard for approximately 27 years (1954 through 1981). A 1984 aerial photograph shows that the Site appears to have been reworked and later photographs show the Site as vacant until construction of the parking lot and landscaped area in approximately 2002 when construction on the adjacent Christian Cultural Center was completed. The site is currently owned by Christian Cultural Center. The Phase I ESA identified historical operations at the subject property and the presence of contaminated fill as recognized environmental conditions.

According to the Phase I ESA, the adjacent properties to the east and south originally consisted of marshlands and were filled in during the early 1900's with ash and waste from the city solid waste incinerator. These properties remained undeveloped and unoccupied until subsequently operated as an auto junk yard between approximately 1954 and 1981 and then were again vacant and undeveloped for a period of time. The adjacent properties to the east and south were developed as the Christian Cultural Center and associated asphalt-paved parking and recreational areas including a playground and basketball court circa 2002. Historical operations on the adjacent properties to the west across Louisiana Avenue included a small commercial building and a bowling alley with a large, paved parking lot from 1961 through 1980. In 1981, the properties were converted to the current shopping center and associated parking lot. The adjacent properties to the north across Flatlands Avenue were undeveloped until 1950, when an egg farm was located on a portion of the adjacent property. The properties were occupied by vehicle storage and auto repair through 1986, auto sales and truck storage through 2006, and a self storage facility through the present.

2.6 Previous Environmental Reports

The Site is part of a master planned community with internal streets that will be maintained by the Volunteer/developer. The Site consists of a small portion of the 10-acre proposed development site consisting of the property at 12020 Flatlands Avenue (currently designated as Block 4430, Lot 1 and Block 4434, Lots 1, 10, and 100) located in Brooklyn, New York, and is specifically located on a 1.049-acre portion of Block 4430, Lot 1 (future Lot 101). The Site location with relation to the Christian Cultural Center building and the proposed development site extents is presented on Figure 3.

Langan reviewed the following environmental assessment and investigation reports prepared for the 10-acre proposed development site:

- *Fresh Creek Estates, Technical Memorandum to the Draft Environmental Impact Statement (DEIS)*, prepared by AKRF, Inc., dated June 1991;
- *Subsurface Investigation and Report*, prepared by Soil Engineering Services, Inc. (SESI), dated March 1994;
- *Phase I Environmental Site Assessment (ESA)*, prepared by Soil Mechanics Environmental Services (SMES), dated July 1997;
- *Phase I ESA for Flatlands Ave. & Pennsylvania Ave.,* prepared by Soil Mechanics Environmental Services (SMES), dated April 2003;
- *Phase I ESA*, prepared by Langan, dated March 2018; and,
- *Limited Due Diligence Phase II Environmental Investigation,* completed by Langan, dated May 2018.

In addition, Langan prepared the following environmental reports for the Site:

- *Phase I ESA,* prepared by Langan, dated 15 January 2026; and,
- *Phase II Environmental Investigation Report,* prepared by Langan, dated 15 January 2026.

Copies of these reports are provided in Appendix C and discussed below.

<u>Fresh Creek Estates, Technical Memorandum to the Draft Environmental Impact Statement (DEIS), AKRF, Inc., June 1991</u>

According to the Technical Memorandum, AKRF, Inc. (AKRF) prepared a comprehensive environmental assessment of the proposed Fresh Creek Estates Site which consisted of current Block 4430 Lot 1, Block 4431 Lot 70, and Block 4434 Lots 1, 10, 60, 75, and 100. The Technical

Memorandum identified that the Site was originally marshlands and was landfilled during the early 1900's using ash and residue from a city solid waste incinerator. Prior to 1950, a gasoline filling station was located on the northeast portion of the Site at the intersection of Pennsylvania Avenue and Flatlands Avenue, which corresponds to the eastern portion of Block 4434, Lot 10. Potential subsurface impacts to soil, groundwater, and soil vapor due to historical Site use and historic filling operations were investigated by completion of an electromagnetic survey, excavation of three test pits, installation of ten soil borings, five groundwater monitoring wells, collection of 34 soil vapor samples, 24 soil samples, and five groundwater samples. Based on the sample location plan provided one soil boring (B-10) was installed on the Site. Soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and metals. Although a soil vapor sample location map was not provided for review, the sampling methodology discussion identified that all 34 soil vapor samples were collected from the former gasoline filling station and were likely located within Block 4434, Lot 10, to the east of the Site. As laboratory analytical packages and summary tables were not provided for review, subsurface soil impacts identified during the 1991 environmental investigation could not be correlated to the Site parcel and the area assessed during Langan's Phase II Investigations on the western portion of Block 4434, Lot 1.

The AKRF Technical Memorandum was reviewed by Soil Mechanics Environmental Services (SEMS) and a summary of the AKRF Technical Memorandum investigation and findings was included in the SEMS April 2003 Phase I ESA, as discussed below. According to the 2003 Phase I ESA, the AKRF soil vapor survey was completed within the extents of the former gasoline station, likely referring to Block 4434, Lot 10. Results of the soil vapor survey did not indicate elevated VOCs with the exception of methane, which was presumed to be associated from organic material in historic fill and/or underlying marsh deposits. Based on the presence of elevated methane concentrations in soil vapor, AKRF recommended that a Health and Safety Plan (HASP) be implemented including air monitoring protocols during intrusive activities for proposed Site development.

The Technical Memorandum concluded that the Site is underlain by unconsolidated fill containing varying amounts of sand, gravel, clay, bricks, organic material, concrete, glass, and asphalt. Groundwater was encountered at depths that ranged from 12.67- to 22.82-feet below existing grades. Soil sample analytical results revealed TPH in soil at concentrations ranging from 91 parts-per-million (ppm) to 25,900 ppm over the entire proposed Fresh Creek Estates development Site; however, TPH results specific to the Site were not provided.

Subsurface Investigation and Report, Soil Engineering Services, Inc. (SESI), March 1994

SESI completed a subsurface investigation that included installation of eight soil borings to depths that ranged from 26- to 51.5-feet below existing grade at the entire CCC property for the purposes of evaluating geotechnical conditions and providing recommendations for foundation design and general Site development. As the report provided was not complete and a geotechnical boring location plan was not provided for review, only general Site-wide subsurface conditions are discussed below. The Site is underlain by a layer of miscellaneous fill of unspecified thickness followed by native medium-dense, medium to fine grained sand. The geotechnical report identified that the bottom of planned excavation at the time, likely for the existing church, was approximately 10-feet below grade and would be within the layer of miscellaneous fill.

Phase I ESA, SMES, July 1997

SMES prepared a Phase I ESA on behalf of Legacy General Contracting Corp. for the intent of constructing an approximately 100,000-square foot two-story building, presumably what became the current CCC building. Based on the descriptions of the subject property and adjacent properties in the SMES Phase I ESA report, it appears that this Phase I ESA was completed for the original extents of Block 4434, Lot 1 and may have included the Site. The Phase I ESA concluded that leaking USTs and an Inactive Hazardous Waste Disposal Site identified within the vicinity of the subject property were not a concern. Notably, only the odd-numbered pages of the report were provided for review.

Phase I ESA for Flatlands Ave. & Pennsylvania Ave., SMES, April 2003

The April 2003 SMES Phase I ESA was completed for the entire CCC property consisting of current Block 4430, Lot 1 and Block 4434, Lots 1, 10, and 100. Previous environmental reports prepared for the subject property that were reviewed to assist in the identification of RECs included the June 1991 Technical Memorandum to the DEIS prepared by AKRF, Inc., the 1994 Subsurface Investigation and Report prepared by SESI Consulting Engineers, and the 1997 Phase I ESA prepared by SMES, each of which is discussed in detail above.

The Phase I ESA did not specifically identify RECs associated with the environmental findings discussed above, but recommended completion and adherence to a Health and Safety Plan (HASP) and installation of a soil capping system provided in the Technical Memorandum to the DEIS should be strictly followed and noted that a methane mitigation system may be required as part of any future building construction. Soil Mechanics also recommended that future Site activities be conducted under the oversight of the New York City Department of Environmental

Protection (NYCDEP) or New York State Department of Environmental Conservation (NYSDEC) and that all underground storage tanks (USTs) encountered during redevelopment be removed in accordance with all applicable laws. The report also identified that proper removal of all miscellaneous waste that was observed on the subject property including an abandoned crane, rubber tires, and demolition debris, and completion of a groundwater investigation to evaluate for potential impacts from hydraulically upgradient properties of concern would be required.

Phase I ESA, Langan, March 2018

Langan prepared a Phase I ESA for the 10-acre CCC property in August 2018. The following RECs and BERs relevant to the subject property were identified:

REC-2: Former On-Site Automobile Junkyard

Based on the review of historical Sanborn Maps and aerial photographs, automobile junkyards were identified on the northern portion the subject property along Flatlands Avenue between Louisiana and Pennsylvania Avenues between 1954 and 1980. Due to this historical site use, the potential exists for adverse environmental impacts to the subsurface due to the potential cumulative effect of unreported petroleum releases associated with these operations; therefore, historical automobile dismantling operations was identified as a REC.

REC-3: Presence of Methane in Subsurface

An historical soil gas investigation conducted in the northeastern portion of the subject property in 1991 revealed the presence of methane and recommended that a methane mitigation system may be required for any future building construction. A methane venting/mitigation system is present at the Christian Cultural Center. As the presence of methane had not been evaluated or investigated on the remainder of the subject property, the potential for methane to be present below the subject property was identified as a REC.

BER-1: Potential Presence of Historical Urban Fill

Based on the evaluation of the historical Sanborn Maps and topographic maps, the subject property historically consisted of marshland and was filled in the early 1900s with ash and waste from the city's solid waste incinerator. Subsurface investigations completed in 1991 and 1994 revealed an 18- to 35-foot-thick layer of historic fill and elevated concentrations of total petroleum hydrocarbons, volatile organic compounds, semi-volatile organic compounds, and metals. The presence of fill requires implementation of soil handling and management procedures to address excavation, reuse, handling, and possible offsite disposal of this material if the subject property were to be redeveloped; therefore, the potential presence of historic fill was identified as a BER.

BER-2: Potential Presence of Undocumented Underground Heating Oil Storage Tanks

The potential presence of undocumented underground heating oil storage tanks associated with small one-story structures throughout the subject property associated with historic use for auto junking/dismantling; however, these buildings were not identified within the extents of the Site.

BER-3: Surrounding Sites

Potential impacts from current and historical operations conducted at adjacent and nearby properties involving auto wrecking/dismantling sites, auto repair, gasoline filling stations, dry cleaners, the use of USTs, spills, and the generation and disposal of hazardous waste were identified as a business environmental risk due to the potential for offsite migration of contaminants to impact sub-slab soil and/or groundwater below the subject property.

The following RECs and BERs were also identified for the 10-acre CCC property:

REC-1: Former On-Site Gasoline Filling Station identified in the northeastern portion of the subject property; however, this REC is located approximately 800-feet to the northeast of the Site.

<u>Limited Due Diligence Phase II Environmental Investigation, Langan, May 2018</u>

A Limited Due Diligence Phase II EI was completed on the 10-acre CCC property for the purposes of due diligence and to evaluate if potential subsurface impacts exist associated with historical site use as an automobile junkyard and automobile dismantling facilities and historical gasoline filling station operations at nearby sites, if subsurface impacts exist associated with the presence of historic fill, and if methane identified during previous investigations is present in the subsurface which would require mitigation of soil vapor intrusion into proposed site buildings.

Within the Site extents, the Limited Due Diligence Phase II EI included installation of one soil boring to approximately 22 feet below sidewalk grade and the collection of two soil samples for laboratory analysis. The soil boring was completed as a monitoring well.

Field observations during the soil boring activities revealed the presence of fill. Odors and elevated photoionization detector (PID) readings were not observed within the boring advanced on the subject property.

Soil analytical results identified elevated concentrations of polycyclic aromatic hydrocarbon (PAHs), pesticides, polychlorinated biphenyls (PCBs), and/or metals detected in fill material from 0 to 15 feet below sidewalk level at the subject property exceeding the NYSDEC Unrestricted

Use SCOs. PAHs, PCBs, and metals were also detected in fill material exceeding the Restricted-Residential, Commercial, and Industrial Restricted Use SCOs (RUSCOs), which are attributed to historical operations and/or the quality of contaminated fill material of unknown origin.

Groundwater was measured at 15 feet below current site grade at the permanent groundwater monitoring well installed at the Site. Groundwater analytical results identified elevated concentrations of metals at the monitoring well, which were attributed to likely sediment entrainment of contaminated fill material of unknown origin in the groundwater samples. Dissolved metal exceedances were attributed to naturally occurring background concentrations.

A temporary soil vapor/methane monitoring point was installed at the subject property at a depth of 8 feet below current site grade. A Honeywell MultiRae was connected to the tubing and methane readings were collected every 30 seconds for five minutes. Methane was not detected at the sample location. The soil vapor/methane field screening results did not identify the presence of methane in the subsurface.

Langan concluded that based on the soil and groundwater analytical results, the subsurface has been impacted from historical operations at the Site and nearby properties and contaminated fill containing elevated concentrations of VOCs, SVOCs, PCBs, pesticides, and metals has been identified.

Phase I ESA, Langan, January 2026

Langan conducted a Phase I ESA on behalf of IUV Phase 2B Owner, LLC dated 15 January 2026 for the property identified as 12020 Flatlands Avenue in Brooklyn, NY. The following recognized environmental conditions (RECs) and Business Environmental Risks (BERs) were identified in Langan's 2026 Phase I ESA.

REC-1: Former On-Site Automobile Junkyard

Based on the review of historical Sanborn Maps, automobile junkyards were identified on the subject property along Flatlands Avenue from 1954 through 1983. This historical use and its potential to have impacted the subsurface conditions was identified as a REC.

REC-2: Historical Site Filling and Presence of Contaminated Fill Material

Based on the review of the 2003 Phase I ESA prepared by Soil Mechanics and the review of historical topographic maps, the Site historically consisted of marshland and was filled in the early 1900's with ash and waste from the city's solid waste incinerator. During the May 2018

Phase II EI, fill containing ash was observed in the subsurface and laboratory analytical results for soil revealed the presence of elevated concentrations of PAHs and metals above the NYSDEC Unrestricted Use SCOs. The presence of contaminated fill containing impacts exceeding state regulatory cleanup objectives represents a REC.

BER-1: Surrounding Sites

Potential impacts from current and historical operations conducted at adjacent and nearby properties involving USTs, spills, dry cleaners, automobile junkyards/dismantling facilities, and automobile repair shops represent a business environmental risk due to the potential for offsite migration of contaminants to impact sub-slab soil and/or groundwater below the Site.

BER-2: Hazardous Materials E-Designation

An E-Designation for Hazardous Materials was assigned to tax lots associated with the site due to historical Site filling and confirmation of contamination during previous investigations completed on and in the vicinity of the Site. Air Quality and Noise Attenuation E-designations were also assigned. As such, any Site redevelopment activities will need to be completed under New York City Office of Environmental Remediation (NYC OER) oversight. Obligations associated with the E-Designation of the Site were identified as a BER.

BER-3: Potential Presence of Undocumented Underground Heating Oil Storage Tanks

While no evidence or records confirming use of fuel oil tanks was observed during the Site inspection or noted during this ESA, small one-story structures were historically identified on the subject property associated with historic Site use for auto junking/dismantling. These structures included a one-story office building identified on the 1977 through 1981 Sanborn Maps. Separate from the auto junking operations, the 1928 Sanborn Map shows a one-story shed, one-story residential building, and one-story building of unspecified use on the subject property. Due to the presence of these structures and this historical use of the site, the potential presence of heating oil USTs beneath the lot or adjacent sidewalks associated with these former buildings represents a business environmental risk.

Phase II Environmental Investigation Report, Langan, January 2026

Langan completed Phase II investigations in May 2018 and October 2025 to assess general Site conditions and to determine if adverse subsurface environmental impacts have resulted from historical operations at the Site and surrounding sites. Langan's Phase II Investigation report was prepared for the Applicant. The results of this investigation are provided on Tables 2 through 4 and summarized on Figures 4 through 6 of this RIWP.

Geophysical utility clearance was completed in October 2025, which was limited to the areas around each boring.

The May 2018 investigation included the installation of one soil boring (LSB-1), one monitoring well (LMW-1) and the collection of soil and groundwater samples for laboratory analysis and the October 2025 investigation included the installation of five soil borings (LSB02 through LSB06), two groundwater monitoring wells (LMW02 and LMW03), three soil vapor sampling points (LSV01 through LSV03), and the collection of soil, groundwater, and soil vapor samples for laboratory analysis.

Soil Investigation Results

Based on the results of the Phase II EI, the presence of contaminated fill was detected in soil samples collected at all six boring locations throughout the Site to the deepest sampling interval of 15 feet bgs. No elevated PID readings, odors, or staining were observed within any soil boring completed as part of the Phase II EI.

All soil analytical results were compared to the NYSDEC Unrestricted Use Soil Cleanup Objectives (SCOs), Restricted-Residential Restricted Use SCOs (RUSCOs), and Protection of Groundwater SCOs. Soil analytical results revealed the presence of SVOCs including 1,2-dichlorobenzene, 2-methylphenol (o-cresol), 3 & 4 methylphenol (m&p cresol), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, and phenanthrene were detected in two soil borings (LSB-1 and LSB02) in the southern portion of the Site above the Unrestricted Use SCOs, Protection of Groundwater SCOs, and/or Restricted-Residential RUSCOs. SVOCs exceeding the Restricted-residential RUSCOs were detected from 0 to 2 feet bgs in LSB-1. The highest concentration of SVOCs was detected from 0 to 2 feet bgs at LSB-1.

Metals including arsenic, barium, cadmium, trivalent chromium, copper, lead, mercury, nickel, selenium, silver, and zinc were detected at concentrations exceeding the Unrestricted Use SCOs, Protection of Groundwater SCOs, and/or Restricted-Residential RUSCOs in all six soil borings advanced at the Site. Metals that exceed the Restricted-Residential RUSCOs were detected from 0 to 2 feet bgs in four soil borings and from between 5 to 7 feet bgs, 8 to 10 feet bgs, 10 to 12 feet bgs, 11 to 13 feet bgs, and 13 to 15 feet bgs in six separate borings. The highest concentration of metals was detected in the sample collected from 10 to 12 feet bgs in LSB04 (lead detected at 2,590 mg/kg, barium detected at 2,170 mg/kg, and zinc detected at 7,470 mg/kg).

PCBs were also detected above the NYSDEC SCOs in five of the six soil borings; two samples reported results above the Restricted-Residential RUSCOs from 10 to 12 feet bgs and 0 to 2 feet bgs. Acetone was detected in exceedance of the NYSDEC Unrestricted Use SCO and Protection of Groundwater SCO; however, acetone is a common laboratory artifact and the detection may not be related to the quality of the fill material. Benzene and methyl ethyl ketone were also detected in exceedance of NYSDEC Unrestricted SCOs in one sample collected from 10 to 12 feet bgs.

The presence of SVOCs, metals, and PCBs at concentrations exceeding the NYSDEC SCOs and at depths ranging from 0 to 15 feet bgs in samples collected at the Site are indicative of the quality of heterogenous fill material at the site. The detection of benzene in one soil sample is likely associated with historical auto junking operations or an unknown source.

Groundwater Investigation Results

Groundwater level was measured in permanent monitoring wells installed as part of this investigation between 15.12 feet bgs and 18.80 feet bgs. No evidence of sheen or free product was observed during purging or sampling activities in any of the wells. PID readings of 0.1 ppm to 2.1 ppm were observed at each of the well locations. Three groundwater samples were collected as part of the Phase II investigation and the analytical results were compared to the NYCRR Part 703.5 and NYSDEC Technical & Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (collectively referred to as SGVs).

Groundwater analytical results revealed total and dissolved iron and manganese detected in exceedance of the NYSDEC SGVs in all three monitoring wells. Total lead, dissolved magnesium and total and dissolved sodium were detected in exceedance of NYSDEC SGVs in one monitoring well. Total lead was detected above the SGVs in the sample collected in 2018; however, dissolved lead was not detected in 2018 and neither total nor dissolved lead were detected above the SGVs in the samples collected in 2025. As such, the detection of lead in the 2018 total metals sample is attributable to the presence of contaminated fill entrainment in the sample media and not indicative of groundwater conditions at the Site.

Soil Vapor Investigation Results

Three soil vapor sampling points (LSV01 through LSV03) were installed within the proposed future building extents at the project Site. Chlorinated VOCs (cis-1,2-dichloroethene, TCE, and vinyl chloride) and petroleum-related VOCs (benzene, o-xylene, 2,2,4-trimethylpentane, cyclohexane, and n-hexane) were detected in soil vapor at concentrations that may require

monitoring or mitigation according to NYSDOH Soil Vapor Intrusion Matrices A through F. Analytical results revealed that vinyl chloride, 2,2,4-trimethylpentane, and benzene were detected at concentrations at which mitigation is required regardless of potential indoor air sampling results, according to NYSDOH Soil Vapor Intrusion Matrices C (vinyl chloride) and D (benzene and 2,2,4-trimethylpentane).

The remaining compounds were detected at concentrations at which the recommendation could be no further action, monitor, or mitigate depending on a paired indoor air sampling result according to NYSDOH Soil Vapor Intrusion Matrices A (cis-1,2-dichloroethene), D (cyclohexane and o-xylene), and E (n-hexane). The results of indoor air samples are typically required to assess NYSDOH Soil Vapor/Indoor Air decision matrix recommendations. No buildings are present on the site and, as such, concurrent indoor sampling was not completed as part of the Phase II EI. As such, the NYSDOH Soil Vapor/ Indoor Air decision matrix recommendations cannot be directly applied to these compounds.

The presence of chlorinated and petroleum-related VOCs in soil vapor may be attributed to historical site operations associated with auto junking or an unknown source.

Conclusions and Recommendations

Based on the results of the October 2025 Phase II EI, two Areas of Concern (AOCs) related to historical Site operations were identified: former on-Site automobile junkyard and the presence of contaminated fill material of an unknown origin and incinerator ash throughout the Site that filled the prior on-Site marshland. These AOCs are discussed in detail as recognized environmental conditions (RECs) in the summary of the January 2026 Phase I ESA prepared by Langan, above.

3.0 SCOPE OF WORK

The objective of this RIWP is to investigate and characterize "the nature and extent of the contamination at and/or emanating from the brownfield Site," per Environmental Conservation Law (ECL) Article 27, Title 14 (Brownfield Cleanup Program) and to address potential data gaps in the October 2025 Phase II EI. The field investigation will include the tasks listed below to supplement the data and findings of the previous Phase II EI. The rationale for each sampling location and analytical parameters for each proposed sample are provided in Table 1 and the locations of the proposed borings, groundwater monitoring wells, and soil vapor sample locations are shown on Figure 6.

Geophysical Survey

Langan will coordinate with a private utility markout contractor to complete a full geophysical survey throughout the accessible areas of the Site to identify if any subsurface anomalies exist and to assess for the presence of subsurface structures, piping, and underground storage tanks, including previously undiscovered USTs, which may contribute to the presence or migration of contamination.

Soil Borings and Sampling

Advancement of twenty-nine soil borings will be completed in areas of concern that were identified as result of the previous Phase II EIs and in areas not previously investigated. Soil boring locations are proposed across the entirety of the Site to evaluate the extents of impacts and potential remedial options based on subsurface conditions.

Thirteen soil borings will be completed for the purposes of characterizing soil conditions. Three discrete soil samples will be collected from each soil boring to determine the extents of contaminated soil at the Site as follows:

- 0 to 2 feet below grade at all thirteen boring locations;
- A two-foot interval within the fill layer based on field observations at all thirteen boring locations (specific depths are noted in Table 1 where required);
- 13 to 15 feet below grade at all thirteen boring locations.

All soil borings will be advanced to approximately 15 feet below grade, corresponding to the maximum proposed development depth. Fill sample depths will vary across the Site based on observed conditions/impacts. Additional samples may be collected to characterize contamination at the Site.

Soil samples collected for Site-wide assessment will be submitted for laboratory analysis of VOCs, SVOCs, PCBs, pesticides, herbicides, TAL metals, total cyanide, trivalent/hexavalent chromium, per- and polyfluoroalkyl substances (PFAS), and 1,4-Dioxane analysis. At previous sampling locations and intervals that were not analyzed for pesticides, herbicides, PFAS and/or 1,4-dioxane, new discrete soil samples will be collected from the two-foot intervals corresponding to depths that were previously sampled for analysis of these compounds as noted in Table 1 to satisfy NYSDEC requirements for Site characterization.

Eight soil borings will be completed at 5-foot and 10-foot step outs to horizontally delineate the elevated concentrations of PCBs identified in LSB-1 during the May 2018 Phase II EI. Soil samples will be collected from each soil boring at the interval corresponding to 0 to 2 feet below grade and will be analyzed for PCBs, only. Additional contingent vertical delineation soil samples will be collected from the 2 to 3 foot, 3 to 4 foot, and 4 to 5 foot interval at LSB-1 and each horizontal delineation boring location and will only be analyzed for PCBs pending analysis of the original soil samples. Soil borings will be advanced to a maximum of 5 feet bgs.

Eight soil borings will be completed at 5-foot and 10-foot step outs to horizontally delineate the elevated concentrations of metals identified in LSB04 during the October 2025 Phase II EI. Soil samples will be collected from each soil boring at the interval corresponding to 10 to 12 feet below grade and will be analyzed for barium, lead, and zinc, only. Additional contingent vertical delineation soil samples will be collected from the 12 to 13 foot, 13 to 14 foot, and 14 to 15 foot interval at LSB04 and each horizontal delineation boring location and will only be analyzed for barium, lead, and zinc pending analysis of the original soil samples. Soil borings will be advanced to a maximum of 15 feet bgs.

Groundwater Monitoring Well Installation and Sampling

Four soil borings will be completed as permanent monitoring wells to allow for the collection of groundwater samples for laboratory analysis. Three permanent wells installed during the May 2018 and October 2025 Phase II EIs will also be re-sampled. Groundwater monitoring well locations are proposed across the entirety of the Site to evaluate the extents of impacts and potential remedial options based on subsurface conditions. The monitoring wells will be installed by a licensed well driller. The monitoring wells will be constructed using 2-inch diameter 0.010-slot screen for the purposes of collecting groundwater samples to assess Site groundwater conditions.

Prior to groundwater sample collection, any newly installed monitoring wells will be developed to remove fines and stagnant water within each of the wells.

Prior to groundwater sampling all wells will be gauged for the presence of LNAPL and DNAPL. If detected, NAPL samples will be collected for fingerprinting, viscosity, boiling point, and density analyses.

One week following development of the permanent groundwater monitoring wells, groundwater samples will be collected via USEPA low-flow sampling methods for analysis of VOCs, SVOCs, dissolved polycyclic aromatic hydrocarbons (PAHs), total and dissolved TAL metals, PCBs,

pesticides, herbicides, total cyanide, trivalent/hexavalent chromium, PFAS, and 1,4-dioxane analyses.

Soil Vapor Point Installation and Sampling

Seven soil vapor points will be installed to allow for the collection of soil vapor samples for laboratory analysis. Soil vapor sampling locations are proposed across the entirety of the Site to evaluate the extents of impacts and potential remedial options based on subsurface conditions. The soil vapor points will be installed by a licensed driller. The soil vapor points will be constructed using Teflon-lined polyethylene tubing connected to a dedicated expendable six-inch stainless steel screen for the purposes of collecting soil vapor samples to assess Site conditions.

Soil vapor samples will be collected in batch-certified clean and evacuated 6-Liter stainless steel summa canisters with regulators set to collect each sample over a 2-hour sampling period (a flow rate of <200-ml per minute) as per USEPA soil vapor sampling guidance for analysis of VOCs via USEPA TO-15 Method.

Modifications to this scope of work may be required: 1) due to Site operations, equipment, or restrictions; 2) if unexpected contamination is detected and additional analytical data is needed to characterize the Site; 3) to accommodate redesign of the proposed Site redevelopment; and 4) to confirm that impacts are adequately characterized and delineated in compliance with the Brownfield Law, regulations, and applicable investigation guidance documents (e.g., DER-10). NYSDEC and NYSDOH will be contacted to obtain approval for these modifications.

The field investigation will be completed in accordance with the procedures specified in Langan's Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) provided in Appendices A and B, respectively. A Community Air Monitoring Plan will be implemented during this investigation (see Section 3.6.2).

Names, contact information, and roles of the principal personnel who will participate in the investigation, including laboratory subcontractor, are listed below. Resumes for each Langan employee are provided in the QAPP (Appendix B).

Personnel	Investigation Role	Contact Information
Amanda Forsburg, CHMM Langan	Qualified Environmental Professional	Phone – 973-560-4900 Email – aforsburg@langan.com
Ronald E. Boyer, P.E. Langan	Remedial Engineer	Phone – 973-560-4900 Email – rboyer@langan.com
Ashley Sandve Langan	Project Manager	Phone – 973-560-4900 Email – asandve@langan.com
Tony Moffa, CHMM Langan	Langan Health & Safety Officer	Phone – 215-491-6500 Email – tmoffa@langan.com
Joe Kowalski Langan	Field Team Leader	Phone – 973-560-4900 Email – jkowalski@langan.com
Marlena Jewett Langan	Quality Assurance Officer	Phone – 212-497-5735 Email – mjewett@langan.com
Joe Conboy Langan	Data Validator/Program Quality Assurance Monitor	Phone – 215-845-8985 Email – jconboy@langan.com
Allison Bennet York Analytical	Laboratory	Phone – 203-325-1371 x 844 Email – allison.bennett@alsglobal.com

3.1 Geophysical Survey

A full geophysical survey across all accessible portions of the Site will be completed. A geophysical contractor will complete a full geophysical survey of the proposed development Site via completion of a geophysical survey to clear the proposed RI boring locations and identify potential subsurface utilities and structures, including unknown USTs, prior to commencing subsurface work. The geophysical survey may be completed using a range of geophysical instruments, including electromagnetic and utility line locator instruments, and ground-penetrating radar (GPR). The results of the survey may necessitate relocation of the proposed boring locations shown on Figure 7.

3.2 Soil Investigation

3.2.1 Drilling and Logging

Six soil borings were advanced as part of Langan's May 2018 and October 2025 Phase II EIs. An environmental drilling subcontractor will advance up to twenty-nine soil borings as discussed above in Section 3.0 to supplement the borings previously completed.

Soil borings will be completed to the maximum development depth corresponding to approximately 15 feet below grade, or to beyond the depth of observed contamination if encountered deeper than 15 feet below grade. A Langan field engineer, scientist, or geologist will document the work, screen the soil samples for environmental impacts, and collect soil samples for laboratory analyses per Section 3.2.2. Soil will be screened continuously to the boring termination depth for total organic vapor (TOV) concentration using a PID equipped with a 10.6 electron volt (eV) bulb, and for visual and olfactory indications of environmental impacts (e.g., staining and odor). Soil descriptions will be recorded in boring logs.

Non-disposable, down-hole drilling equipment and sampling apparatus will be decontaminated between locations with Alconox® (or similar) and water where grossly impacted material is identified. Following sampling, each soil boring will be backfilled with granulated bentonite below the groundwater interface and/or clean sand in the vadose zone.

3.2.2 Soil Sampling and Analysis

Discrete soil samples will be collected from the 0- to 2-foot interval below grade, a two-foot interval within the fill layer based on field observations (specific depths are noted in Table 1 where required), and the two-foot interval corresponding to the maximum proposed development depth (corresponding to 13 to 15 feet below grade). Fill sample depths will vary across the Site based on observed conditions/impacts. Soil samples will be submitted for laboratory analysis of VOCs, SVOCs, TAL metals, PCBs, pesticides, herbicides, total cyanide, hexavalent chromium, PFAS, and 1,4-dioxane. At previous soil sampling locations and intervals that were not analyzed for pesticides, herbicides, PFAS and/or 1,4-dioxane, new discrete soil samples will be collected from the two-foot intervals corresponding to depths that were previously sampled for analysis of these compounds as noted in Table 1 to satisfy NYSDEC requirements for Site characterization. QA/QC procedures including the collection frequency and analysis of field blanks and duplicate samples are described in the QAPP provided as Appendix B.

Soil samples will be collected in laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to York Analytical Laboratories, Inc. (York), a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified analytical laboratory.

3.3 Groundwater Investigation

3.3.1 Monitoring Well Installation

Three permanent monitoring wells were installed as part of Langan's May 2018 and October 2025 Phase II EIs. Four of the fifteen proposed soil boring locations will be converted into permanent groundwater monitoring wells. The three permanent wells installed during the May 2018 and October 2025 Phase II EIs will also be re-sampled. If any of the previously installed monitoring wells are inaccessible, the monitoring well will be reinstalled at an offset location. Groundwater monitoring well locations are proposed across the entirety of the Site to evaluate the extents of impacts and potential remedial options based on subsurface conditions. Groundwater monitoring wells will be installed by a licensed well driller. During well installation, soil conditions will be screened, logged, and sampled as described above in Section 3.2.

The proposed monitoring wells will be constructed using 2-inch-diameter polyvinyl chloride (PVC) riser pipe attached to 10- to 15-foot long, schedule-40, 0.010-inch slotted, 2-inch-diameter PVC screen. Each monitoring well will be installed so that the well screen straddles the observed water table. The well annulus around the screen will be backfilled with clean sand to about 2 feet above the top of the screen. A minimum 2-foot bentonite seal will be installed above the sand, and the borehole annulus will be backfilled with clean sand and/or a Portland cement, bentonite slurry. The wells will be finished with flush-mounted metal manhole covers set in concrete.

Following installation, the wells will be developed by surging the newly installed sand pack with a surge block, a weighted bailer, or surge pumping techniques across the well screen to agitate and remove fine particles. The surge block, bailer, or submersible pump will be surged across the submerged well screen in 2- to 3-foot increments for approximately 2 minutes per increment. After surging, the well will be purged via pumping until the water becomes clear. The well will then be allowed to sit for a minimum of one week before sampling.

3.3.2 Groundwater Sampling and Analysis

Prior to completion of groundwater sample collection, all monitoring wells will be gauged for the presence of LNAPL and DNAPL. If detected, NAPL samples will be collected for fingerprinting, viscosity, boiling point, and density analyses.

One week following development of the permanent groundwater monitoring wells, groundwater samples will be collected via USEPA low-flow sampling methods for analysis of VOCs, SVOCs, PCBs, pesticides, herbicides, total and dissolved TAL metals, total cyanide, hexavalent chromium, PFAS, and 1,4-dioxane. Groundwater samples will be collected into laboratory-

supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to a NYSDOH ELAP-certified analytical laboratory. QA/QC procedures including the collection frequency and analysis of field blanks and duplicate samples are described in the QAPP provided as Appendix B.

3.3.3 Monitoring Well Survey and Synoptic Gauging

Vertical locations of the monitoring wells, including ground surface elevation, outer casing elevation, and inner casing elevation, will be surveyed. This data will be used with the groundwater well gauging data to prepare a sample location plan and a groundwater contour map depicting the elevation of the water table across the Site. Vertical control will be established by surveying performed relative to North American Vertical Datum of 1988 (NAVD88) and/or Brooklyn Highway Datum (BHD) by a New York State-licensed land surveyor. Elevations of the top of monitoring well casings and protective well casings will be surveyed to the nearest 0.01 foot. A synoptic gauging event will be performed to document static water levels. All accessible wells will be gauged during this event.

3.4 Soil Vapor Investigation

3.4.1 Soil Vapor Point Installation

Seven soil vapor points will be installed to allow for the collection of soil vapor samples for laboratory analysis. Soil vapor sampling locations are proposed across the entirety of the Site to evaluate the extents of impacts and potential remedial options based on subsurface conditions. The soil vapor points will be installed by a licensed driller and installed to a depth corresponding to the development depth (anticipated to be a maximum of approximately 15 feet below grade) or to approximately one-foot above the groundwater table if the development depth extends beyond the groundwater interface. During soil vapor point installation, soil conditions will not be screened, as the points will be directly pushed to the desired depth. Subsurface conditions will be evaluated based on the adjacent soil boring or nearby soil boring conditions.

The soil vapor points will be constructed using Teflon-lined polyethylene tubing connected to a dedicated expendable six-inch stainless steel screen. Quartz filter media will be used to backfill the screened interval followed by No. 2 sand to approximately 0.5 feet above the screened interval followed by a hydrated granular bentonite clay to the ground surface. Each soil vapor point will be sealed at the surface with hydrated bentonite clay.

3.4.2 Soil Vapor Sampling and Analysis

Soil vapor samples will be collected shortly after installation of the temporary soil vapor points. Each soil vapor sampling point will be tightness tested using the helium tracer gas method and purged at a flow-rate of <200-ml per minute for 5 minutes into a 1-liter tedlar bag to obtain a PID reading. Helium concentrations below 5% must be measured prior to sample collection. One to three volumes (i.e., the volume of the sample probe and tube) will be purged prior to collecting the sample to ensure a representative sample is obtained.

Soil vapor samples will be laboratory analyzed for VOCs via the USEPA TO-15 Method. Samples will be collected in batch-certified clean and evacuated 6-Liter stainless steel summa canisters with regulators supplied by York. The regulators will be set to collect each sample over a 2-hour sampling period (a flow rate of <200-ml per minute) as per USEPA soil vapor sampling guidance. Samples will be transferred to the laboratory immediately after field sampling is completed and stored at a maximum room temperature of 30° Celsius. QA/QC procedures including the collection frequency and analysis of ambient air and duplicate samples are described in the QAPP provided as Appendix B.

3.5 Data Management and Validation

York, a NYSDOH ELAP-approved laboratory, will analyze soil, groundwater, soil vapor and ambient air samples. Laboratory analyses will be conducted in accordance with USEPA SW-846 methods and NYSDEC Analytical Services Protocol (ASP) B deliverable format. Environmental data will be reported electronically using the database software application EQuIS as part of NYSDEC's Environmental Information Management System (EIMS).

Table 1 summarizes the anticipated samples. Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C of the QAPP (provided as Appendix B of this RIWP). QA/QC procedures required by the NYSDEC ASP and SW-846 methods, including initial and continuing instrument calibrations, surrogate compound spikes, and analysis of other samples (blanks, laboratory control samples, and matrix spikes/matrix spike duplicates) will be followed in accordance with the QAPP (Appendix B). The laboratory will provide pre-cleaned and preserved sample bottles in accordance with the SW-846 methods. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP shall take precedence.

Data validation will be performed in accordance with the USEPA Region 2 SOPs for data validation and USEPA's National Functional Guidelines for Organic and Inorganic Data Review. Tier 1 data validation (the equivalent of USEPA's Stage 2A validation) will be performed to evaluate data quality. Tier 1 data validation is based on completeness and compliance checks of sample-related QC results including:

- Holding times;
- Sample preservation;
- Blank results (method, trip, and field blanks);
- Surrogate recovery compounds and extracted internal standards (as applicable);
- LCS and LCSD recoveries and RPDs;
- MS and MSD recoveries and RPDs;
- Laboratory duplicate RPDs; and
- Field duplicate RPDs

A Data Usability Summary Report (DUSR) will be prepared by the data validator and reviewed by the QAM before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. Additional details on the DUSRs are provided in the QAPP in Appendix B.

3.6 Management of Investigation-Derived Waste

Investigation-derived wastes (IDW) (i.e., grossly-contaminated soil cuttings and purge water, or soil that cannot be returned to the borehole due to monitoring well construction) will be containerized and staged on-Site, pending proper disposal at an off-Site facility. Soil cuttings with no apparent staining, odors, or elevated PID readings will be used to backfill boring holes above the vadose zone. Soil to be disposed off-Site will be placed in 55-gallon, United Nations/ Department of Transportation (UN/DOT)-approved drums. Purge water with no apparent impacts (odor, sheen, and/or product) will be discharged to a vegetated Site surface. Purge water to be disposed off-Site will be placed in 55-gallon UN/DOT-approved fluid drums with closed tops.

Decontamination fluids, if necessary, will be placed in UN/DOT-approved fluid drums with closed tops. All drums will be properly labeled, sealed, and characterized as necessary. If RI analytical data is insufficient to gain disposal facility acceptance, waste characterization samples will be analyzed for parameters that are typically required by disposal facilities, such as TCL VOCs, SVOCs, metals, PCBs, pesticides, herbicides, Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, and Resource Conservation and Recovery Act (RCRA) characteristics including ignitability, corrosivity, and reactivity. Additional sampling and analyses may be required based on the selected disposal facility. Management of IDW will comply with NYSDEC DER-10 3.3(e).

3.7 Air Monitoring

Air monitoring will be conducted for Site personnel and the community pursuant to the Community Air Monitoring Program [CAMP]. See Section 3.7.2 below. Fugitive particulate (dust) generation that could affect Site personnel or the public is not expected because intrusive work is limited to boring, monitoring well, and soil vapor point installation, which does not disturb large volumes of soil.

Dust emissions will be monitored using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10). Organic odors will be monitored with a PID equipped with a 10.6 eV bulb. Dust and odor suppression measures (e.g., water misting, odor suppressant) will be implemented as required.

3.7.1 Personnel Air Monitoring

Langan will conduct air monitoring of the breathing zone periodically during drilling and sampling activities to evaluate health and safety protection for the field personnel. Ambient air monitoring will be performed within the work area. Langan will monitor VOCs with a PID (MultiRAE 3000 or similar) in accordance with the HASP (Appendix A). If air monitoring during intrusive operations identifies the presence of VOCs or dust, on-Site personnel will follow the guidelines outlined in the HASP regarding action levels, permissible exposure, suppression/engineering controls, and personal protective equipment. If the VOC action level is exceeded, work will cease and the work location will be evacuated. Monitoring will be continued until the levels drop to safe limits. At that time, work can resume with continued monitoring. If high levels persist, field activities will be halted, and the work relocated to another area. If the dust action level is exceeded, dust suppression will be applied, and monitoring will be continued. If high levels persist, field activities will be halted and re-assessed.

3.7.2 Community Air Monitoring Plan

In addition to air monitoring in the worker breathing zone, Langan will conduct community air monitoring in compliance with the NYSDOH Generic CAMP. CAMP deployment will comply with NYSDEC DER-10 Appendix 1A and Appendix 1B, which are provided as Attachment J of the HASP included in Appendix A of this RIWP. Special requirements for work within 20 feet of potentially exposed individuals or structures are provided as Attachment K of the HASP.

Langan will conduct monitoring for VOCs and dust during ground-intrusive work (i.e., soil boring advancement and monitoring well installation). Upwind concentrations of VOCs and dust will be monitored continuously each day to establish background concentrations. Langan will monitor VOCs and dust at the downwind perimeter of the work zone, which will be established at a point on the Site where the general public or Site employees may be present. Monitoring for VOCs will be conducted with a PID equipped with a 10.6 eV bulb. Dust emissions will be monitored using real-time monitoring equipment capable of measuring PM-10 (e.g., DustTrak).

Langan will also conduct periodic monitoring for VOCs during non-intrusive work such as the collection of groundwater samples. Periodic monitoring may include obtaining measurements upon arrival at a location, when opening a monitoring well cap, when bailing/purging a well, and upon departure from a location.

3.8 Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment (QHHEA) will be conducted in accordance with Appendix 3B of the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation. The assessment will be submitted in the Remedial Investigation Report (RIR).

4.0 REMEDIAL INVESTIGATION REPORT

4.1 Daily Field Reports

Daily reports will be prepared and submitted to the assigned NYSDEC and NYSDOH project managers by the end of each day following the reporting period and will include:

- An update of progress made during the reporting day;
- Photographic documentation of the activities completed during the reporting day;
- Identification of samples collected during the reporting day;
- Locations and references to a Site map for completed activities;

- A summary of any and all complaints with relevant details, including contact information;
- A summary of CAMP findings, including elevated concentrations and response actions, if any;
- An explanation of notable Site conditions; and,
- A list of anticipated work for the following reporting day.

Daily reports are not intended to notify the NYSDEC of emergencies (e.g., accidents, spills), request changes to the RIWP, or communicate other sensitive or time-critical information. However, such conditions will also be included in the daily reports. Emergency conditions and changes to the RIWP will be communicated directly to the NYSDEC Project Manager.

4.2 Remedial Investigation Report

Following completion of the RI and receipt of analytical data, a RIR will be prepared in accordance with the applicable requirements of DER-10 Section 3.14. The report will include:

- A summary of the Site history and previous investigations;
- A description of Site conditions;
- Sampling methodology and field observations;
- An evaluation of the results and findings; and,
- Conclusions and recommendations for any further assessment (if warranted).

The report will summarize the nature and extent of contamination at each area of concern and identify unacceptable exposure pathways (as determined through a Qualitative Human Health Exposure Assessment).

The report will include soil boring and well construction logs, sampling logs, tabulated analytical results, figures, and laboratory data packages. The tabulated analytical results will be organized in table format and include sample location, media sampled, sample depth, field/laboratory identification numbers, analytical results and the applicable Standards, Criteria, and Guidance (SCGs) pertaining to the Site and contaminants of concern for comparison. The report will include scaled figures showing the locations of soil borings, monitoring wells, and soil vapor points, sample concentrations above SCGs for each media, groundwater elevation contours and flow direction, and, if appropriate, groundwater contaminant concentration contours.

The RIR will be provided in an electronic format to the NYSDEC.

5.0 SCHEDULE

The table below presents an estimated schedule for the proposed RI and reporting. If the schedule changes, it will be updated and submitted to NYSDEC.

Activity	Weeks (following approval of RIWP)															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinate Geophysical Survey, Driller and Laboratory																
Perform Geophysical Survey																
Advance Soil Borings, Install Monitoring Wells, Install Soil Vapor Points and Collect Soil, Groundwater, and Soil Vapor Samples																
Receipt of Laboratory Results																
Data Validation																
EQuIS™ Electronic Data Deliverable																
Preparation and Submission of RIR																

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TABLES

Table 1
Remedial Investigation Work Plan
Proposed Sampling Summary

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Matrix	Boring Location	Sample Depth (feet below grade)	VOCs	SVOCs	PCBs	Pesticides	Herbicides	TAL Metals	TAL Metals (Dissolved)	Barium	Lead	Zinc	Total Cyanide	Trivalent Chromium	Hexavalent Chromium	PFAS	1,4-Dioxane	Rationale
Soil	LSB-1	0-2	--	--	--	--	X	--					X	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	--	--	--	--	X	--					X	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
	LSB02	0-2	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		11-13	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB03	0-2	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		5-7	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB04	0-2	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		10-12	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		12-13								X	X	X						Hotspot Delineation
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization and Hotspot Delineation
	LSB05	0-2	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		10-12	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB06	0-2	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		8-10	--	--	--	X	X	--					--	--	--	X	X	Supplemental Analyses for Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB07	0-2	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB08	0-2	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB09	0-2	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB10	0-2	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB11	0-2	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB12	0-2	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB13	0-2	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		2-ft interval within the fill layer[1], at varying depths	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
		13-15	X	X	X	X	X	X					X	X	X	X	X	Site-Wide Characterization
	LSB-1_N_5	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB-1_N_10	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB-1_E_5	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB-1_E_10	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB-1_S_5	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB-1_S_10	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB-1_W_5	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB-1_W_10	0-2			X													Hotspot Delineation
		2-3			X													Hotspot Delineation
		3-4			X													Hotspot Delineation
	LSB04_N_5	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
	LSB04_N_10	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
	LSB04_E_5	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
	LSB04_E_10	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
	LSB04_S_5	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
	LSB04_S_10	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
	LSB04_W_5	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
	LSB04_W_10	10-12								X	X	X						Hotspot Delineation
		12-13								X	X	X						Hotspot Delineation
		13-14								X	X	X						Hotspot Delineation
Groundwater	LMW-1	---	X	X	X	X	X	X	X				X	X	X	X	X	Site-Wide Characterization
	LMW02	---	X	X	X	X	X	X	X				X	X	X	X	X	Site-Wide Characterization
	LMW03	---	X	X	X	X	X	X	X				X	X	X	X	X	Site-Wide Characterization
	LMW04	---	X	X	X	X	X	X	X				X	X	X	X	X	Site-Wide Characterization
	LMW05	---	X	X	X	X	X	X	X				X	X	X	X	X	Site-Wide Characterization
	LMW06	---	X	X	X	X	X	X	X				X	X	X	X	X	Site-Wide Characterization
	LMW07	---	X	X	X	X	X	X	X				X	X	X	X	X	Site-Wide Characterization
Soil Vapor[4]	LSV04	4-4.5	X															Site-Wide Characterization
	LSV05	15-15.5	X															Site-Wide Characterization
	LSV06	1-1.5	X															Site-Wide Characterization
	LSV07	14-14.5	X															Site-Wide Characterization
	LSV08	Six-inch interval approximately 1-foot above the groundwater table	X															Site-Wide Characterization
	LSV09	Six-inch interval approximately 1-foot above the groundwater table	X															Site-Wide Characterization
	LSV10	Six-inch interval approximately 1-foot above the groundwater table	X															Site-Wide Characterization

NOTES:
1 - "--" denotes that the referenced compound was previously analyzed in the sample collected during the May 2018 or October 2025 Phase II Environmental Investigation.
2 - The samples will be collected from a 2-foot interval from the fill within the proposed development depth.
3 - QA/QC sampling frequency and analytical methods provided in the Quality Assurance Project Plan provided as Appendix B of this report.
4 - The soil vapor points will be installed to the depth corresponding to immediately below the development depth or to approximately one-foot above the groundwater table.
5 - Modifications to sample locations and/or depths may be implemented to accommodate redesign of the proposed site redevelopment.

Table 2
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs (2025)	NYSDEC Part 375 Protection of Groundwater SCOs (2025)	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs (2025)	Location	LSB02	LSB02	LSB03	LSB03	LSB04	LSB04	LSB05	LSB05	LSB05	LSB06	LSB06	LSB-1A	LSB-1B
					Sample Name	B7-8_LSB02_0-2	B7-8_LSB02_11-13	B7-8_LSB03_0-2	B7-8_LSB03_5-7	B7-8_LSB04_0-2	B7-8_LSB04_10-12	B7-8_LSB05_0-2	B7-8_LSB05_10152025	B7-8_LSB05_10-12	B7-8_LSB06_0-2	B7-8_LSB06_8-10	049_LSB-1A	050_LSB-1B
					Sample Date	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	05/11/2018	05/11/2018
					Sample Depth	0-2	11-13	0-2	5-7	0-2	10-12	0-2	0-2	10-12	0-2	8-10	0-2	13-15
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.02 U	<0.049 U	<0.019 U	<0.02 U	<0.026 U	<0.048 U	<0.028 U	<0.027 U	<0.029 U	<0.032 U	<0.032 U	<0.0054 U	<0.0094 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,1-Dichloroethane	75-34-3	0.27	0.27	47	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,1-Dichloroethene	75-35-4	0.24	0.33	0.98	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0094 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2,4-Trimethylbenzene	95-63-6	5.9	5.9	100	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	0.0012 J	0.88	<0.0069 U	<0.0068 U	0.0012 J	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.51 U	0.15 J	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2-Dichloroethane	107-06-2	0.02	0.02	5.8	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	3.1	3.1	100	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.0025 J	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,3-Dichlorobenzene	541-73-1	2.6	2.6	38	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0094 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	24	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	5.7	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.11 U	<0.19 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0094 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0094 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.025 U	<0.061 U	<0.024 U	<0.025 U	<0.032 U	<0.059 U	<0.035 U	<0.034 U	<0.036 U	<0.04 U	<0.04 U	<0.0054 U	<0.0094 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0094 U
Acetone	67-64-1	**0.03**	0.03	100	mg/kg	<0.049 U	**0.3 S**	<0.048 U	**0.037 JS**	**0.05 S**	**0.4 S**	**0.051 S**	**0.086 S**	**0.089 S**	**0.19 S**	<0.05 U	**0.057**	**0.069**
Acrolein	107-02-8	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.011 U	<0.019 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.02 U	<0.049 U	<0.019 U	<0.02 U	<0.026 U	<0.048 U	<0.028 U	<0.027 U	<0.029 U	<0.032 U	<0.032 U	<0.0054 U	<0.0094 U
Benzene	71-43-2	**0.06**	0.06	3.7	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	0.0011 J	0.00098 J	**0.27**	<0.0069 U	<0.0068 U	0.0036 J	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0094 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.0049 U	0.034	<0.0048 U	<0.0051 U	<0.0065 U	0.011 J	<0.0069 U	0.0027 J	0.0051 J	0.0041 J	<0.0081 U	<0.0054 U	<0.0094 U
Carbon Tetrachloride	56-23-5	0.76	0.76	7.1	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Chlorobenzene	108-90-7	4.5	4.5	100	mg/kg	<0.0049 U	0.0014 J	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Chloroform	67-66-3	0.37	0.37	24	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Cis-1,2-Dichloroethene	156-59-2	0.19	0.19	41	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Cyclohexane	110-82-7	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.0036 J	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Cymene	99-87-6	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.37 J	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Ethylbenzene	100-41-4	1	1	76	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	0.0034 J	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.0058 J	<0.0069 U	<0.0068 U	0.001 J	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.48 J	<0.0069 U	<0.0068 U	0.0021 J	<0.0079 U	<0.0081 U	<0.011 U	<0.019 U
Methyl Acetate	79-20-9	NS	NS	NS	mg/kg	<0.049 U	<0.12 U	<0.048 U	<0.051 U	<0.065 U	<0.12 U	<0.069 U	<0.068 U	<0.073 U	<0.079 U	<0.081 U	<0.0054 U	<0.0094 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	**0.1**	0.1	100	mg/kg	<0.03 U	0.097	<0.029 U	0.0098 J	0.016 J	**0.12**	0.013 J	0.02 J	0.022 J	0.049	<0.049 U	0.016	0.018
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.025 U	<0.061 U	<0.024 U	<0.025 U	<0.032 U	<0.059 U	<0.035 U	<0.034 U	<0.036 U	<0.04 U	<0.04 U	<0.0054 U	<0.0094 U
Methylcyclohexane	108-87-2	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	0.004 J	0.023	<0.0069 U	<0.0068 U	0.0031 J	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Methylene Chloride	75-09-2	0.05	0.05	81	mg/kg	<0.025 U	<0.05 U	<0.024 U	<0.025 U	<0.032 U	<0.05 U	<0.035 U	<0.034 U	<0.036 U	<0.04 U	<0.04 U	<0.011 U	0.011 J
n-Butylbenzene	104-51-8	18	18	100	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.018	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
n-Propylbenzene	103-65-1	5	5	100	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.53 J	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Sec-Butylbenzene	135-98-8	25	25	100	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.029	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
T-Butylbenzene	98-06-6	11	11	100	mg/kg	<0.51 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.014	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Tert-Butyl Alcohol	75-65-0	NS	NS	NS	mg/kg	<0.099 U	<0.25 U	<0.096 U	<0.1 U	<0.13 U	<0.24 U	<0.14 U	<0.14 U	<0.15 U	<0.16 U	<0.16 U	<0.0054 U	<0.0094 U
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.1	0.1	100	mg/kg	<0.0099 U	<0.025 U	<0.0096 U	<0.01 U	<0.013 U	<0.024 U	<0.014 U	<0.014 U	<0.015 U	<0.016 U	<0.016 U	<0.0054 U	<0.0094 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	18	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Toluene	108-88-3	0.7	0.7	100	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	0.24 J	<0.0069 U	<0.0068 U	0.0013 J	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Total Xylenes	1330-20-7	0.26	1.2	100	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.016 U	<0.028 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	6.4	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U
Vinyl Chloride	75-01-4	0.03	0.03	0.48	mg/kg	<0.0049 U	<0.012 U	<0.0048 U	<0.0051 U	<0.0065 U	<0.012 U	<0.0069 U	<0.0068 U	<0.0073 U	<0.0079 U	<0.0081 U	<0.0054 U	<0.0094 U

Table 2
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs (2025)	NYSDEC Part 375 Protection of Groundwater SCOs (2025)	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs (2025)	Location	LSB02	LSB02	LSB03	LSB03	LSB04	LSB04	LSB05	LSB05	LSB05	LSB06	LSB06	LSB-1A	LSB-1B
					Sample Name	B7-8_LSB02_0-2	B7-8_LSB02_11-13	B7-8_LSB03_0-2	B7-8_LSB03_5-7	B7-8_LSB04_0-2	B7-8_LSB04_10-12	B7-8_LSB05_0-2	B7-8_LSB05_10152025	B7-8_LSB05_10-12	B7-8_LSB06_0-2	B7-8_LSB06_8-10	049_LSB-1A	050_LSB-1B
					Sample Date	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	05/11/2018	05/11/2018
					Sample Depth	0-2	11-13	0-2	5-7	0-2	10-12	0-2	0-2	10-12	0-2	8-10	0-2	13-15
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																		
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
1,2-Dichlorobenzene	95-50-1	**1.1**	1.1	100	mg/kg	<0.0913 U	**1.44 D**	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
1,2-Diphenylhydrazine	122-66-7	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
1,3-Dichlorobenzene	541-73-1	2.6	2.6	38	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	24	mg/kg	<0.0913 U	0.493 D	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	0.0467 JD	0.255 D	<0.0986 U	0.0574 JD	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2-Methylphenol (o-Cresol)	95-48-7	**0.33**	0.33	100	mg/kg	<0.0913 U	**0.531 D**	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	**0.33**	0.33	100	mg/kg	<0.0913 U	**0.531 D**	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.182 U	0.221 JD	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
Acenaphthene	83-32-9	20	98	100	mg/kg	0.0591 JD	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	0.13 D	<0.117 U
Acenaphthylene	208-96-8	100	365	100	mg/kg	0.0774 JD	<0.133 U	<0.0986 U	0.0801 JD	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	0.111 D	<0.117 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	0.04	0.04	8.1	mg/kg	<0.366 U	<0.533 U	<0.395 U	<0.379 U	<0.371 U	<25.6 U	<0.379 U	<0.381 U	<0.409 U	<0.391 U	<0.382 U	<0.375 U	<0.47 U
Anthracene	120-12-7	100	1,000	100	mg/kg	0.218 D	<0.133 U	0.0599 JD	0.109 D	0.0533 JD	<6.39 U	0.09 JD	0.0928 JD	<0.102 U	<0.0977 U	0.0838 JD	0.354 D	<0.117 U
Atrazine	1912-24-9	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Benzaldehyde	100-52-7	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Benzidine	92-87-5	NS	NS	NS	mg/kg	<0.366 U	<0.533 U	<0.395 U	<0.379 U	<0.371 U	<25.6 U	<0.379 U	<0.381 U	<0.409 U	<0.391 U	<0.382 U	<0.375 U	<0.47 U
Benzo(a)anthracene	56-55-3	**1**	1	1.4	mg/kg	0.784 D	0.0968 JD	0.374 D	0.375 D	0.216 D	<6.39 U	0.296 D	0.284 D	<0.102 U	0.186 D	0.246 D	**1.18 D**	0.121 D
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	0.678 D	0.107 JD	0.509 D	0.409 D	0.282 D	<6.39 U	0.259 D	0.318 D	<0.102 U	0.149 D	0.203 D	**1.36 D**	0.141 D
Benzo(b)fluoranthene	205-99-2	**1**	2.1	1.4	mg/kg	0.68 D	0.159 D	0.365 D	0.351 D	0.27 D	<6.39 U	0.233 D	0.26 D	<0.102 U	0.13 D	0.166 D	**1.06 D**	0.11 JD
Benzo(g,h,i)Perylene	191-24-2	**0.64**	1,000	4.9	mg/kg	0.365 D	0.0904 JD	0.305 D	0.547 D	0.185 D	<6.39 U	0.189 D	0.22 D	<0.102 U	0.101 D	0.128 D	**0.718 D**	0.0816 JD
Benzo(k)fluoranthene	207-08-9	**0.8**	2	4.9	mg/kg	0.574 D	0.157 D	0.357 D	0.353 D	0.23 D	<6.39 U	0.222 D	0.25 D	<0.102 U	0.135 D	0.166 D	**1.03 D**	0.114 JD
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	0.103 D	0.329 D	0.147 D	7.61 D	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	0.172 D	0.249 D	<0.117 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	0.225 D	<0.0953 U	<0.0937 U	<0.117 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	4.85 DE	1.91 D	0.151 D	1.93 D	0.255 D	154 D	0.361 D	0.306 D	<0.102 U	0.346 D	0.4 D	0.331 D	<0.117 U
Caprolactam	105-60-2	NS	NS	NS	mg/kg	<0.182 U	<0.266 U	<0.197 U	<0.189 U	<0.185 U	<12.8 U	<0.189 U	<0.19 U	<0.204 U	<0.195 U	<0.19 U	<0.187 U	<0.234 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.0759 JD	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	0.0742 JD	<0.117 U
Chrysene	218-01-9	**1**	1	4.9	mg/kg	0.876 D	0.134 D	0.411 D	0.378 D	0.257 D	<6.39 U	0.325 D	0.295 D	<0.102 U	0.194 D	0.268 D	**1.08 D**	0.113 JD
Dibenz(a,h)anthracene	53-70-3	0.33	1,000	0.33	mg/kg	0.123 D	<0.133 U	0.0977 JD	0.161 D	0.0637 JD	<6.39 U	0.0575 JD	0.0708 JD	<0.102 U	<0.0977 U	<0.0953 U	0.282 D	<0.117 U
Dibenzofuran	132-64-9	2.1	110	18	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.0913 U	0.227 D	<0.0986 U	0.0967 D	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	0.0775 JD	<0.0977 U	<0.0953 U	0.177 D	<0.117 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	12.2 D	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Fluoranthene	206-44-0	85	1,000	100	mg/kg	1.48 D	0.165 D	0.667 D	0.648 D	0.385 D	<6.39 U	0.515 D	0.513 D	<0.102 U	0.249 D	0.437 D	2.27 D	0.177 D
Fluorene	86-73-7	30	386	100	mg/kg	0.0738 JD	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	0.148 D	<0.117 U
Hexachlorobenzene	118-74-1	0.33	3.2	0.33	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	6.6	1.4	mg/kg	0.31 D	0.0904 JD	0.251 D	0.412 D	0.134 D	<6.39 U	0.182 D	0.179 D	<0.102 U	0.101 D	0.125 D	**0.671 D**	0.076 JD
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Naphthalene	91-20-3	12	12	100	mg/kg	0.112 D	0.801 D	<0.0986 U	0.276 D	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	0.0697 JD	<0.117 U
Nitrobenzene	98-95-3	0.08	0.08	1.8	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
n-Nitrosodimethylamine	62-75-9	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Pentachlorophenol	87-86-5	0.8	0.8	1.3	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Phenanthrene	85-01-8	**1.1**	1,000	4.9	mg/kg	0.697 D	0.107 JD	0.188 D	0.334 D	0.154 D	<6.39 U	0.312 D	0.319 D	<0.102 U	0.109 D	0.3 D	**1.18 D**	0.0826 JD
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.0913 U	<0.133 U	<0.0986 U	<0.0945 U	<0.0926 U	<6.39 U	<0.0946 U	<0.0952 U	<0.102 U	<0.0977 U	<0.0953 U	<0.0937 U	<0.117 U
Pyrene	129-00-0	64	1,000	100	mg/kg	1.68 D	0.192 D	0.67 D	0.685 D	0.515 D	<6.39 U	0.603 D	0.644 D	<0.102 U	0.399 D	0.572 D	2.14 D	0.167 D
Pyridine	110-86-1	NS	NS	NS	mg/kg	<0.366 U	<0.533 U	<0.395 U	<0.379 U	<0.371 U	<25.6 U	<0.379 U	<0.381 U	<0.409 U	<0.391 U	<0.382 U	<0.375 U	<0.47 U

Table 2
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs (2025)	NYSDEC Part 375 Protection of Groundwater SCOs (2025)	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs (2025)	Location	LSB02	LSB02	LSB03	LSB03	LSB04	LSB04	LSB05	LSB05	LSB05	LSB06	LSB06	LSB-1A	LSB-1B
					Sample Name	B7-8_LSB02_0-2	B7-8_LSB02_11-13	B7-8_LSB03_0-2	B7-8_LSB03_5-7	B7-8_LSB04_0-2	B7-8_LSB04_10-12	B7-8_LSB05_0-2	B7-8_DUP_10152025	B7-8_LSB05_10-12	B7-8_LSB06_0-2	B7-8_LSB06_8-10	049_LSB-1A	050_LSB-1B
					Sample Date	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	10/15/2025	05/11/2018	05/11/2018
					Sample Depth	0-2	11-13	0-2	5-7	0-2	10-12	0-2	0-2	10-12	0-2	8-10	0-2	13-15
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																		
4,4'-DDD	72-54-8	0.0033	14	5	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
4,4'-DDE	72-55-9	0.0033	9.3	3.4	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
4,4'-DDT	50-29-3	**0.0033**	135	3.8	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	**0.0503 DP**
Aldrin	309-00-2	0.0048	0.19	0.044	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.18	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Alpha Chlordane	5103-71-9	0.014	4.5	0.65	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Alpha Endosulfan	959-98-8	4.3	65	35	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.021	0.09	0.18	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Beta Endosulfan	33213-65-9	4.3	44	35	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0371 UP	<0.0464 UP
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.1	100	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Dieldrin	60-57-1	0.005	0.1	0.075	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Endosulfan Sulfate	1031-07-8	4.3	47	35	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Endrin	72-20-8	0.014	0.06	5.3	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Gamma Bhc (Lindane)	58-89-9	0.025	0.05	0.21	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Gamma-Chlordane	5566-34-7	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Heptachlor	76-44-8	0.013	0.38	0.53	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00185 UP	<0.00232 UP
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00927 UP	<0.0116 UP
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0938 UP	<0.118 UP
Polychlorinated Biphenyl																		
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0181 UP	<0.0263 UP	<0.0195 UP	<0.0188 UP	<0.0184 UP	<0.0254 UP	<0.0188 UP	<0.019 UP	<0.0203 UP	<0.0194 UP	<0.019 UP	<0.374 UP	<0.0234 UP
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0181 UP	<0.0263 UP	<0.0195 UP	<0.0188 UP	<0.0184 UP	<0.0254 UP	<0.0188 UP	<0.019 UP	<0.0203 UP	<0.0194 UP	<0.019 UP	<0.374 UP	<0.0234 UP
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0181 UP	<0.0263 UP	<0.0195 UP	<0.0188 UP	<0.0184 UP	<0.0254 UP	<0.0188 UP	<0.019 UP	<0.0203 UP	<0.0194 UP	<0.019 UP	<0.374 UP	<0.0234 UP
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	0.0305 P	<0.0263 UP	<0.0195 UP	0.0864 P	0.0259 P	9.2 DP	0.0591 P	0.0308 P	<0.0203 UP	0.0671 P	0.173 P	<0.374 UP	<0.0234 UP
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0181 UP	<0.0263 UP	<0.0195 UP	<0.0188 UP	<0.0184 UP	<0.0254 UP	<0.0188 UP	<0.019 UP	<0.0203 UP	<0.0194 UP	<0.019 UP	<0.374 UP	<0.0234 UP
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	0.0647 P	<0.0263 UP	0.139 P	0.174 P	0.0565 P	3.01 DP	0.117 P	0.0661 P	<0.0203 UP	0.0832 P	0.221 P	<0.374 UP	<0.0234 UP
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0181 UP	<0.0263 UP	0.134 P	0.12 P	0.0259 P	1.26 DP	0.0586 P	0.0365 P	0.0313 P	0.0331 P	0.0935 P	9.11 DP	0.338 P
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	NS	mg/kg	NA	0.0921 P	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	1336-36-3	**0.1**	3.2	1	mg/kg	0.0952 P	0.0921 P	**0.274 P**	**0.38 P**	**0.108 P**	**13.5 DP**	**0.235 P**	**0.133 P**	0.0313 P	**0.183 P**	**0.487 P**	**9.11 DP**	**0.338 P**
Metals																		
Aluminum	7429-90-5	NS	NS	NS	mg/kg	6,440	5,710	6,850	6,790	9,150	13,400	6,860	8,220	4,250	7,910	6,310	6,540	5,990
Antimony	7440-36-0	NS	NS	NS	mg/kg	<2.3 U	<3.36 U	<2.47 U	<2.38 U	<2.32 U	5.66	<2.37 U	<2.39 U	<2.56 U	<2.45 U	<2.39 U	1.29	5.58
Arsenic	7440-38-2	**13**	16	16	mg/kg	6.88	**13.1**	5.41	6.12	3.64	**21.1**	5.12	4.85	**14.9**	9.15	8.78	3.24	**15.7**
Barium	7440-39-3	**410**	820	410	mg/kg	263	**1,320**	206	235	67.9	**2,170**	204	**470**	**453**	158	**1,490**	272	**913**
Beryllium	7440-41-7	4.4	47	43	mg/kg	0.052	0.451	0.167	0.181	<0.047 U	0.252	0.173	0.158	0.24	0.25	0.162	0.133	0.313
Cadmium	7440-43-9	**2.5**	7.5	2.5	mg/kg	**4.3**	2.23	1.42	1.97	0.39	**25.4**	1.01	0.878	**3.63**	0.92	1.49	**3.45**	2.21
Calcium	7440-70-2	NS	NS	NS	mg/kg	33,200	7,720	27,900	18,700	46,100	25,000	23,500	20,100	16,000	50,300	9,680	15,500	31,400
Chromium, Hexavalent	18540-29-9	1	19	1	mg/kg	<0.551 U	<0.806 U	<0.593 U	<0.572 U	<0.557 U	<0.769 U	<0.569 U	<0.573 U	<0.614 U	<0.588 U	<0.574 U	<0.562 U	<0.704 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	21.3	74.2	25.6	147	14.4	968	24.7	19.6	54.6	24.3	28.3	24.1	93.6
Chromium, Trivalent	16065-83-1	**30**	NS	110	mg/kg	21.3	**74.2**	25.6	**147**	14.4	**968**	24.7	19.6	**54.6**	24.3	28.3	24.1	**93.6**
Cobalt	7440-48-4	NS	NS	NS	mg/kg	8.92	26.7	6.15	6.58	7.05	29.7	6.02	6.58	3.99	7.04	6.1	7.97	20.9
Copper	7440-50-8	**50**	1,720	280	mg/kg	**128**	**108**	**171**	**184**	**69.3**	**391**	**137**	**86.9**	**69.8**	**74.4**	**73.6**	**117**	**359**
Cyanide	57-12-5	2.3	40	13	mg/kg	0.788	1.87	<0.593 U	0.768	<0.557 U	1.08	0.895	0.736	1.13	<0.588 U	0.969	NA	NA
Iron	7439-89-6	NS	NS	NS	mg/kg	25,700	27,100	18,700	33,200	15,800	197,000 D	20,800	18,100	21,700	18,700	20,900	23,700	103,000
Lead	7439-92-1	**63**	450	400	mg/kg	**309**	**1,100**	**293**	**361**	**63.4**	**2,590**	**228**	**333**	**637**	**183**	**259**	**389**	**2,310**
Magnesium	7439-95-4	NS	NS	NS	mg/kg	14,000	369	9,290	3,030	12,100	5,470	10,400	6,330	1,130	6,340	2,760	3,640	1,200
Manganese	7439-96-5	1,600	2,000	2,000	mg/kg	279	155	188	290	173	862	227	213	118	197	207	268	570
Mercury	7439-97-6	**0.18**	0.73	0.3	mg/kg	**0.743**	**0.196**	**0.386**	**0.59**	0.142	**1.94**	**0.2**	**0.307**	**0.275**	**0.275**	**0.413**	**0.801**	**3.05**
Nickel	7440-02-0	**30**	130	320	mg/kg	26.3	**68.4**	26.2	**43.3**	13.9	**173**	24.9	24.6	13.8	22.8	27.9	**32.1**	**78.4**
Potassium	7440-09-7	NS	NS	NS	mg/kg	2,010	834	892	776	936	754	829	1,080	786	797	595	752	953
Selenium	7782-49-2	**3.9**	4	110	mg/kg	<2.3 U	<3.36 U	<2.47 U	<2.38 U	<2.32 U	<3.2 U	<2.37 U	<2.39 U	**5.84**	<2.45 U	<2.39 U	<1.12 U	<1.41 U
Silver	7440-22-4	**2**	8.3	110	mg/kg	0.524	<0.677 U	<0.498 U	<0.481 U	<0.468 U	**4.8**	<0.478 U	<0.481 U	<0.516 U	<0.494 U	<0.482 U	<0.562 U	1.53
Sodium	7440-23-5	NS	NS	NS	mg/kg	271	995	174	177	858	710	216	228	509	301	123	269 B	838 B
Thallium	7440-28-0	NS	NS	NS	mg/kg	<1.84 U	<2.69 U	<1.98 U	<1.91 U	<1.86 U	<2.57 U	<1.9 U	<1.91 U	<2.05 U	<1.96 U	<1.92 U	<1.12 U	<1.41 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	52	32.5	29.3	31.7	51.8	16.7	25.3	29.1	14.1	22.7	20	48.6	29.3
Zinc	7440-66-6	**109**	2,480	6,600	mg/kg	**759**	**3,570**	**428**	**841**	**121**	**7,470 D**	**338**	**424**	**2,530**	**285**	**1,120**	**1,340**	**1,340**
General Chemistry																		
Solids, Percent	SOLID	NS	NS	NS	Percent	90.7	62	84.3	87.3	89.7	65.1	87.9	87.3	81.4	85.1	87.2	89	71.1

Table 2
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Notes:

CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
NA - Not analyzed
RL - Reporting limit
<RL - Not detected
Soil sample analytical results are compared to the 2025 New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).
Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and 4-methylphenol (p-cresol).

Qualifiers:

If data is directly from lab (no validation)

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

J - The analyte was detected above the method detection limit (MDL), but below the RL; therefore, the result is an estimated concentration.
P - The relative percent difference (RPD) between the results for the two columns exceeds the method-specified criteria.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
B - The analyte was found in the associated analysis batch blank.
S - Laboratory solvent, contamination is possible.

Exceedance Summary:

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

Table 3
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Analyte	CAS Number	NYSDEC SGVs	Location	LMW01	LMW02	LMW03	LMW03	LMW-1
			Sample Name	B7-8_LMW01_102325	B7-8_LMW02_102325	B7-8_LMW03_102325	B7-8_DUP_10232025	B7-8_061_LMW-1_051518
			Sample Date	10/23/2025	10/23/2025	10/23/2025	10/23/2025	05/15/2018
			Unit	Result	Result	Result	Result	Result
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	630-20-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-Trichloroethane	71-55-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2,2-Tetrachloroethane	79-34-5	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-Trichloroethane	79-00-5	1	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-Dichloroethane	75-34-3	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-Dichloroethene	75-35-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-Dichloropropene	563-58-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-Trichlorobenzene	87-61-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-Trichloropropane	96-18-4	0.04	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2,4-Trimethylbenzene	95-63-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-Dichloroethane	107-06-2	0.6	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-Dichloropropane	78-87-5	1	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3-Dichloropropane	142-28-9	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	NA	NA	NA	NA	<80 U
2,2-Dichloropropane	594-20-7	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
2-Chlorotoluene	95-49-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
2-Hexanone (MBK)	591-78-6	50	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
4-Chlorotoluene	106-43-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Acetone	67-64-1	50	ug/l	3.11	7.46	<2 U	<2 U	2.27
Acrolein	107-02-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Acrylonitrile	107-13-1	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Benzene	71-43-2	1	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Bromobenzene	108-86-1	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Bromochloromethane	74-97-5	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Bromodichloromethane	75-27-4	50	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Bromoform	75-25-2	50	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Bromomethane	74-83-9	5	ug/l	<2 U	<2 U	<2 U	<2 U	<0.5 U
Carbon Disulfide	75-15-0	60	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Carbon Tetrachloride	56-23-5	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Chlorobenzene	108-90-7	5	ug/l	0.31 J	<0.5 U	<0.5 U	<0.5 U	0.58
Chloroethane	75-00-3	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Chloroform	67-66-3	7	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Chloromethane	74-87-3	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cis-1,2-Dichloroethene	156-59-2	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cis-1,3-Dichloropropene	10061-01-5	0.4	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cyclohexane	110-82-7	NS	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cymene	99-87-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Dibromochloromethane	124-48-1	50	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Dibromomethane	74-95-3	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Dichlorodifluoromethane	75-71-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Ethylbenzene	100-41-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Isopropylbenzene (Cumene)	98-82-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
M,P-Xylene	179601-23-1	5	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U
Methyl Acetate	79-20-9	NS	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	ug/l	<0.5 U	0.5	<0.5 U	<0.5 U	0.52
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Methylcyclohexane	108-87-2	NS	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Methylene Chloride	75-09-2	5	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U
n-Butylbenzene	104-51-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
n-Propylbenzene	103-65-1	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Sec-Butylbenzene	135-98-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Styrene	100-42-5	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
T-Butylbenzene	98-06-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.34 J
Tert-Butyl Alcohol	75-65-0	NS	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	10	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tetrachloroethene (PCE)	127-18-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Toluene	108-88-3	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Total Xylenes	1330-20-7	5	ug/l	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U
Trans-1,2-Dichloroethene	156-60-5	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trans-1,3-Dichloropropene	10061-02-6	0.4	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichloroethene (TCE)	79-01-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichlorofluoromethane	75-69-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Vinyl Chloride	75-01-4	2	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Total BTEX	BTEX	NS	ug/l	ND	ND	ND	ND	ND
Total VOCs	TOTALVOCS	NS	ug/l	3.42	7.96	ND	ND	3.71

Table 3
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Analyte	CAS Number	NYSDEC SGVs	Location	LMW01	LMW02	LMW03	LMW03	LMW-1
			Sample Name	B7-8_LMW01_102325	B7-8_LMW02_102325	B7-8_LMW03_102325	B7-8_DUP_10232025	B7-8_061_LMW-1_051518
			Sample Date	10/23/2025	10/23/2025	10/23/2025	10/23/2025	05/15/2018
			Unit	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds								
1,2,4,5-Tetrachlorobenzene	95-94-3	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
1,2-Diphenylhydrazine	122-66-7	0	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,4,5-Trichlorophenol	95-95-4	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,4,6-Trichlorophenol	88-06-2	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,4-Dichlorophenol	120-83-2	1	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,4-Dimethylphenol	105-67-9	1	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,4-Dinitrophenol	51-28-5	1	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,4-Dinitrotoluene	121-14-2	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2,6-Dinitrotoluene	606-20-2	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2-Chloronaphthalene	91-58-7	10	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2-Chlorophenol	95-57-8	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2-Methylnaphthalene	91-57-6	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2-Methylphenol (o-Cresol)	95-48-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2-Nitroaniline	88-74-4	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
2-Nitrophenol	88-75-5	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
3,3'-Dichlorobenzidine	91-94-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
3-Nitroaniline	99-09-2	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
4-Chloro-3-Methylphenol	59-50-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
4-Chloroaniline	106-47-8	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
4-Nitroaniline	100-01-6	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
4-Nitrophenol	100-02-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Acenaphthene	83-32-9	20	ug/l	0.0935	<0.05 U	<0.05 U	<0.05 U	0.103
Acenaphthylene	208-96-8	NS	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Acetophenone	98-86-2	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Anthracene	120-12-7	50	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Atrazine	1912-24-9	7.5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.513 U
Benzaldehyde	100-52-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Benzidine	92-87-5	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Benzo(a)anthracene	56-55-3	0.002	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Benzo(a)pyrene	50-32-8	0	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Benzo(b)fluoranthene	205-99-2	0.002	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Benzo(g,h,i)Perylene	191-24-2	NS	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Benzo(k)fluoranthene	207-08-9	0.002	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Benzoic Acid	65-85-0	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<51.3 U
Benzyl Alcohol	100-51-6	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Benzyl Butyl Phthalate	85-68-7	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Biphenyl (Diphenyl)	92-52-4	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Bis(2-chloroethoxy) methane	111-91-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Bis(2-chloroisopropyl) ether	108-60-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Bis(2-ethylhexyl) phthalate	117-81-7	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.513 U
Caprolactam	105-60-2	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Carbazole	86-74-8	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Chrysene	218-01-9	0.002	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Dibenz(a,h)anthracene	53-70-3	NS	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Dibenzofuran	132-64-9	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Dibutyl phthalate	84-74-2	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Diethyl phthalate	84-66-2	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Dimethyl phthalate	131-11-3	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Dioctyl phthalate	117-84-0	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Fluoranthene	206-44-0	50	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	0.103
Fluorene	86-73-7	50	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	0.0615
Hexachlorobenzene	118-74-1	0.04	ug/l	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.0205 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.513 U
Hexachlorocyclopentadiene	77-47-4	5	ug/l	<10 U	<10 U	<10 U	<10 U	<10.3 U
Hexachloroethane	67-72-1	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.513 U
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	<0.0513 U
Isophorone	78-59-1	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Naphthalene	91-20-3	10	ug/l	<0.05 U	0.0566	0.474	<0.05 U	0.0821
Nitrobenzene	98-95-3	0.4	ug/l	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.256 U
n-Nitrosodimethylamine	62-75-9	NS	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.513 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
n-Nitrosodiphenylamine	86-30-6	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Pentachlorophenol	87-86-5	1	ug/l	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.256 U
Phenanthrene	85-01-8	50	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	0.0821
Phenol	108-95-2	1	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Pyrene	129-00-0	50	ug/l	<0.05 U	<0.05 U	<0.05 U	<0.05 U	0.0513
Pyridine	110-86-1	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5.13 U
Total SVOCs	TOTALSVOCS	NS	ug/l	0.0935	0.0566	0.474	ND	0.483

Table 3
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Analyte	CAS Number	NYSDEC SGVs	Location	LMW01	LMW02	LMW03	LMW03	LMW-1
			Sample Name	B7-8_LMW01_102325	B7-8_LMW02_102325	B7-8_LMW03_102325	B7-8_DUP_10232025	B7-8_061_LMW-1_051518
			Sample Date	10/23/2025	10/23/2025	10/23/2025	10/23/2025	05/15/2018
			Unit	Result	Result	Result	Result	Result
Pesticides								
4,4'-DDD	72-54-8	0.3	ug/l	NA	NA	NA	NA	<0.00444 U
4,4'-DDE	72-55-9	0.2	ug/l	NA	NA	NA	NA	<0.00444 U
4,4'-DDT	50-29-3	0.2	ug/l	NA	NA	NA	NA	<0.00444 U
Aldrin	309-00-2	0	ug/l	NA	NA	NA	NA	<0.00444 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	ug/l	NA	NA	NA	NA	<0.00444 U
Alpha Chlordane	5103-71-9	NS	ug/l	NA	NA	NA	NA	<0.00444 U
Alpha Endosulfan	959-98-8	NS	ug/l	NA	NA	NA	NA	<0.00444 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	ug/l	NA	NA	NA	NA	<0.00444 U
Beta Endosulfan	33213-65-9	NS	ug/l	NA	NA	NA	NA	<0.00444 U
Chlordane (alpha and gamma)	57-74-9	0.05	ug/l	NA	NA	NA	NA	<0.0222 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	ug/l	NA	NA	NA	NA	<0.00444 U
Dieldrin	60-57-1	0.004	ug/l	NA	NA	NA	NA	<0.00222 U
Endosulfan Sulfate	1031-07-8	NS	ug/l	NA	NA	NA	NA	<0.00444 U
Endrin	72-20-8	0	ug/l	NA	NA	NA	NA	<0.00444 U
Endrin Aldehyde	7421-93-4	5	ug/l	NA	NA	NA	NA	<0.0111 U
Endrin Ketone	53494-70-5	5	ug/l	NA	NA	NA	NA	<0.0111 U
Gamma Bhc (Lindane)	58-89-9	0.05	ug/l	NA	NA	NA	NA	<0.00444 U
Gamma-Chlordane	5566-34-7	NS	ug/l	NA	NA	NA	NA	<0.0111 U
Heptachlor	76-44-8	0.04	ug/l	NA	NA	NA	NA	<0.00444 U
Heptachlor Epoxide	1024-57-3	0.03	ug/l	NA	NA	NA	NA	<0.00444 U
Methoxychlor	72-43-5	35	ug/l	NA	NA	NA	NA	<0.00444 U
Toxaphene	8001-35-2	0.06	ug/l	NA	NA	NA	NA	<0.111 U
Polychlorinated Biphenyl								
PCB-1016 (Aroclor 1016)	12674-11-2	NS	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
Total PCBs	1336-36-3	0.09	ug/l	<0.05 UP	<0.0556 UP	<0.05 UP	<0.05 UP	<0.0556 U
Metals - Dissolved								
Aluminum	7429-90-5	NS	ug/l	222 J	<556 U	<556 U	<556 U	<55.6 U
Antimony	7440-36-0	3	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Arsenic	7440-38-2	25	ug/l	<1.11 U	2.26	<1.11 U	<1.11 U	<1.11 U
Barium	7440-39-3	1000	ug/l	258	55.7	5.89 J	6.33 J	170
Beryllium	7440-41-7	3	ug/l	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<1.11 U
Cadmium	7440-43-9	5	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<1.11 U
Calcium	7440-70-2	NS	ug/l	163,000	111,000	21,200	19,300	177,000
Chromium, Total	7440-47-3	50	ug/l	3.56 J	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Cobalt	7440-48-4	NS	ug/l	2.44 J	<4.44 U	<4.44 U	<4.44 U	<5.56 U
Copper	7440-50-8	200	ug/l	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<5.56 U
Iron	7439-89-6	**300**	ug/l	**13,400**	**7,420**	**2,370**	**2,240**	140
Lead	7439-92-1	25	ug/l	<6.67 U	<6.67 U	<6.67 U	<6.67 U	<5.56 U
Magnesium	7439-95-4	**35000**	ug/l	26,600	10,200	1,990	1,910	**50,700**
Manganese	7439-96-5	**300**	ug/l	286	**757**	**1,510**	**1,470**	**371**
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<5.56 U
Potassium	7440-09-7	NS	ug/l	22,500	8,960	928 J	923 J	36,900
Selenium	7782-49-2	10	ug/l	<27.8 U	<27.8 U	<27.8 U	<27.8 U	5.65
Silver	7440-22-4	50	ug/l	<6.67 U	<6.67 U	<6.67 U	<6.67 U	<5.56 U
Sodium	7440-23-5	**20000**	ug/l	**58,300**	18,800	8,660	9,300	**78,000 B**
Thallium	7440-28-0	0.5	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	ug/l	2.78 J	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2000	ug/l	14.9 J	21.8 J	<27.8 U	<27.8 U	<16.7 U
Metals - Total								
Aluminum	7429-90-5	NS	ug/l	<556 U	206 J	<556 U	<556 U	25,300
Antimony	7440-36-0	3	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Arsenic	7440-38-2	25	ug/l	<1.11 U	5.13	1.36	1.51	1.58
Barium	7440-39-3	1000	ug/l	288	62.9	7.22 J	9.22 J	459
Beryllium	7440-41-7	3	ug/l	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<1.11 U
Cadmium	7440-43-9	5	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<1.11 U
Calcium	7440-70-2	NS	ug/l	166,000	113,000	21,200	21,200	36,100
Chromium, Hexavalent	18540-29-9	50	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U
Chromium, Total	7440-47-3	NS	ug/l	1 J	1 J	<5.56 U	5 J	378
Chromium, Trivalent	16065-83-1	NS	ug/l	<10 U	<10 U	<10 U	<10 U	378
Cobalt	7440-48-4	NS	ug/l	<4.44 U	<4.44 U	<4.44 U	<4.44 U	134
Copper	7440-50-8	200	ug/l	<22.2 U	<22.2 U	<22.2 U	71.4	166
Cyanide	57-12-5	200	ug/l	<10 U	<10 U	<10 U	<10 U	NA
Iron	7439-89-6	**300**	ug/l	**31,400**	**10,500**	**8,450**	**9,210**	**43,500**
Lead	7439-92-1	**25**	ug/l	<6.67 U	<6.67 U	<6.67 U	<6.67 U	**87**
Magnesium	7439-95-4	35000	ug/l	26,200	10,600	2,020	2,030	5,920
Manganese	7439-96-5	**300**	ug/l	271	**771**	**1,510**	**1,510**	**9,120**
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	<11.1 U	<11.1 U	<11.1 U	11.3	90.9
Potassium	7440-09-7	NS	ug/l	20,700	9,360	986 J	973 J	6,970 B
Selenium	7782-49-2	10	ug/l	<27.8 U	<27.8 U	<27.8 U	<27.8 U	3.24
Silver	7440-22-4	50	ug/l	<6.67 U	<6.67 U	<6.67 U	<6.67 U	<5.56 U
Sodium	7440-23-5	**20000**	ug/l	**43,600**	19,400	8,780	8,860	**89,700 B**
Thallium	7440-28-0	0.5	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	ug/l	1.11 J	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2000	ug/l	<27.8 U	27.2 J	<27.8 U	25.6 J	39.3

Table 3
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Notes:

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

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

Qualifiers:

J - The analyte was detected above the method detection limit (MDL), but below the RL; therefore, the result is an estimated concentration.
P - The relative percent difference (RPD) between the results for the two columns exceeds the method-specified criteria.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
B - The analyte was found in the associated analysis batch blank.

Exceedance Summary:

10 - Result exceeds NYSDEC SGVs

Table 4
Remedial Investigation Work Plan
Historical Soil Vapor Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

Analyte	CAS Number	Location	AA01	LSV01	LSV02	LSV03	LSV03
		Sample Name	B7-8_AA01_10172025	B7-8_LSV01_10172025	B7-8_LSV02_10172025	B7-8_LSV03_10172025	B7-8_DUP_10172025
		Sample Date	10/17/2025	10/17/2025	10/17/2025	10/17/2025	10/17/2025
		Sample Type	AA	AS	AS	AS	AS
		Unit	Result	Result	Result	Result	Result
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	630-20-6	ug/m3	<0.64 U	<1.2 U	<1.1 U	<11 U	<22 U
1,1,1-Trichloroethane	71-55-6	ug/m3	<0.51 U	<0.93 U	<0.86 U	<9 U	<18 U
1,1,2,2-Tetrachloroethane	79-34-5	ug/m3	<0.64 U	<1.2 U	<1.1 U	<11 U	<22 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	ug/m3	<0.71 U	<1.3 U	<1.2 U	<13 U	<25 U
1,1,2-Trichloroethane	79-00-5	ug/m3	<0.51 U	<0.93 U	<0.86 U	<9 U	<18 U
1,1-Dichloroethane	75-34-3	ug/m3	<0.38 U	3.3 D	<0.64 U	<6.6 U	<13 U
1,1-Dichloroethene	75-35-4	ug/m3	<0.18 U	1.8 D	<0.31 U	<3.3 U	<6.5 U
1,2,4-Trichlorobenzene	120-82-1	ug/m3	<34 U	<63 U	<58 U	<610 U	<1,200 U
1,2,4-Trimethylbenzene	95-63-6	ug/m3	1.3 D	<0.84 U	3.5 D	<8.1 U	<16 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	ug/m3	<0.71 U	<1.3 U	<1.2 U	<13 U	<25 U
1,2-Dichlorobenzene	95-50-1	ug/m3	<0.56 U	<1 U	<0.95 U	<9.9 U	<20 U
1,2-Dichloroethane	107-06-2	ug/m3	<0.38 U	<0.69 U	<0.64 U	<6.6 U	<13 U
1,2-Dichloropropane	78-87-5	ug/m3	<0.43 U	<0.79 U	<0.73 U	<7.6 U	<15 U
1,2-Dichlorotetrafluoroethane	76-14-2	ug/m3	<0.65 U	<1.2 U	<1.1 U	<11 U	<23 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	ug/m3	<0.46 U	<0.84 U	<0.77 U	<8.1 U	<16 U
1,3-Butadiene	106-99-0	ug/m3	<0.62 U	<1.1 U	1.3 D	<11 U	<22 U
1,3-Dichlorobenzene	541-73-1	ug/m3	<0.56 U	<1 U	<0.95 U	<9.9 U	<20 U
1,3-Dichloropropane	142-28-9	ug/m3	<0.43 U	<0.79 U	<0.73 U	<7.6 U	<15 U
1,4-Dichlorobenzene	106-46-7	ug/m3	<0.56 U	<1 U	<0.95 U	<9.9 U	<20 U
1,4-Dioxane (P-Dioxane)	123-91-1	ug/m3	<1.7 U	<3.1 U	<2.8 U	<30 U	<59 U
2,2,4-Trimethylpentane	540-84-1	ug/m3	<0.22 U	23 D	5.2 D	1,600 D	1,600 D
2-Hexanone (MBK)	591-78-6	ug/m3	<0.76 U	<1.4 U	<1.3 U	<13 U	<27 U
4-Ethyltoluene	622-96-8	ug/m3	<0.46 U	<0.84 U	<0.77 U	<8.1 U	<16 U
Acetone	67-64-1	ug/m3	32 D	300 D	150 D	200 D	180 JD
Acrolein	107-02-8	ug/m3	0.26 D	<0.39 U	<0.36 U	<3.8 U	<7.5 U
Acrylonitrile	107-13-1	ug/m3	<10 U	<19 U	<17 U	<180 U	<360 U
Allyl Chloride (3-Chloropropene)	107-05-1	ug/m3	<1.5 U	<2.7 U	<2.5 U	<26 U	<51 U
Benzene	71-43-2	ug/m3	0.8 D	36 D	46 D	610 D	600 D
Benzyl Chloride	100-44-7	ug/m3	<12 U	<22 U	<20 U	<210 U	<420 U
Bromodichloromethane	75-27-4	ug/m3	<0.62 U	<1.1 U	<1.1 U	<11 U	<22 U
Bromoethene	593-60-2	ug/m3	<0.41 U	<0.75 U	<0.69 U	<7.2 U	<14 U
Bromoform	75-25-2	ug/m3	<0.96 U	<1.8 U	<1.6 U	<17 U	<34 U
Bromomethane	74-83-9	ug/m3	<0.36 U	<0.66 U	<0.61 U	<6.4 U	<13 U
Carbon Disulfide	75-15-0	ug/m3	<0.29 U	400 D	79 D	<5.1 U	<10 U
Carbon Tetrachloride	56-23-5	ug/m3	<0.15 U	<0.27 U	<0.25 U	<2.6 U	<5.1 U
Chlorobenzene	108-90-7	ug/m3	<0.43 U	<0.79 U	<0.73 U	<7.6 U	<15 U
Chloroethane	75-00-3	ug/m3	<0.24 U	<0.45 U	<0.42 U	<4.3 U	<8.6 U
Chloroform	67-66-3	ug/m3	<0.45 U	9.5 D	<0.77 U	<8 U	<16 U
Chloromethane	74-87-3	ug/m3	1.6 D	0.85 D	0.49 D	<3.4 U	<6.8 U
Cis-1,2-Dichloroethene	156-59-2	ug/m3	<0.18 U	44 D	11 D	44 D	43 D
Cis-1,3-Dichloropropene	10061-01-5	ug/m3	<0.42 U	<0.77 U	<0.71 U	<7.5 U	<15 U
Cyclohexane	110-82-7	ug/m3	<0.32 U	26 D	9.6 D	580 D	580 D
Cymene	99-87-6	ug/m3	<0.51 U	1.1 D	<0.86 U	<9 U	<18 U
Dibromochloromethane	124-48-1	ug/m3	<0.79 U	<1.5 U	<1.3 U	<14 U	<28 U
Dichlorodifluoromethane	75-71-8	ug/m3	2.1 D	17 D	2.4 D	<8.1 U	<16 U
Ethyl Acetate	141-78-6	ug/m3	4.7 JD	<31 U	6 JD	<300 U	<590 U
Ethylbenzene	100-41-4	ug/m3	0.4 D	15 D	4 D	21 D	24 D
Hexachlorobutadiene	87-68-3	ug/m3	<0.99 U	<1.8 U	<1.7 U	<18 U	<35 U
Isopropanol	67-63-0	ug/m3	2.2 D	5.2 D	2.9 D	27 D	33 JD
Isopropylbenzene (Cumene)	98-82-8	ug/m3	<0.46 U	12 D	2.9 D	110 D	140 D
M,P-Xylene	179601-23-1	ug/m3	1.4 D	28 D	12 D	190 D	220 D
Methyl Ethyl Ketone (2-Butanone)	78-93-3	ug/m3	2.8 JD	72 D	33 D	60 JD	60 JD
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	ug/m3	0.68 D	<0.7 U	<0.65 U	<6.7 U	<13 U
Methyl Methacrylate	80-62-6	ug/m3	<0.38 U	<0.7 U	<0.64 U	<6.7 U	<13 U
Methylene Chloride	75-09-2	ug/m3	0.42 JD	<3.6 U	<3.3 U	<34 U	<68 U
Naphthalene	91-20-3	ug/m3	0.68 JD	<8.9 U	<8.3 U	<86 U	<170 U
n-Butylbenzene	104-51-8	ug/m3	<0.51 U	0.94 D	<0.86 U	<9 U	<18 U
n-Heptane	142-82-5	ug/m3	<0.38 U	<0.7 U	14 D	<6.7 U	1,200 D
n-Hexane	110-54-3	ug/m3	0.39 D	150 D	20 D	780 D	680 D
n-Propylbenzene	103-65-1	ug/m3	<0.46 U	5.6 D	<0.77 U	19 D	26 D
o-Xylene (1,2-Dimethylbenzene)	95-47-6	ug/m3	0.52 D	14 D	4.8 D	84 D	100 D
Propylene	115-07-1	ug/m3	<0.16 U	570 D	21 D	8,700 D	6,800 D
Sec-Butylbenzene	135-98-8	ug/m3	<0.51 U	4.2 D	1.2 D	<9 U	<18 U
Styrene	100-42-5	ug/m3	<0.39 U	<0.73 U	<0.67 U	7.7 D	<14 U
T-Butylbenzene	98-06-6	ug/m3	<0.51 U	3.7 D	<0.86 U	<9 U	<18 U
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	ug/m3	<0.33 U	<0.62 U	<0.57 U	<5.9 U	<12 U
Tetrachloroethene (PCE)	127-18-4	ug/m3	<0.63 U	12 D	9.8 D	20 D	<22 U
Tetrahydrofuran	109-99-9	ug/m3	<0.55 U	<1 U	<0.93 U	<9.7 U	<19 U
Toluene	108-88-3	ug/m3	1.8 D	25 D	17 D	110 D	<12 U
Total Xylenes	1330-20-7	ug/m3	1.9 D	42 D	17 D	270 D	320 D
Trans-1,2-Dichloroethene	156-60-5	ug/m3	<0.37 U	5.1 D	1.2 D	<6.5 U	<13 U
Trans-1,3-Dichloropropene	10061-02-6	ug/m3	<0.42 U	<0.77 U	<0.71 U	<7.5 U	<15 U
Trichloroethene (TCE)	79-01-6	ug/m3	<0.12 U	14 D	3.1 D	<2.2 U	<4.4 U
Trichlorofluoromethane	75-69-4	ug/m3	1.2 D	1.2 D	<0.88 U	190 D	<18 U
Vinyl Acetate	108-05-4	ug/m3	<0.33 U	<0.6 U	<0.55 U	<5.8 U	<12 U
Vinyl Chloride	75-01-4	ug/m4	<0.12 U	89 D	3.9 D	110 D	100 D
Total BTEX	BTEX	ug/m3	4.9	118	84	1011	944
Trichlorofluoromethane	TOTALCVOCS	ug/m3	ND	169.2	29	174	143
Vinyl Acetate	TOTALVOCS	ug/m3	57.15	1,931.49	482.29	13,732.70	12,706

Table 4
Remedial Investigation Work Plan
Historical Soil Vapor Sample Analytical Results

Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York
Langan Project No.: 100688807

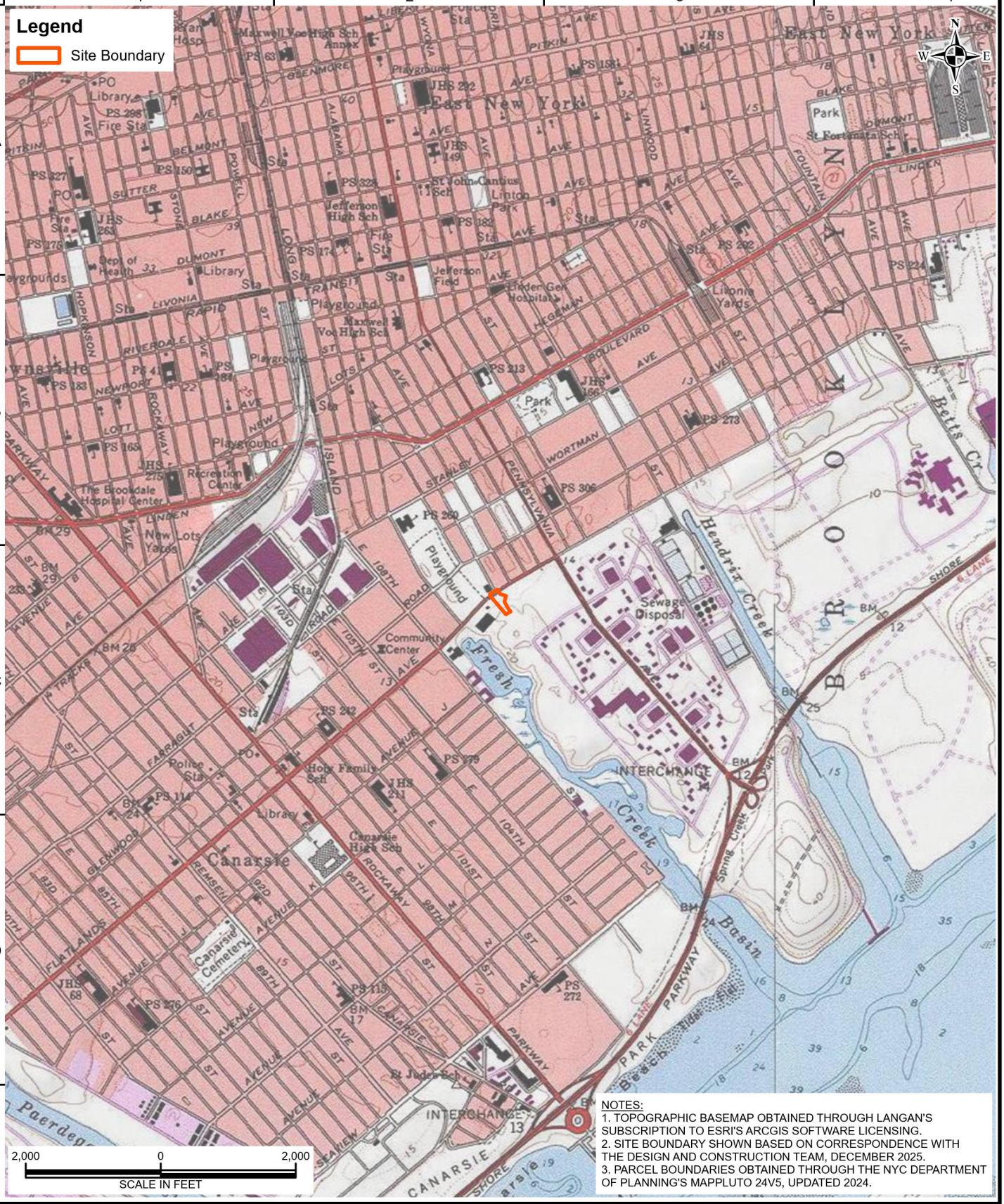
Notes:

AA - Ambient Air
SV - Soil Vapor
CAS - Chemical Abstract Service
NS - No standard
ug/m3 - microgram per cubic meter
NA - Not analyzed
ND - Not detected
RL - Reporting limit
<RL - Not detected

Qualifiers:

D - The concentration reported is a result of a diluted sample.
J - The analyte was detected above the method detection limit (MDL), but below the RL; therefore, the result is an estimated concentration.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.

FIGURES



NOTES:
1. TOPOGRAPHIC BASEMAP OBTAINED THROUGH LANGAN'S SUBSCRIPTION TO ESRI'S ARCGIS SOFTWARE LICENSING.
2. SITE BOUNDARY SHOWN BASED ON CORRESPONDENCE WITH THE DESIGN AND CONSTRUCTION TEAM, DECEMBER 2025.
3. PARCEL BOUNDARIES OBTAINED THROUGH THE NYC DEPARTMENT OF PLANNING'S MAPPLUTO 24V5, UPDATED 2024.

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Parsippany, NJ 07054
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NJ Certification of Authorization No. 24GA27996400

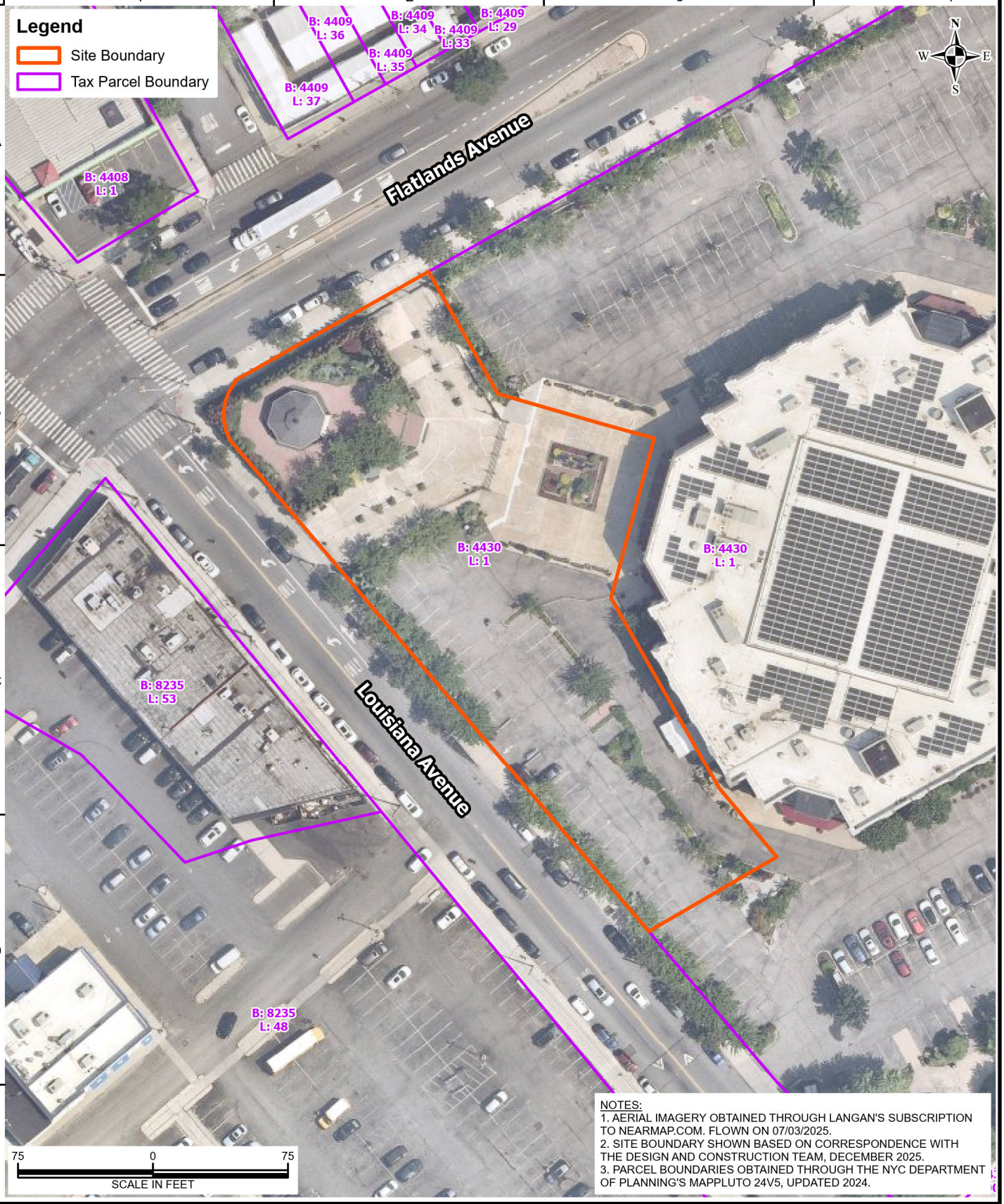
Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
SITE LOCATION PLAN

Project No.	Figure No.
100688801	1
Date: 1/12/2026	
Scale: 1"=2,000'	
Drawn By: RDB	

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NOTES:
1. AERIAL IMAGERY OBTAINED THROUGH LANGAN'S SUBSCRIPTION TO NEARMAP.COM. FLOWN ON 07/03/2025.
2. SITE BOUNDARY SHOWN BASED ON CORRESPONDENCE WITH THE DESIGN AND CONSTRUCTION TEAM, DECEMBER 2025.
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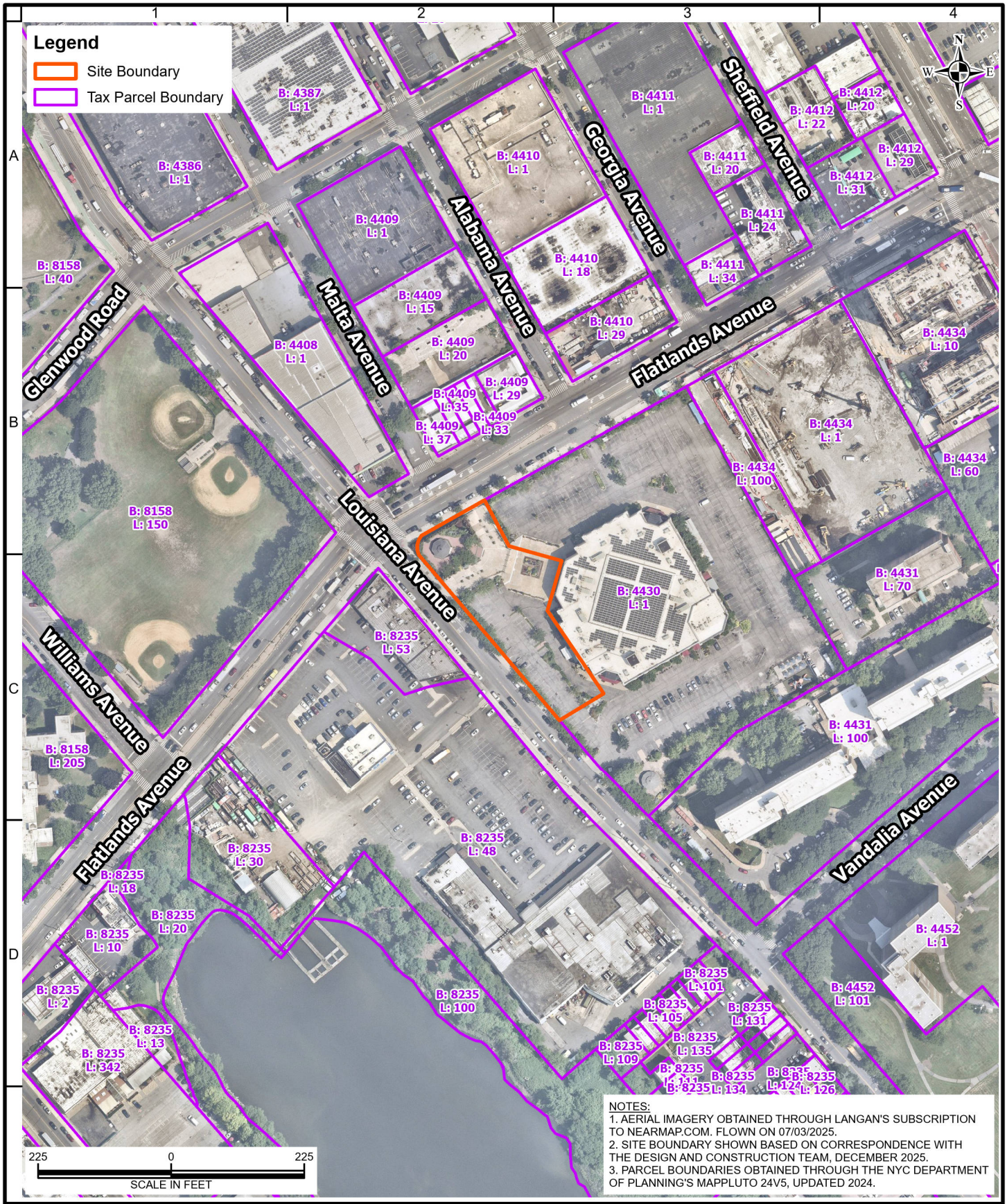
Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
TAX MAP

Project No.	Figure No.
100688801	2
Date: 1/12/2026	
Scale: 1"=75'	
Drawn By: RDB	

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NOTES:
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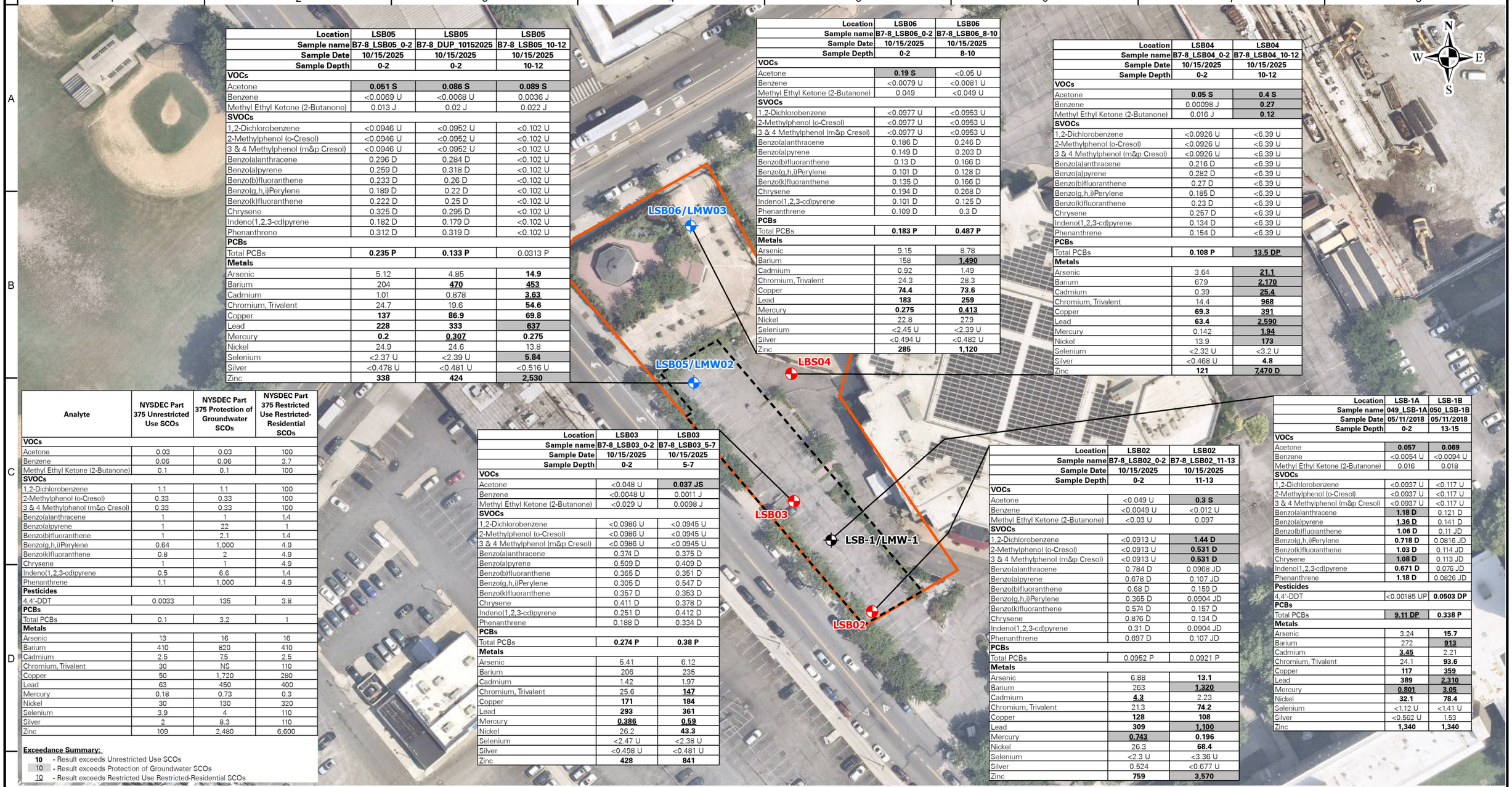
Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
SITE PLAN AND ADJACENT PROPERTIES

Project No.	Figure No.
100688801	3
Date: 1/12/2026	
Scale: 1"=225'	
Drawn By: RDB	

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Location	LSB05	LSB05	LSB05
Sample name	B7-8_LSB05_0-2	B7-8_DUP_10152025	B7-8_LSB05_10-12
Sample Date	10/15/2025	10/15/2025	10/15/2025
Sample Depth	0-2	0-2	10-12
VOCs			
Acetone	**0.051 S**	**0.086 S**	**0.089 S**
Benzene	<0.0069 U	<0.0068 U	0.0036 J
Methyl Ethyl Ketone (2-Butanone)	0.013 J	0.02 J	0.022 J
SVOCs			
1,2-Dichlorobenzene	<0.0946 U	<0.0952 U	<0.102 U
2-Methylphenol (o-Cresol)	<0.0946 U	<0.0952 U	<0.102 U
3 & 4 Methylphenol (m&p Cresol)	<0.0946 U	<0.0952 U	<0.102 U
Benzo(a)anthracene	0.296 D	0.284 D	<0.102 U
Benzo(a)pyrene	0.259 D	0.318 D	<0.102 U
Benzo(b)fluoranthene	0.233 D	0.26 D	<0.102 U
Benzo(g,h,i)Perylene	0.189 D	0.22 D	<0.102 U
Benzo(k)fluoranthene	0.222 D	0.25 D	<0.102 U
Chrysene	0.325 D	0.295 D	<0.102 U
Indeno(1,2,3-cd)pyrene	0.182 D	0.179 D	<0.102 U
Phenanthrene	0.312 D	0.319 D	<0.102 U
PCBs			
Total PCBs	**0.235 P**	**0.133 P**	0.0313 P
Metals			
Arsenic	5.12	4.85	**14.9**
Barium	204	**470**	**453**
Cadmium	1.01	0.878	**3.63**
Chromium, Trivalent	24.7	19.6	**54.6**
Copper	**137**	**86.9**	**69.8**
Lead	**228**	**333**	**637**
Mercury	**0.2**	**0.307**	**0.275**
Nickel	24.9	24.6	13.8
Selenium	<2.37 U	<2.39 U	**5.84**
Silver	<0.478 U	<0.481 U	<0.516 U
Zinc	**338**	**424**	**2,530**

Location	LSB06	LSB06
Sample name	B7-8_LSB06_0-2	B7-8_LSB06_8-10
Sample Date	10/15/2025	10/15/2025
Sample Depth	0-2	8-10
VOCs		
Acetone	**0.19 S**	<0.05 U
Benzene	<0.0079 U	<0.0081 U
Methyl Ethyl Ketone (2-Butanone)	0.049	<0.049 U
SVOCs		
1,2-Dichlorobenzene	<0.0977 U	<0.0953 U
2-Methylphenol (o-Cresol)	<0.0977 U	<0.0953 U
3 & 4 Methylphenol (m&p Cresol)	<0.0977 U	<0.0953 U
Benzo(a)anthracene	0.186 D	0.246 D
Benzo(a)pyrene	0.149 D	0.203 D
Benzo(b)fluoranthene	0.13 D	0.166 D
Benzo(g,h,i)Perylene	0.101 D	0.128 D
Benzo(k)fluoranthene	0.135 D	0.166 D
Chrysene	0.194 D	0.268 D
Indeno(1,2,3-cd)pyrene	0.101 D	0.125 D
Phenanthrene	0.109 D	0.3 D
PCBs		
Total PCBs	**0.183 P**	**0.487 P**
Metals		
Arsenic	9.15	8.78
Barium	158	**1,490**
Cadmium	0.92	1.49
Chromium, Trivalent	24.3	28.3
Copper	**74.4**	**73.6**
Lead	**183**	**259**
Mercury	**0.275**	**0.413**
Nickel	22.8	27.9
Selenium	<2.45 U	<2.39 U
Silver	<0.494 U	<0.482 U
Zinc	**285**	**1,120**

Location	LSB04	LSB04
Sample name	B7-8_LSB04_0-2	B7-8_LSB04_10-12
Sample Date	10/15/2025	10/15/2025
Sample Depth	0-2	10-12
VOCs		
Acetone	**0.05 S**	**0.4 S**
Benzene	0.00098 J	**0.27**
Methyl Ethyl Ketone (2-Butanone)	0.016 J	**0.12**
SVOCs		
1,2-Dichlorobenzene	<0.0926 U	<6.39 U
2-Methylphenol (o-Cresol)	<0.0926 U	<6.39 U
3 & 4 Methylphenol (m&p Cresol)	<0.0926 U	<6.39 U
Benzo(a)anthracene	0.216 D	<6.39 U
Benzo(a)pyrene	0.282 D	<6.39 U
Benzo(b)fluoranthene	0.27 D	<6.39 U
Benzo(g,h,i)Perylene	0.185 D	<6.39 U
Benzo(k)fluoranthene	0.23 D	<6.39 U
Chrysene	0.257 D	<6.39 U
Indeno(1,2,3-cd)pyrene	0.134 D	<6.39 U
Phenanthrene	0.154 D	<6.39 U
PCBs		
Total PCBs	**0.108 P**	**13.5 DP**
Metals		
Arsenic	3.64	**21.1**
Barium	67.9	**2,170**
Cadmium	0.39	**25.4**
Chromium, Trivalent	14.4	**968**
Copper	**69.3**	**391**
Lead	**63.4**	**2,590**
Mercury	0.142	**1.94**
Nickel	13.9	**173**
Selenium	<2.32 U	<3.2 U
Silver	<0.468 U	**4.8**
Zinc	**121**	**7,470 D**

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs			
Acetone	0.03	0.03	100
Benzene	0.06	0.06	3.7
Methyl Ethyl Ketone (2-Butanone)	0.1	0.1	100
SVOCs			
1,2-Dichlorobenzene	1.1	1.1	100
2-Methylphenol (o-Cresol)	0.33	0.33	100
3 & 4 Methylphenol (m&p Cresol)	0.33	0.33	100
Benzo(a)anthracene	1	1	1.4
Benzo(a)pyrene	1	22	1
Benzo(b)fluoranthene	1	2.1	1.4
Benzo(g,h,i)Perylene	0.64	1,000	4.9
Benzo(k)fluoranthene	0.8	2	4.9
Chrysene	1	1	4.9
Indeno(1,2,3-cd)pyrene	0.5	6.6	1.4
Phenanthrene	1.1	1,000	4.9
Pesticides			
4,4'-DDT	0.0033	135	3.8
PCBs			
Total PCBs	0.1	3.2	1
Metals			
Arsenic	13	16	16
Barium	410	820	410
Cadmium	2.5	7.5	2.5
Chromium, Trivalent	30	NS	110
Copper	50	1,720	280
Lead	63	450	400
Mercury	0.18	0.73	0.3
Nickel	30	130	320
Selenium	3.9	4	110
Silver	2	8.3	110
Zinc	109	2,480	6,600

Exceedance Summary:

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

Location	LSB03	LSB03
Sample name	B7-8_LSB03_0-2	B7-8_LSB03_5-7
Sample Date	10/15/2025	10/15/2025
Sample Depth	0-2	5-7
VOCs		
Acetone	<0.048 U	**0.037 JS**
Benzene	<0.0048 U	0.0011 J
Methyl Ethyl Ketone (2-Butanone)	<0.029 U	0.0098 J
SVOCs		
1,2-Dichlorobenzene	<0.0986 U	<0.0945 U
2-Methylphenol (o-Cresol)	<0.0986 U	<0.0945 U
3 & 4 Methylphenol (m&p Cresol)	<0.0986 U	<0.0945 U
Benzo(a)anthracene	0.374 D	0.375 D
Benzo(a)pyrene	0.509 D	0.409 D
Benzo(b)fluoranthene	0.365 D	0.351 D
Benzo(g,h,i)Perylene	0.305 D	0.547 D
Benzo(k)fluoranthene	0.357 D	0.353 D
Chrysene	0.411 D	0.378 D
Indeno(1,2,3-cd)pyrene	0.251 D	0.412 D
Phenanthrene	0.188 D	0.334 D
PCBs		
Total PCBs	**0.274 P**	**0.38 P**
Metals		
Arsenic	5.41	6.12
Barium	206	235
Cadmium	1.42	1.97
Chromium, Trivalent	25.6	**147**
Copper	**171**	**184**
Lead	**293**	**361**
Mercury	**0.386**	**0.59**
Nickel	26.2	**43.3**
Selenium	<2.47 U	<2.38 U
Silver	<0.498 U	<0.481 U
Zinc	**428**	**841**

Location	LSB02	LSB02
Sample name	B7-8_LSB02_0-2	B7-8_LSB02_11-13
Sample Date	10/15/2025	10/15/2025
Sample Depth	0-2	11-13
VOCs		
Acetone	<0.049 U	**0.3 S**
Benzene	<0.0049 U	<0.012 U
Methyl Ethyl Ketone (2-Butanone)	<0.03 U	0.097
SVOCs		
1,2-Dichlorobenzene	<0.0913 U	**1.44 D**
2-Methylphenol (o-Cresol)	<0.0913 U	**0.531 D**
3 & 4 Methylphenol (m&p Cresol)	<0.0913 U	**0.531 D**
Benzo(a)anthracene	0.784 D	0.0968 JD
Benzo(a)pyrene	0.678 D	0.107 JD
Benzo(b)fluoranthene	0.68 D	0.159 D
Benzo(g,h,i)Perylene	0.365 D	0.0904 JD
Benzo(k)fluoranthene	0.574 D	0.157 D
Chrysene	0.876 D	0.134 D
Indeno(1,2,3-cd)pyrene	0.31 D	0.0904 JD
Phenanthrene	0.697 D	0.107 JD
PCBs		
Total PCBs	0.0952 P	0.0921 P
Metals		
Arsenic	6.88	**13.1**
Barium	263	**1,320**
Cadmium	**4.3**	2.23
Chromium, Trivalent	21.3	**74.2**
Copper	**128**	**108**
Lead	**309**	**1,100**
Mercury	**0.743**	**0.196**
Nickel	26.3	**68.4**
Selenium	<2.3 U	<3.36 U
Silver	0.524	<0.677 U
Zinc	**759**	**3,570**

Location	LSB-1A	LSB-1B
Sample name	049_LSB-1A	050_LSB-1B
Sample Date	05/11/2018	05/11/2018
Sample Depth	0-2	13-15
VOCs		
Acetone	**0.057**	**0.069**
Benzene	<0.0054 U	<0.0094 U
Methyl Ethyl Ketone (2-Butanone)	0.016	0.018
SVOCs		
1,2-Dichlorobenzene	<0.0937 U	<0.117 U
2-Methylphenol (o-Cresol)	<0.0937 U	<0.117 U
3 & 4 Methylphenol (m&p Cresol)	<0.0937 U	<0.117 U
Benzo(a)anthracene	**1.18 D**	0.121 D
Benzo(a)pyrene	**1.36 D**	0.141 D
Benzo(b)fluoranthene	**1.06 D**	0.11 JD
Benzo(g,h,i)Perylene	**0.718 D**	0.0816 JD
Benzo(k)fluoranthene	**1.03 D**	0.114 JD
Chrysene	**1.08 D**	0.113 JD
Indeno(1,2,3-cd)pyrene	**0.671 D**	0.076 JD
Phenanthrene	**1.18 D**	0.0826 JD
Pesticides		
4,4'-DDT	<0.00185 UP	**0.0503 DP**
PCBs		
Total PCBs	**9.11 DP**	**0.338 P**
Metals		
Arsenic	3.24	**15.7**
Barium	272	**913**
Cadmium	**3.45**	2.21
Chromium, Trivalent	24.1	**93.6**
Copper	**117**	**359**
Lead	**389**	**2,310**
Mercury	**0.801**	**3.05**
Nickel	**32.1**	**78.4**
Selenium	<1.12 U	<1.41 U
Silver	<0.562 U	1.53
Zinc	**1,340**	**1,340**

Legend

- Previous Soil Boring Location (2025)
- Previous Soil Boring/Monitoring Well Location (2025)
- Previous Soil Boring/Monitoring Well Location (2018)
- Proposed Building Extent
- Site Boundary

75 0 75
SCALE IN FEET

NOTES:
1. AERIAL IMAGERY OBTAINED THROUGH LANGAN'S SUBSCRIPTION TO NEARMAP.COM. FLOWN ON 07/03/2025.
2. SITE BOUNDARY SHOWN BASED ON CORRESPONDENCE WITH THE DESIGN AND CONSTRUCTION TEAM, DECEMBER 2025.
3. PARCEL BOUNDARIES OBTAINED THROUGH THE NYC DEPARTMENT OF PLANNING'S MAPPLUTO 24V5, UPDATED 2024.
4. PROPOSED BUILDING EXTENTS AS PROVIDED BY IUV PHASE 2A LIHTC OWNER, LLC ON 11 NOVEMBER 2025.

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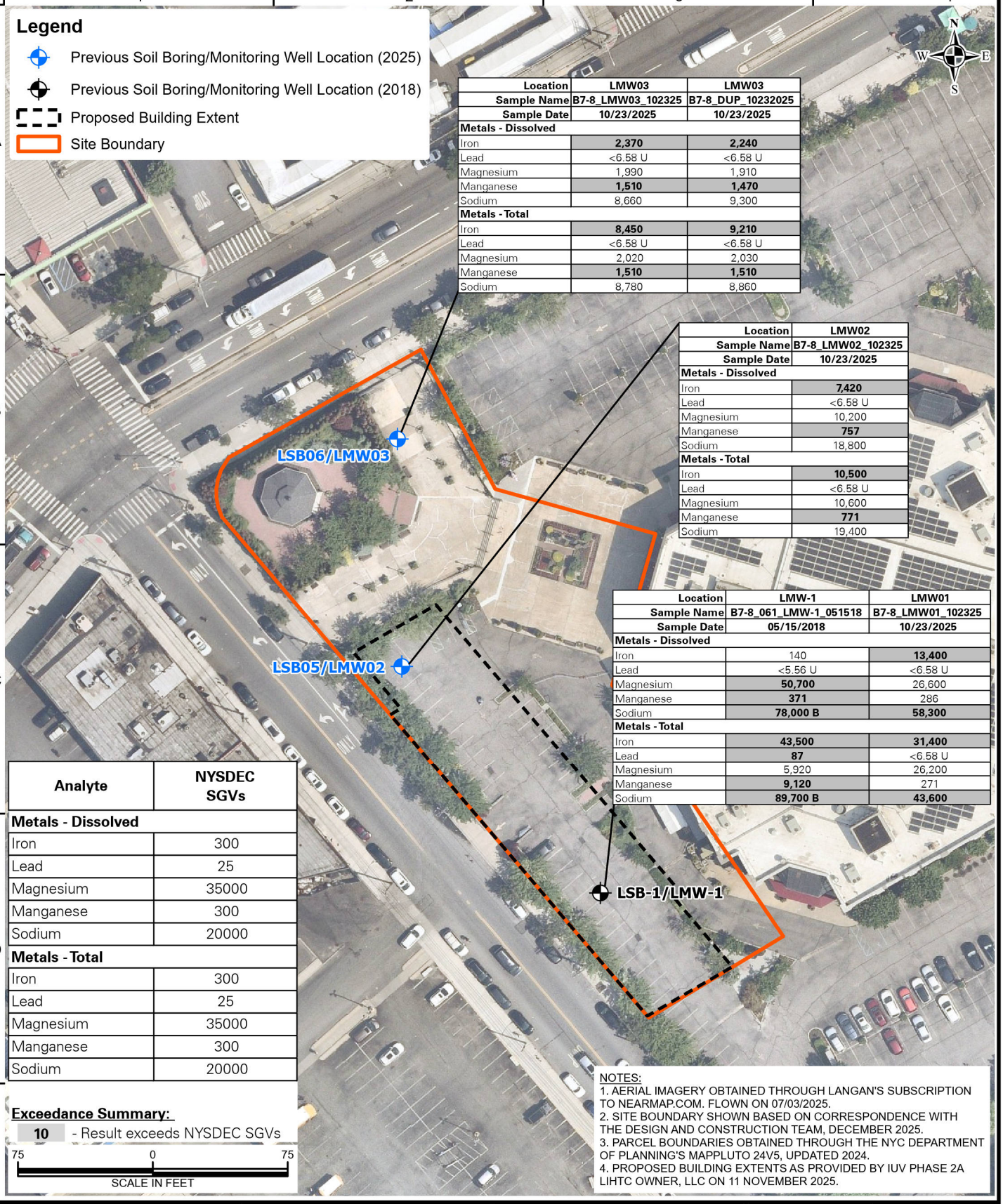
Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Drawing Title
HISTORICAL SOIL SAMPLE ANALYTICAL RESULTS SUMMARY

Project No.	100688801
Date	1/12/2026
Scale	1" = 75 feet
Drawn By	RDB
Figure	4

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Location	LMW03	LMW03
Sample Name	B7-8_LMW03_102325	B7-8_DUP_10232025
Sample Date	10/23/2025	10/23/2025
Metals - Dissolved		
Iron	**2,370**	**2,240**
Lead	<6.58 U	<6.58 U
Magnesium	1,990	1,910
Manganese	**1,510**	**1,470**
Sodium	8,660	9,300
Metals - Total		
Iron	**8,450**	**9,210**
Lead	<6.58 U	<6.58 U
Magnesium	2,020	2,030
Manganese	**1,510**	**1,510**
Sodium	8,780	8,860

Location	LMW02
Sample Name	B7-8_LMW02_102325
Sample Date	10/23/2025
Metals - Dissolved	
Iron	**7,420**
Lead	<6.58 U
Magnesium	10,200
Manganese	**757**
Sodium	18,800
Metals - Total	
Iron	**10,500**
Lead	<6.58 U
Magnesium	10,600
Manganese	**771**
Sodium	19,400

Location	LMW-1	LMW01
Sample Name	B7-8_061_LMW-1_051518	B7-8_LMW01_102325
Sample Date	05/15/2018	10/23/2025
Metals - Dissolved		
Iron	140	**13,400**
Lead	<5.56 U	<6.58 U
Magnesium	**50,700**	26,600
Manganese	**371**	286
Sodium	**78,000 B**	**58,300**
Metals - Total		
Iron	**43,500**	**31,400**
Lead	**87**	<6.58 U
Magnesium	5,920	26,200
Manganese	**9,120**	271
Sodium	**89,700 B**	**43,600**

Analyte	NYSDEC SGVs
Metals - Dissolved	
Iron	300
Lead	25
Magnesium	35000
Manganese	300
Sodium	20000
Metals - Total	
Iron	300
Lead	25
Magnesium	35000
Manganese	300
Sodium	20000

Exceedance Summary:

10 - Result exceeds NYSDEC SGVs

75 0 75

SCALE IN FEET

NOTES:
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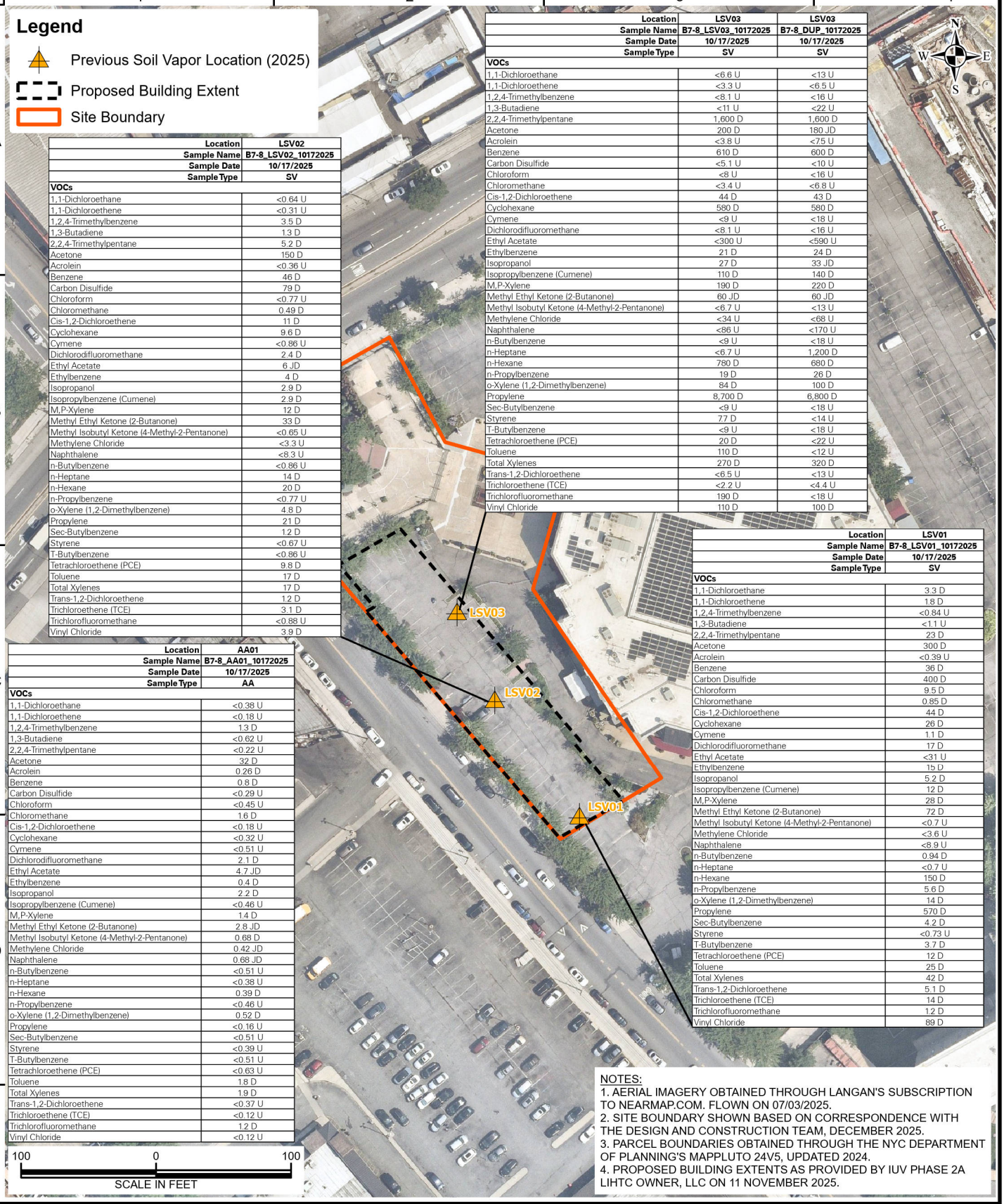
Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
HISTORICAL GROUNDWATER SAMPLE ANALYTICAL RESULTS SUMMARY

Project No. 100688801
Date 1/12/2026
Scale 1"=75'
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Figure No. 5

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Location	LSV02
Sample Name	B7-8_LSV02_10172025
Sample Date	10/17/2025
Sample Type	SV
VOCs	
1,1-Dichloroethane	<0.64 U
1,1-Dichloroethene	<0.31 U
1,2,4-Trimethylbenzene	3.5 D
1,3-Butadiene	1.3 D
2,2,4-Trimethylpentane	5.2 D
Acetone	150 D
Acrolein	<0.36 U
Benzene	46 D
Carbon Disulfide	79 D
Chloroform	<0.77 U
Chloromethane	0.49 D
Cis-1,2-Dichloroethene	11 D
Cyclohexane	9.6 D
Cymene	<0.86 U
Dichlorodifluoromethane	2.4 D
Ethyl Acetate	6 JD
Ethylbenzene	4 D
Isopropanol	2.9 D
Isopropylbenzene (Cumene)	2.9 D
M,P-Xylene	12 D
Methyl Ethyl Ketone (2-Butanone)	33 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.65 U
Methylene Chloride	<3.3 U
Naphthalene	<8.3 U
n-Butylbenzene	<0.86 U
n-Heptane	14 D
n-Hexane	20 D
n-Propylbenzene	<0.77 U
o-Xylene (1,2-Dimethylbenzene)	4.8 D
Propylene	21 D
Sec-Butylbenzene	1.2 D
Styrene	<0.67 U
T-Butylbenzene	<0.86 U
Tetrachloroethene (PCE)	9.8 D
Toluene	17 D
Total Xylenes	17 D
Trans-1,2-Dichloroethene	1.2 D
Trichloroethene (TCE)	3.1 D
Trichlorofluoromethane	<0.88 U
Vinyl Chloride	3.9 D

Location	AA01
Sample Name	B7-8_AA01_10172025
Sample Date	10/17/2025
Sample Type	AA
VOCs	
1,1-Dichloroethane	<0.38 U
1,1-Dichloroethene	<0.18 U
1,2,4-Trimethylbenzene	1.3 D
1,3-Butadiene	<0.62 U
2,2,4-Trimethylpentane	<0.22 U
Acetone	32 D
Acrolein	0.26 D
Benzene	0.8 D
Carbon Disulfide	<0.29 U
Chloroform	<0.45 U
Chloromethane	1.6 D
Cis-1,2-Dichloroethene	<0.18 U
Cyclohexane	<0.32 U
Cymene	<0.51 U
Dichlorodifluoromethane	2.1 D
Ethyl Acetate	4.7 JD
Ethylbenzene	0.4 D
Isopropanol	2.2 D
Isopropylbenzene (Cumene)	<0.46 U
M,P-Xylene	1.4 D
Methyl Ethyl Ketone (2-Butanone)	2.8 JD
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	0.68 D
Methylene Chloride	0.42 JD
Naphthalene	0.68 JD
n-Butylbenzene	<0.51 U
n-Heptane	<0.38 U
n-Hexane	0.39 D
n-Propylbenzene	<0.46 U
o-Xylene (1,2-Dimethylbenzene)	0.52 D
Propylene	<0.16 U
Sec-Butylbenzene	<0.51 U
Styrene	<0.39 U
T-Butylbenzene	<0.51 U
Tetrachloroethene (PCE)	<0.63 U
Toluene	1.8 D
Total Xylenes	1.9 D
Trans-1,2-Dichloroethene	<0.37 U
Trichloroethene (TCE)	<0.12 U
Trichlorofluoromethane	1.2 D
Vinyl Chloride	<0.12 U

Location	LSV03	LSV03
Sample Name	B7-8_LSV03_10172025	B7-8_DUP_10172025
Sample Date	10/17/2025	10/17/2025
Sample Type	SV	SV
VOCs		
1,1-Dichloroethane	<6.6 U	<13 U
1,1-Dichloroethene	<3.3 U	<6.5 U
1,2,4-Trimethylbenzene	<8.1 U	<16 U
1,3-Butadiene	<11 U	<22 U
2,2,4-Trimethylpentane	1,600 D	1,600 D
Acetone	200 D	180 JD
Acrolein	<3.8 U	<7.5 U
Benzene	610 D	600 D
Carbon Disulfide	<5.1 U	<10 U
Chloroform	<8 U	<16 U
Chloromethane	<3.4 U	<6.8 U
Cis-1,2-Dichloroethene	44 D	43 D
Cyclohexane	580 D	580 D
Cymene	<9 U	<18 U
Dichlorodifluoromethane	<8.1 U	<16 U
Ethyl Acetate	<300 U	<590 U
Ethylbenzene	21 D	24 D
Isopropanol	27 D	33 JD
Isopropylbenzene (Cumene)	110 D	140 D
M,P-Xylene	190 D	220 D
Methyl Ethyl Ketone (2-Butanone)	60 JD	60 JD
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<6.7 U	<13 U
Methylene Chloride	<34 U	<68 U
Naphthalene	<86 U	<170 U
n-Butylbenzene	<9 U	<18 U
n-Heptane	<6.7 U	1,200 D
n-Hexane	780 D	680 D
n-Propylbenzene	19 D	26 D
o-Xylene (1,2-Dimethylbenzene)	84 D	100 D
Propylene	8,700 D	6,800 D
Sec-Butylbenzene	<9 U	<18 U
Styrene	77 D	<14 U
T-Butylbenzene	<9 U	<18 U
Tetrachloroethene (PCE)	20 D	<22 U
Toluene	110 D	<12 U
Total Xylenes	270 D	320 D
Trans-1,2-Dichloroethene	<6.5 U	<13 U
Trichloroethene (TCE)	<2.2 U	<4.4 U
Trichlorofluoromethane	190 D	<18 U
Vinyl Chloride	110 D	100 D

Location	LSV01
Sample Name	B7-8_LSV01_10172025
Sample Date	10/17/2025
Sample Type	SV
VOCs	
1,1-Dichloroethane	3.3 D
1,1-Dichloroethene	1.8 D
1,2,4-Trimethylbenzene	<0.84 U
1,3-Butadiene	<1.1 U
2,2,4-Trimethylpentane	23 D
Acetone	300 D
Acrolein	<0.39 U
Benzene	36 D
Carbon Disulfide	400 D
Chloroform	9.5 D
Chloromethane	0.85 D
Cis-1,2-Dichloroethene	44 D
Cyclohexane	26 D
Cymene	1.1 D
Dichlorodifluoromethane	17 D
Ethyl Acetate	<31 U
Ethylbenzene	15 D
Isopropanol	5.2 D
Isopropylbenzene (Cumene)	12 D
M,P-Xylene	28 D
Methyl Ethyl Ketone (2-Butanone)	72 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.7 U
Methylene Chloride	<3.6 U
Naphthalene	<8.9 U
n-Butylbenzene	0.94 D
n-Heptane	<0.7 U
n-Hexane	150 D
n-Propylbenzene	5.6 D
o-Xylene (1,2-Dimethylbenzene)	14 D
Propylene	570 D
Sec-Butylbenzene	4.2 D
Styrene	<0.73 U
T-Butylbenzene	3.7 D
Tetrachloroethene (PCE)	12 D
Toluene	25 D
Total Xylenes	42 D
Trans-1,2-Dichloroethene	5.1 D
Trichloroethene (TCE)	14 D
Trichlorofluoromethane	1.2 D
Vinyl Chloride	89 D

NOTES:
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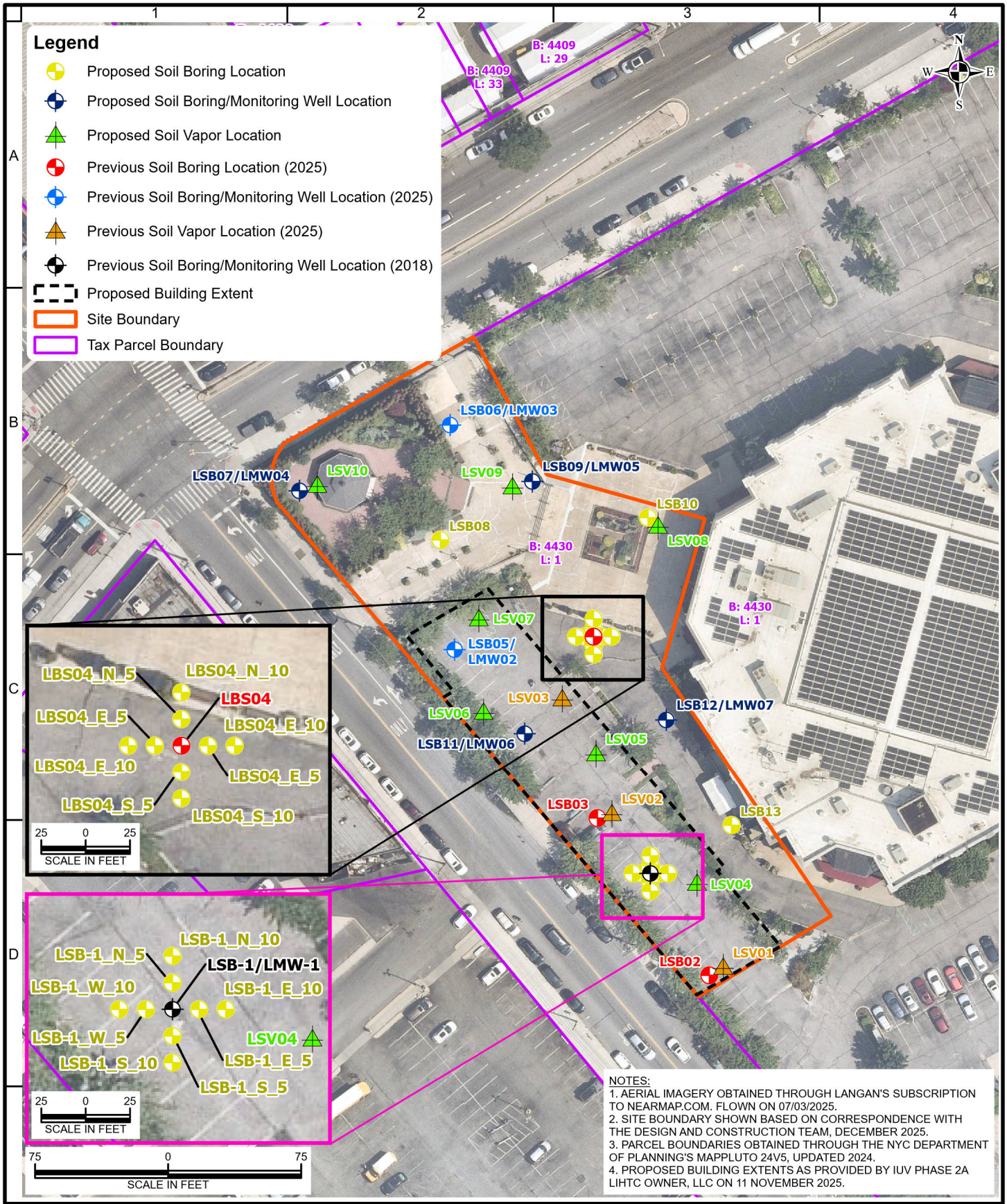
Project
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BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
HISTORICAL SOIL VAPOR SAMPLE ANALYTICAL RESULTS SUMMARY

Project No. 100688801
Date 1/12/2026
Scale 1"=100'
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Figure No. 6

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Project
LOUISIANA AVE LANDFILL
AUTO WRECKING
PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
PROPOSED SAMPLE LOCATION PLAN

Project No.	Figure No.
100688801	7
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APPENDIX A

Health and Safety Plan

LANGAN

HEALTH AND SAFETY PLAN

for

ENVIRONMENTAL INVESTIGATION

Louisiana Ave Landfill Auto Wrecking
Project 7 Site
Flatlands Avenue
Brooklyn, New York

Prepared For:

IUV Phase 2B Owner, LLC
111 Fifth Avenue, 9th Floor
New York, New York 10003

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, New Jersey 07054

January 2026
100688807

LANGAN

ENVIRONMENTAL HEALTH AND SAFETY PLAN

Client:	**IUV Phase 2B Owner, LLC**
Project:	**NYSDEC BCP Remedial Investigation**
Location:	**Flatlands Avenue, Brooklyn, New York**
Chemical Hazards:	**VOCs, SVOCs, Metals, Pesticides, PCBs, Historic Fill**
Prepared By:	**LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C.**
Version:	**1**
Date:	**15 January 2026**

Client Contact:	**Bryan Kelly**	**(212) 716-2502**
Langan Project Manager (PM):	**Ashley Sandve**	**(973) 560-4900**
Langan Health & Safety Manager (HSM):	**Tony Moffa, CHMM**	**(215) 491-6545**
Langan Health and Safety Officer (HSO):	**Field Personnel**	
WorkCare:	**1-888-449-7787**	
Langan Incident/Injury Hotline:	**(973) 560-4699**	

LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C., (LANGAN), AND LANGAN SUBCONTRACTORS, DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY A TRAINED HEALTH AND SAFETY SPECIALIST. THIS HASP HAS BEEN PREPARED FOR LANGAN EMPLOYEES ONLY. ALL OTHER PARTIES WORKING ON THE SITE THAT HAVE THE POTENTIAL TO BE EXPOSED TO HAZARDOUS MATERIALS MUST DEVELOP AND IMPLEMENT THEIR OWN HASP FOR USE BY THEIR EMPLOYEES.

APPROVALS

By signature, the personnel identified below hereby acknowledge that they have reviewed this Health and Safely Plan (HASP) and agree to comply with the requirements contained therein as well as the applicable provisions of 29 CFR Parts 1910 and 1926. Furthermore, in reviewing and accepting this HASP, as currently written, the undersigned agree that to the best of their knowledge, this HASP adequately identifies the activities and hazards associated with work at this site and describes the appropriate and necessary precautions and protections for site workers required by the applicable OSHA statutes and regulations.

LANGAN Project Manager - PM (Ashley Sandve)	1/15/2026 Date
LANGAN Health and Safety Manager (Tony Moffa, CHMM)	Date
LANGAN Health and Safety Officer – HSO	Date

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ATTACHMENT D **Calibration Log**
ATTACHMENT E **Emergency Notification Numbers**
ATTACHMENT F **Accident / Incident Report Form**
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1.0 INTRODUCTION

1.1 Purpose and Policy

This Health and Safety Plan (HASP) has been developed to comply with the regulations under Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120(b)(4), Hazardous Waste Operations and Emergency Response. It addresses foreseeable activities associated with the site work activities to be conducted in the western portion of 12020 Flatlands Avenue in Brooklyn, New York (see Figure 1). This HASP establishes personnel protection standards and mandatory safety practices and procedures. Additionally, it assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at known or suspected hazardous waste sites.

Langan personnel involved with inspection of site work activities which involve the displacement of soil and/or material during the soil, groundwater, and soil vapor investigation in the identified Area of Concern (AOC) during the proposed investigation shall comply with the requirements of this HASP. All Langan personnel engaged in onsite activities will read this document carefully and complete the Safety Briefing Form (Attachment A), a copy of which will be provided to Langan's Project files. Contractors and subcontractors conducting investigation activities which will disturb or displace soil in the identified AOC are required to develop and follow their own HASP based on the identified hazards. All sampling data and environmental reports pertaining to the site that are available to Langan will be provided upon request to the Langan PM. Contractors and subcontractors are responsible for their own workers Health and Safety and providing a safe working environment in accordance with all applicable federal, state and local requirements. Each Subcontractor will have a designated Site Health and Safety Manager who will be responsible for ensuring that the designated procedures are implemented in the field. Personnel who have any questions or concerns regarding implementation of this plan are encouraged to request clarification from the Langan PM. Field personnel must follow the designated health and safety procedures, be alert to the hazards associated with working close to vehicles and equipment, and use common sense and exercise reasonable caution at all times.

This HASP covers investigation-related field activities which have the potential to disturb and/or displace potentially contaminated soil, soil vapor, and groundwater. These activities include, but are not limited to: the completion of soil borings and collection of soil samples, the installation of permanent monitoring wells and collection of groundwater samples, and the installation of soil vapor points and collection of soil vapor samples.

This HASP was prepared in accordance with the following documents and/or guidelines:

- Occupational Safety and Health Administration (OSHA) regulations for hazardous site workers (29 CFR 1910.120 and 29 CFR 1926); and,
- NIOSH/OSHA/USCG/USEPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.*

Langan's Health and Safety Program and Safe Operating Procedures support this site-specific HASP.

The level of protection and the procedures specified in this HASP represent the minimum health and safety requirements to be observed by Langan site personnel engaged in the referenced investigation and inspection of investigation activities. Unknown conditions may exist, and known conditions may change. Should an employee find himself or herself in a potentially hazardous situation, the employee will immediately discontinue the hazardous procedure(s) and either personally effect appropriate preventative or corrective measures, or immediately notify the Health and Safety Officer or the Langan PM of the nature of the hazard. In the event of an immediately dangerous or life threatening situation, the employee always has "stop work" authority. Any necessary revision to the Health and Safety procedures will be recorded in the Field Procedure Change Authorization Form (Attachment B), and will require authorization from the Langan Health and Safety Manager and Langan PM.

The provisions of this HASP address worker health and safety within defined contaminant zones and assume that work will be completed within a vacant lot which is used for parking for the adjacent church. Additional provisions including modifications to drilling techniques to further limit potential exposure to sensitive populations will be required if work is to be conducted within occupied building areas or in occupied areas that may be impacted by the proposed work. Additional

provisions including the use of traffic control measures will be employed in order to avoid possible hazards associated with vehicular traffic and pedestrians, as needed.

THE ULTIMATE RESPONSIBILITY FOR THE HEALTH AND SAFETY OF THE INDIVIDUAL EMPLOYEE RESTS WITH THE EMPLOYEE AND HIS OR HER COLLEAGUES. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel as designated above and to follow-up the verbal notification by completing the Unsafe Conditions and Practices Form provided in Attachment C, a copy of which will be provided to the Langan Health and Safety Officer.

"Extenuating" circumstances such as budget or time constraints, equipment breakdown, changing or unexpected conditions, never justify unsafe work practices or procedures. In fact, the opposite is true. Under stressful circumstances all project personnel must be mindful of the potential to consciously or unconsciously compromise health and safety standards, and be especially safety conscious. **ALL SITE PERSONNEL ARE EXPECTED TO CONSIDER "SAFETY FIRST" AT ALL TIMES.**

1.2 Site Description

The Site is an approximately 45,677-square-foot or 1.049-acre property located to the northwest and west of the Christian Cultural Center building on Flatlands Avenue in Brooklyn, New York, and is designated as New York City Tax Block 4430, portion of Lot 1. A RP602 form has been filed with the New York City Department of Finance (NYCDOF) to reapportion this portion of Lot 1 into future Lot 101. The Site has not yet been assigned a new address since it was recently subdivided into its own lot; however, it is anticipated that the Site will have a Louisiana Avenue and/or Flatlands Avenue address. The property is developed as an asphalt paved parking lot and landscaped entryway associated with the Christian Cultural Center located adjacent to the east.

The Site is bounded by Flatlands Avenue to the north; the asphalt paved parking lot and the Christian Cultural Center to the east; the asphalt paved parking lot associated with the Christian Cultural Center to the south; and, Louisiana Avenue to the west.

1.3 Scope of Work

The site work activities which will require the oversight by a Langan Engineer include the following scope and will include the completion of:

- Task 1: Geophysical survey;
- Task 2: Completion of environmental soil borings and installation of monitoring wells and soil vapor points;
- Task 3: Soil sample collection,
- Task 4: Groundwater sample collection; and,
- Task 5: Soil vapor sample collection.

2.0 PROJECT TEAM ORGANIZATION AND RESPONSIBILITIES

This section specifies the Langan Project Organization.

2.1 Langan Project Manager

The Langan Project Manager (PM) is Ashley Sandve. The PM responsibilities include:

- Prepares and organizes the background review of site conditions, the site HASP, and the field team;
- Obtains permission for site access and coordinates activities with appropriate officials;
- Briefs the field team on their specific assignments;
- Coordinates with the Health and Safety Officer (HSO) to ensure that health and safety requirements are met;
- Serves as the liaison with public officials;
- Ensuring that this HASP is developed and approved prior to on-site activities;
- Ensuring that all the tasks in the project are performed in a manner consistent with Langan's comprehensive Health and Safety Program for Hazardous Waste Operations and this HASP.

2.2 Health and Safety Manager (HSM)

The Langan Corporate Health and Safety Manager (HSM) is Tony Moffa. His responsibilities include:

- Serving as a resource in the development and implementation of HASPs;
- Assist in reviewing results of Jobsite Safety Inspections;
- Assisting site Health and Safety Officer (HSO) with development of the HASP, updating HASP as dictated by changing conditions, jobsite inspection results, etc.;
- Maintaining all records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Langan Health and Safety Officer (HSO)

The Langan Health and Safety Officer (HSO) is to be identified prior to the start of field work. The HSO responsibilities include:

- Participating in the development and implementation of this HASP;
- Conducting Jobsite Safety Inspections (Attachment G) and correcting any shortcomings in a timely manner;
- Helping to select proper Personal Protective Equipment (PPE) and periodically inspecting it;
- Ensuring that PPE is properly stored and maintained;
- Controlling entry into and exit from the contaminated areas or zones of the site;
- Confirming each team member's suitability for work based on a current physician's recommendation;
- Monitoring the work parties for signs of stress, such as heat stress, fatigue, and cold exposure;
- Monitoring site hazards and conditions;
- Knowing (and ensuring that all site personnel also know) emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department;
- Resolves conflicting situations which may arise concerning safety requirements and working conditions.
- Conducting daily tailgate meetings to review applicable Hazard Analyses (Table 3) as well as check-in with site personnel.

3.0 HAZARDS ANALYSIS

This section presents an assessment of the general, chemical, physical, and biological hazards that may be encountered during the tasks specified under this HASP (Section 1.3). A detail on types of potential contaminants of concerns Langan anticipates to encounter at different locations during the intrusive investigation is listed in Tables 1 and 2 of this HASP.

3.1 General Hazard Assessment

A general hazard assessment was conducted for the required field work described in Section 1.3 and the following potential hazards have been identified:

- Inhalation of pesticides (chlordane) and polycyclic aromatic hydrocarbons (PAHs) with low volatilization potential;
- Skin and eye contact with contaminants;
- Ingestion of contaminants;
- Inhalation of dusts impacted with polycyclic aromatic hydrocarbons, metals and pesticides;
- Physical hazards associated with the use of heavy equipment;
- Excavation hazards;
- Tripping hazards;
- Noise exposure;
- Heat stress (depending on weather conditions);
- Cold exposure (depending on weather conditions);
- Flammable hazards;
- Electrical hazards; and,
- Use of personal protective equipment.

These hazards are further described in the task-by-task hazard analysis in Table 3. Specific chemical, physical and biological hazards are discussed below.

Mitigation and controls will include as needed work procedures, work/rest regiment, dust control measures, personal protective equipment, and respiratory protection as appropriate.

3.2 Chemical Exposure Hazards

The following chemical hazard evaluation for the proposed investigation activities is based on the previous Phase II Environmental Investigations of the Site, compounds typically associated with historic urban fill, and historical Site operations. The evaluation has been conducted to identify chemicals/materials that potentially may be present at the site, and to ensure that work activities, personnel protection, and emergency response are consistent with the specific contaminants that potentially could be encountered.

3.2.1 Specific Chemical Hazards Previously Detected at the Site

Potential contaminants that may be encountered while conducting site investigation activities include VOCs, SVOCs, pesticides, PCBs, and metals commonly associated with historic urban fill. Table 1 lists Contaminants of Concern and potentially affected media. Exposure limits for potential contaminants that might be encountered in the field are listed in Table 2.

3.2.2 Chemical Hazard Exposure Routes

Potential hazards and their exposure routes include:

- Inhalation of organic vapors due to the presence of volatile organic compounds in soil and from diesel-powered equipment and minimal volatilization potential related to the presence of chlordane and PAHs in soil.
- Inhalation of dust impacted with PAHs, metals, or pesticides associated with soil borings, soil sampling activity, and construction activity.
- Inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of materials inadvertently contaminated with potentially toxic materials.
- Dermal exposure and possible percutaneous (skin) absorption of certain lipophilic (readily absorbed through the skin) PAHs and pesticides.
- Skin and eye contact with contaminants at the site and decontamination activities.

Exposure limits and health effects of selected chemicals are in Table 2. The probability of exposure for each task is outlined in Table 3.

3.2.3 Control of Exposure to Chemical Hazards

To protect potentially exposed personnel the following procedures and protocols will be adopted and used as needed: work procedures will be adhered to, work zones will be established, dust control will be utilized, respirators (if required) and personal protective equipment will be worn, Dust monitoring will be conducted during times of disturbance of the impacted soil to assess the potential inhalation pathway of exposure and strict personnel decontamination procedures will be followed.

3.3 Physical Hazards

3.3.1 Temperature Extremes

Hot Temperatures

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE, in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke. If onsite workers exhibit the signs of heat exhaustion or heat stroke, they should seek immediate medical attention.

Cold Temperatures

Workers may be exposed to the hazard of working in a cold environment. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia, as well as slippery surfaces, brittle equipment, poor judgment, and unauthorized procedural changes. In order to prevent frostbite, hypothermia, trench foot and immersion foot, the workers are responsible for dressing warmly in layers with thick socks, gloves, and appropriate head and face gear. Upon the onset of discomfort due to the cold, onsite workers should take regular five to ten minute breaks to warm up inside nearby buildings and to drink warm fluids. Please note that the NYCDEP statute prohibits idling an engine for more than three minutes (one-minute if adjacent to a school). This statue includes the use of a vehicle for the purpose of warming up employees. As such, all contractors and employees shall identify a place to warm up in advance. If discomfort continues and the onsite workers start to exhibit the signs of frostbite, hypothermia, trench foot or immersion foot, they should seek immediate medical attention.

3.3.2 Noise and Air Resources

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Hearing protection is required and shall be used in designated areas of the site as indicated by the posted signs.

3.3.3 Hand and Power Tools

In order to complete the various tasks for the project, personnel will utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Hand and power tools will be inspected prior to use. Proper personal protective equipment shall be worn while utilizing hand and power tools. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.4 Slips, Trips, and Falls

Working in and around the site will pose slip, trip and fall hazards due to equipment, piping, slippery surfaces that may be oil covered, or from surfaces that are wet from rain or ice. Potential adverse health effects include falling to the ground and becoming injured or twisting an ankle. Good housekeeping at the site must be maintained at all times.

3.3.5 Fire and Explosion

Prior to starting all excavation work, a review of appropriate New York City maps will be conducted to identify potential hazards. The possibility of encountering fire and explosion hazards exists from under- ground utilities and gases. Therefore, all excavation equipment must be grounded.

3.3.6 Material Handling

Manual lifting of heavy objects may be required. Failure to follow proper lifting techniques can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

Whenever possible, heavy objects must be lifted and moved by mechanical devices rather than by manual effort. The mechanical devices will be appropriate for the lifting or moving task and will be operated only by trained and authorized personnel. Objects that require special handling or rigging will only be moved under the guidance of a person who has been specifically trained to move such objects, such as a Master Rigger or equivalent. Lifting devices, including equipment, slings, ropes, chains, and straps, will be inspected, certified, and labeled to confirm their weight capacities. Defective equipment will be taken out of service immediately and repaired or destroyed.

The lift and swing path of a crane/equipment will be watched and maintained clear of obstructions. Personnel will not pass under a raised load, nor will a suspended load be left unattended. Personnel will not be carried on lifting equipment, unless it is specifically designed to carry passengers.

All reciprocating, rotating, or other moving parts will be guarded at all times. Accessible fire extinguishers will be made available in all mechanical lifting devices. All material must be stored in tiers, racked, blocked, or otherwise secure to prevent sliding, falling, or collapse. All loads/material will be verified to be secure before transportation.

3.3.7 Confined Space/Excavation Hazards

Personnel entry into trenches or unshored (*e.g.,* lagging) excavations within the designated areas of concern will not be permitted. No other confined spaces are known to exist on Site. If entry into trenches or excavations is required, all work will stop until the HASP has been revised to address the new hazards.

3.3.8 Working Near Equipment

Personnel working in the immediate vicinity of heavy equipment (*e.g.*, excavators, loaders, etc.) may encounter physical hazards resulting from contact with equipment. Field personnel should be aware of the presence of these hazards at all times and take appropriate action to avoid them. Due to the limited ability to communicate when wearing respiratory protection, the risk is increased. Workers must be careful to communicate

with heavy equipment operators regarding their location, and should maintain a safe distance from operating equipment at all times. Prior to working around equipment, the site personnel will review appropriate hand signals with the operator.

Equipment will be equipped with back up alarms.

3.3.9 Drill Rig Operations

In order to complete soil borings, a track-mounted direct push drill rig will be used. Working with and near this equipment and associated power generators pose many potential hazards, including being struck by or against, or pinched/caught by moving parts. These hazards can result in serious physical harm. Other hazards include electrocution and explosion due to encountering overhead or underground utilities.

Drill rigs for hollow stem auger drilling and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and other field personnel must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency switch. Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed.

The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment. A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. Drillers, helpers, and other field personnel must secure all loose clothing when in the vicinity of drilling operations. No person shall climb the drill mast while tools are rotating or without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder that meets the requirement of the OSHA standard.

3.3.10 Electrical Safety

The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.11 Utilities

Prior to the start of any intrusive work, the location of above-ground and underground utilities and other structures will be completed by the contractor/subcontractor responsible for completing investigation activities.

3.3.12 Vehicular Traffic

Portions of site activities (load in and load out) will be conducted in the street so vehicular and pedestrian traffic will be present. Appropriate precautions to protect the on-site workers and civilians should be used including the use of cones and traffic vests as appropriate.

3.4 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals and insects. As the potential for exposure to blood borne pathogens during site investigation is anticipated to be low, a Blood Borne Pathogen Exposure Plan (BBPEP) is not required. A BBPEP will be prepared if site operation requires its implementation.

3.4.1 Animals

During site operations, animals such as dogs, cats, pigeons, mice, and rats may be encountered. Workers shall use discretion and avoid all contact with animals. Bites and scratches from dogs and cats can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis. Cryptococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

3.4.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, spiders, and ticks may be present at the site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis.

3.4.3 Wound Care

A source of occupational exposure may occur when an employee gives First Aid and or CPR to an individual who had infectious blood. The occupational exposure occurs when there is the possibility for an employee's eyes, mucous membranes, non-intact skin (i.e., cut and abraded skin) to come into contact with potentially infectious materials from another employee. If an accident were to occur where First Aid would need to be administered, the person administering the First Aid will presume that any wounds and materials used are contaminated with BBP and should wear the appropriate PPE to prevent contact with these materials. Additionally, should the use of First Aid materials and or clothing that was potentially contaminated with BBP be encountered these materials should be property containerized and transported to the nearest hospital for proper disposal.

3.5 Coronavirus

General Preventative Measures

Field personnel must follow general proper hygiene measures while in the field including:

- Avoid touching eyes, nose and mouth.
- Cover cough or sneeze with tissue, and throw in trash.
- Wash hands often with soap and water for 20 seconds after going to bathroom, before eating, after blowing nose, coughing or sneezing.
- Use hand sanitizer with at least 60% alcohol if soap and water are not available.
- Avoid physical contact with other people (e.g., no handshakes).
- Maintain a safe distance of at least 6 feet from other people (social distancing).
- Wear face coverings when around other worker to minimize spread of COVID-19. (May be required in certain states or locations.)

Construction Trailers

Employees should avoid use of shared construction trailers or where employees cannot maintain a safe distance (minimum 6 feet) from other workers. If trailer use is needed, areas such as desks, phones, chairs and other common areas, should be cleaned and disinfected before and after use. Protocols should be developed to minimize trailer use to essential personal, restrict use from any workers who are ill or showing symptoms of being ill, use if face coverings and ensure a safe distance of 6 feet can be established between workers.

Communication

Include Coronavirus topics and prevention topics in daily tailgate meetings to ensure Coronavirus awareness is communicated daily. Discussions can focus on general topics including: social distancing, prevention measures for field personnel, signs and symptoms and recent news on the Coronavirus. Site-specific topics should include minimizing face-to-face contact, disinfecting/sterilizing field equipment, use of PPE to reduce exposure, site security, use of face coverings and other potential exposure issues/concerns.

Sick/Ill Workers

No Langan employee is permitted to be onsite when ill and/or showing potential symptoms of the Coronavirus. Symptoms of the Coronavirus may appear 2-14 days after exposure and can range from mild to severe. The most common symptoms include: fever, fatigue, dry cough, shortness of breath chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell. If an employee or subcontractor is observed being ill or exhibiting symptoms of Coronavirus, employees must immediately utilize their Stop Work Authority and contact their project manager to address the situation. If an employee observes another worker onsite exhibiting symptoms of Coronavirus, immediately utilize Stop Work Authority and notify their project manager and site construction manager or safety officer. Work should resume when the safety and health of Langan and subcontractors is adequately addressed.

3.6 Task Hazard Analysis

The tasks to be completed during the proposed site work activities, as summarized in Section 1.3, are listed in Table 3 with a Hazard Analysis for each task.

3.6.1 Soil Boring, Monitoring Well, and Soil Vapor Point Installation

Special attention shall be given to establishing the location of any underground utilities prior to boring or drilling. Prior to beginning the Site investigation work, the N.Y. One Call Center will be contacted by the boring/drilling contractor for utility mark-outs. Additionally, a private utility clearance subcontractor has been retained to complete a geophysical survey in the vicinity of each boring location within the asphalt paved parking area to identify the potential presence of underground utility lines. Pressure safety valves and hose whip prevention devices will be installed and operational on any air compressors, hoses, and their tools to be used on site. Additionally, all appropriate and current FDNY Certificates of Fitness (C of F) cards must be on site for those workers using equipment where C of Fs are required.

Chemical exposure may also occur as soil cuttings are handled.

3.6.2 Soil Sample Collection

Chemical exposure may occur as soil samples are collected. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

If evidence of historic contamination is encountered during test borings other than what is part of the intended investigation, installation or drilling, work will be stopped and emergency contacts listed in Attachment D of this HASP will be immediately notified.

3.6.3 Groundwater Sample Collection

Permanent monitoring wells will be installed for the collection of groundwater samples. Chemical exposure may occur as groundwater samples are collected. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

If evidence of historic contamination is encountered during groundwater sampling other than what is part of the intended investigation, installation or drilling, work will be stopped and emergency contacts listed in Attachment D of this HASP will be immediately notified.

3.6.4 Soil Vapor Sample Collection

Soil vapor points will be installed for the collection of soil vapor samples. Chemical exposure may occur as soil vapor samples are collected. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

If evidence of historic contamination is encountered during test borings other than what is part of the intended investigation, installation or drilling, work will be stopped and emergency contacts listed in Attachment D of this HASP will be immediately notified.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.1 Levels of Protection

PPE must protect workers from the specific hazards they are likely to encounter on site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and, (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards. Based on anticipated site conditions and the proposed work activities to be performed at the site, Level D Protection will be used for work completed within the defined exclusion zone. This will include any work within the defined investigation areas. Level D Protection will be required for all personnel working outside the investigation area but engaged with investigation activities. The upgrading/downgrading of these levels of protection will be based on continuous air monitoring results as described in Section 5.0. The decision to modify standard PPE will be made by the HSO after conferring with the Project Manager. The levels of protection are described below.

- **Level D Protection**

  a. Safety glasses w/ sideshields or chemical splash goggles
  b. Safety boots/shoes (toe-protected)
  c. Hard hat
  d. Long sleeve work shirt and work pants
  e. Nitrile gloves
  f. Hearing protection (as needed)
  g. Reflective traffic vest

- **Level D Protection (Modified)**

  a. Safety glasses w/ sideshields or chemical splash goggles
  b. Safety boots/shoes (toe-protected)
  c. Disposable chemical-resistant boot covers
  d. Coveralls Tyvek or equivalent to be worn when contact with contaminated soil or groundwater, or non-aqueous phase liquids is anticipated)
  e. Hard hat
  f. Long sleeve work shirt and work pants
  g. Nitrile gloves
  h. Hearing protection (as needed)
  i. Reflective traffic vest

- **Level C Protection**

  a. Full face-piece, air-purifying, cartridge*-equipped, NIOSH-approved respirator [*combo cartridge P100/OV/CL/HC/SD/CD/HS (escape)]
  b. Inner (latex) and outer (nitrile) chemical-resistant glove
  c. Chemical-resistant safety boots/shoes (toe-protected)
  d. Disposable chemical-resistant boot covers
  e. Hard hat
  f. Long sleeve work shirt and work pants
  g. Coveralls (Tyvek or equivalent, poly-coated Tyvek will be worn when contact, or anticipated contact with wet contaminated soils, ground water, and/or non-aqueous phase liquids (NAPL) is anticipated))
  h. Hearing protection (as needed)
  i. Reflective traffic vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are summarized in Table 4. The written Respiratory Protection Program is maintained by Langan's H&S Department in Langan's Doylestown, Pennsylvania office. The monitoring procedures and equipment are outlined in Section 5.0.

4.2 Respirator Fit-Test

All Langan employees and subcontractors performing site work who could be exposed to hazardous substances at the work site are in possession of a full face-piece, air-purifying respirator and have been successfully quantitative fit-tested within the past year. Quantitative fit-test records are maintained by Langan's H&S Department.

4.3 Respirator Cartridge Change-Out Schedule

Respiratory protection is required to be worn when certain action levels (Table 2) are reached. A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short the time period was the previous day they were used.

5.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

5.1 Monitoring During Site Operations

Atmospheric air monitoring results are used to provide data to determine when exclusion zones need to be established and when certain levels of personal protective equipment are required. For all instruments there are Site-specific action level criteria which are used in making field health and safety determinations. Other data, such as the visible presence of contamination or the steady state nature of air contaminant concentration, are also used in making field health and safety decisions. Therefore, the Langan Health and Safety Officer may expand the exclusion zone beyond the extents of the excavation or sampling area

or require a person to wear a respirator even though atmospheric air contaminant concentrations are below established HASP action levels.

During Site work involving disturbance of impacted soils, real time air monitoring will be conducted to assess the potential for exposure to airborne contaminants of concern including VOCs and SVOCs. A photoionization detector (PID) and/or flame ionization detector (FID) will be used to monitor concentrations of VOCs at personnel breathing-zone height to assess the potential exposure to petroleum related VOCs related to use of machinery including backhoes, drill rigs, compressors etc. Air monitoring will be the responsibility of the Langan Health and Safety Officer or designee. Air monitoring will be conducted during intrusive activities associated with the completion of soil borings, collection of soil samples, and oversight of investigation activities on the project Site. All manufacturers' instructions for instrumentation and calibration will be available onsite.

Subcontractors' air monitoring plans must be equal or more stringent as the Langan plan.

An air monitoring calibration log is provided in Attachment D of this HASP.

5.1.1 Volatile Organic Compounds

Monitoring with a PID, such as a MiniRAE 2000 (10.6v) or equivalent will occur during investigation activities. Colormetric Indicator Tubes for benzene may be used as backup for the PID, if measurements remain above background monitor every 2 hours. The HSO will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, appearance of drill cuttings, etc.) since the last measurement. Instrument action levels for monitored gases are provided in Table 4.

5.1.2 Dust

The soil at the Site is impacted with SVOCs, pesticides, PCBs, and metals. Additionally, the soil at the Site consists of historic fill. During invasive procedures which have the potential for creating airborne dust, such as excavation of dry soils, a real time airborne dust monitor such as a Thermo MEI person DataRAM-1000 (pDR-1000) should be used to monitor for air particulates within the work zone and a Dustrak Aerosol Monitor should be

used to monitor for air particulates at the downwind perimeter of the work zone.

The HSO will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (appearance of visible dust) since the last measurement. If dust levels are observed to be greater than 0.150 mg/m3 or visible dust is observed for longer than 15 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the work zone every 30 minutes in addition to the employee breathing zone. Instrument action levels for dust monitoring are provided in Table 4.

5.1.3 Determination of Background Levels

Background (BKD) levels for VOCs and dust will be established prior to intrusive activities within the work zone. A notation of BKD levels will be referenced in the daily monitoring log. BKD levels are a function of prevailing conditions. BKD levels will be taken in an appropriate upwind location as determined by the Langan Health and Safety Officer.

5.2 Monitoring Equipment Calibration and Maintenance

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments shall be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

All instruments shall be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on site by the HSO for reference.

5.3 Noise Monitoring

As a standard work practice, hearing protection will be worn within the area that exceeds 85 dBA created by any loud machinery as a precaution. Work areas or tasks which pose an exposure risk greater than 85 dBA will require hearing

protection. Hearing protection is required and should be used in the exclusion zone while the drill rig is operating.

6.0 COMMUNITY HEALTH AND SAFETY CONSIDERATIONS

Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP provided as Attachment J. Special CAMP requirements for work within 20 feet of potentially exposed individuals or structures, if determined to be necessary, will be implemented as described in Attachment K.

Langan will conduct monitoring for VOCs during ground-intrusive work (i.e., soil boring advancement, monitoring well installation, and soil vapor point installation). Upwind concentrations of VOCs and dust will be monitored continuously each day to establish background concentrations. Langan will monitor VOCs and dust at the downwind perimeter of the work zone, which will be established at a point on the Site where the general public or site employees may be present. Monitoring for VOCs will be conducted with a PID equipped with a 10.6 eV bulb. Dust emissions will be monitored using real-time monitoring equipment capable of measuring PM-10 (e.g., DustTrak).

Sustained concentrations of VOCs or PM10 will be reported to the NYSDEC and NYSDOH Project Managers and included in the daily report. In addition, a map showing the location of the downwind and upwind CAMP stations will be included in the daily report.

7.0 WORK ZONES AND DECONTAMINATION

7.1 Site Control

Work zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas.

Any person working in an area where the potential for exposure to site contaminants exists will only be allowed access after providing the HSO with proper training and medical documentation.

Exclusion Zone (EZ) - All activities which may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an EZ. Decontamination of field equipment will also be conducted in the Contaminant Reduction Zone (CRZ) which will be located on the perimeter of the EZ. The EZ

and the CRZ will be clearly delineated by cones, tapes or other means. The Langan Health and Safety Officer may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the Langan Health and Safety Officer allowing adequate space for the activity to be completed, field members and emergency equipment. For purposes of this HASP the exclusion zones are defined by a 10-foot buffer around each soil boring, monitoring well location, and soil vapor point but may be expanded based on the results of air monitoring or any other field conditions identified by the HSO. All personnel working in the EZ must have 40 hours HAZWOPER training and be enrolled in a medical monitoring program prior to conducting any site activities.

7.2 Contamination Control

7.2.1 Personnel Decontamination Station

Personal hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure.

7.2.2 Minimization of Contact with Contaminants

During completion of all site activities, personnel should attempt to minimize the chance of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and other physical contact with contamination as PPE is intended to minimize accidental contact. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control over spray and runoff and to ensure that unprotected personnel working nearby are not affected.

7.2.3 Personnel Decontamination Sequence

Decontamination will be performed by removing all PPE used in EZ and placing it in drums/trash cans at the CRZ. Baby wipes shall be available for wiping hands and face. Drums/trash cans will be labeled by the field crews in accordance with all local, state, and federal requirements. Management

plans for contaminated PPE, tools and investigative-derived waste (i.e., soil cutting) are provided below.

7.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment.

If the injured person can be moved, he/she will be decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury), provisions shall be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent data.

7.2.5 Hand-Held Equipment Decontamination

Hand-held equipment includes all monitoring instruments as stated earlier, samples, hand tools, and notebooks. The hand-held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the CRZ.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident. Sampling equipment, hand tools, etc. will be cleaned with non-phosphorous soap to remove any potentially contaminated soil, and rinsed with deionized water. All decontamination fluids will be containerized and stored on-site pending waste characterization sampling and appropriate off-site disposal.

7.2.6 Heavy Equipment Decontamination

All heavy equipment and vehicles arriving at the work site will be free from contamination from offsite sources. Any vehicles arriving to work that are suspected of being impacted will not be permitted on the work site. Potentially contaminated heavy equipment will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the HSO or his designee.

7.3 Communications

The following communications equipment will be utilized as appropriate.

- Telephones - A cellular telephone will be located with the HSO for communication with the HSM and emergency support services/facilities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

Signal	Meaning
Hand gripping throat	Out of air, can't breathe
Grip on partner's wrist or placement of both hands around partner's waist	Leave area immediately, no debate
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand
Thumbs down	No, negative

8.0 MEDICAL SURVEILLANCE

All personnel who will be performing field work involving potential exposure to toxic and hazardous substances will be required to have passed an initial baseline medical examination, with annual follow-up medical exams thereafter, consistent with 29 CFR 1910.120(f). Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by Langan's H&S Department.

9.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures that are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures. In case of emergency, in addition to 911 the Langan Incident/Injury Hotline (973-560-4699) should be called as soon as possible.

9.1 Responsibilities

9.1.1 Langan Health and Safety Officer (HSO)

The HSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The HSO is responsible for ensuring the HSM are notified of all incidents, all injuries, near misses, fires, spills, releases or equipment damage. The HSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can notify OSHA within the required time frame.

9.1.2 Emergency Coordinator

For this project the Emergency Coordinator is the HSO.

The Emergency Coordinator shall locate emergency phone numbers and identify hospital routes prior *to beginning* work on the sites. The Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator is responsible for implementing the Emergency Response/ Contingency Plan whenever conditions resulting from the Site Investigation warrant such action.

9.1.3 Site Personnel

Project site personnel are responsible for knowing the Emergency Response Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency. Project site personnel, including all subcontractors will be trained in the Emergency Response Plan.

9.2 Communications

Once an emergency situation has been stabilized or as soon as practically possible, the HSO will contact the Langan Incident/Injury Hotline (973-560-4699) and Project Manager to identify any emergency situation.

9.3 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during investigative activities at the site, Attachment E Emergency Notification Numbers, will be available in the field vehicles and provided to all personnel conducting work within the EZ.

Figure 2 is the hospital route map. Outside emergency number 911 and local ambulance should be relied on for response to medical emergencies and transport to emergency rooms. Due to traffic congestion that is prevalent in the New York metropolitan area, alternate hospital routes will need to be considered. The Emergency Coordinator will determine the appropriate route based on time of day and traffic patterns. Changes in the referenced primary facilities shall be documented with the HASP Field Change Authorization Request Form (Attachment B).

The Emergency Phone Numbers listed are preliminary. Upon mobilization, the HSO shall verify all numbers and document the changes in the Site Logbook. Any changes shall also be documented with the HASP Field Change Authorization Request Form.

Hospital route maps will be provided to all field personnel.

9.4 Pre-Emergency Planning

Langan will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

9.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the HSO on site immediately. First-aid equipment will be available on site at the following locations:

First Aid Kit:	Vehicles
Emergency Eye Wash:	Vehicles

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

Personnel with current first aid and CPR certification will be identified.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance.

Nearest hospital: **Brookdale University Hospital**
1 Brookdale Plaza
Brooklyn, NY 11212
(718) 240-5363
(directions from site to hospital found on Figure 2)

9.6 Non-Emergency Medical Treatment

In case of injury to personnel, which is not a medical emergency the employee will contact WorkCare at (1-888-449-7787). WorkCare provides access 24 hours / 7 days a week to experienced occupational health nurses and physicians who confer with employees at the onset of a work-related injury or illness. WorkCare will provide over the phone injury treatment or direct employees to medical treatment by third party provider, if appropriate.

9.7 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs as a result of the site investigation activities, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, the Langan Project Manager will be verbally notified immediately. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the nearest intersection to be accounted for and to receive further instructions.

9.8 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site and notification of the Langan Project Manager of the investigation activities. Portable fire extinguishers will be provided at the work zone. The extinguishers located in the various locations should also be identified prior to the start of work. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

9.8.1 Fire Prevention

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.

- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.

The person responsible for the control of fuel source hazards and the maintenance of fire prevention and/or control equipment is the HSO.

9.9 Significant Vapor Release

Based on the proposed tasks, the potential for a significant vapor is low. However, if a release occurs, the following steps will be taken:

- Move all personnel to an upwind location. All non-essential personnel shall evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations shall be monitored for volatile organics..
- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator shall notify the Langan Project Manager.
- Local emergency response coordinators will be notified.

9.10 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Safety Data Sheet (SDS) will be followed, when necessary.

SKIN AND EYE: Use copious amounts of soap and water from eye-wash kits and portable hand wash stations.

CONTACT: Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Skin shall also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs. Affected items of clothing shall also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

9.11 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or omitted. The HSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

9.12 Incident Reporting

Once first aid and/or emergency response needs have been met, the following parties are to be contacted:

- WorkCare (1-888-449-7787)
- Langan Incident/Injury Report Hotline (973-560-4699)
- Langan Project Manager, Ashley Sandve (973-560-4900) or Steve Ciambruschini (973-560-4982)
- Langan Health and Safety Manager, Tony Moffa (215-491-6500)
- The employer of any injured worker who is not a Langan employee

For emergencies involving personal injury and/or exposure including near-misses, the HSO or designee will complete and submit an Accident/Incident Report Form (Attachment F) within 24 hours. If the employee involved is not a Langan employee, his employer shall receive a copy of the report.

9.13 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work will continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The HSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

9.14 Spill Control and Response

All small spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the SDS will be consulted to assist in determining proper waste characterization and the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. All spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill.

All contractor vehicles shall have spill kits on them with enough material to contain and absorb the worst-case spill from that vehicle. All vehicles and equipment shall be inspected prior to be admitted on site. Any vehicle or piece of equipment that develops a leak will be taken out of service and removed from the job site.

The following seven steps shall be taken by the Emergency Coordinator:

1. Determine the nature, identity and amounts of major spills.
2. Make sure all unnecessary persons are removed from the spill area.
3. Notify the HSO immediately.
4. Use proper PPE in consultation with the HSO.
5. If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosion-proof equipment to contain or clean up the spill (diesel-only vehicles, air-operated pumps, etc.).
6. If possible, try to stop the leak with appropriate material.
7. Remove all surrounding materials that can react or compound with the spill.

In addition to the spill control and response procedures described in this HASP, Langan personnel will coordinate with the designated project manager relative to spill response and control actions. Notification to the Project Manager must be immediate and, to the extent possible, include the following information:

- Time and location of the spill.
- Type and nature of the material spilled.
- Amount spilled.
- Whether the spill has affected or has a potential to affect a waterway or sewer.
- A brief description of affected areas/equipment.
- Whether the spill has been contained.
- Expected time of cleanup completion. If spill cleanup cannot be handled by Langan's on-site personnel alone, such fact must be conveyed to the Project Manager immediately.

Langan shall not make any notification of spills to outside agencies. The client will notify regulatory agencies as per their reporting procedures.

9.15 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on site:

- Industrial first aid kit.
- Fire extinguishers (one per site).
- Absorbent material.

9.16 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers.
- Refilling medical supplies.
- Recharging eyewashes and/or showers.
- Replenishing spill control supplies.

10.0 TRAINING

10.1 General Health and Safety Training

Completion of an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program (or its equivalent) as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees who will perform work in areas where the potential for a toxic exposure exists. Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment.

10.2 Site Specific Training

Prior to commencement of site activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include a documented verbal review of the entire HASP and all the provisions within the HASP document. Should any new employees arrive on-site, they will also be given

a documented full HASP review – or one that address the appropriate tasks that remain at the time of the new employee's arrival.

10.3 Onsite Safety Briefings

Project personnel and visitors will participate in documented daily on-site health and safety briefings ("Tailgate Talks") led by the HSO to assist site personnel in safely conducting their work activities. The briefings will include information on operations to be conducted that shift, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity for the work crews to be updated on monitoring results. Prior to starting any new activity, a training session will be held for crew members involved in the activity. The Health and Safety Briefing Statement (Attachment A) can be used to facilitate this effort.

10.4 Hazard Communication

All material brought on-site will be in the appropriate containers and will be properly labeled. The SDS for chlordane and contaminants typically associated with historic fill are attached. Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.0 RECORDKEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

11.1 Field Change Authorization Request

A Field Procedures Change Authorization Request Form is to be completed for requesting a change to this HASP (Attachment B). Any changes to the work to be performed that is not included in the HASP will require an Addendum that is approved by the Langan Project Manager and Langan HSM to be prepared. Approved changes will be reviewed with all field personnel at a safety briefing.

11.2 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training, documentation of three-day OJT, and respirator fit-test records) and medical clearance for Site work and respirator use will be maintained in the office and available upon request. Records for all subcontractor employees must also be available upon request. All employee medical records will be maintained by Langan's H&S Department.

11.3 Onsite Log

A log of personnel on site each day will be kept by the Site Supervisor or designee.

11.4 Daily Safety Meetings ("Tailgate Talks")

Completed Safety Briefing forms will be maintained by the HSO.

11.5 Exposure Records

All personal monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be maintained by the HSO during site work. At the end of the project they will be maintained according to 29 CFR 1910.1020.

11.6 Hazard Communication Program/SDS

Safety Data Sheets (SDS) have been obtained for applicable substances and are included in this HASP (Attachment H). Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.7 Documentation

Employees are required to contact WorkCare at (1-888-449-7787) to document incidents/injuries which are not medical emergencies. Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at (973-560-4699 and the client representative to report the incident or near miss. A written report must be completed and submitted to the client representative within 24 hours of the incident. For emergencies involving personnel injury and/or

exposure, employee will complete and submit the Langan Incident/Injury Report to the Langan Corporate Health and Safety Manager as soon as possible following the incident. Accidents will be investigated in-depth to identify all causes and to recommend hazard control measures.

12.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have been verbally given a full HASP review by Langan personnel, and understand the provisions of this EHS Plan. It is maintained on site by the HSO as a project record.

Each field team member shall sign this section after Site-specific training is completed and before being permitted to work onsite.

Name (Print and Sign)	***Company***	***Date***

TABLES

TABLE 1
SUSPECTED CONTAMINANTS OF CONCERN
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Contaminant of Concern	Affected Media
VOLATILES	
2,2,4-Trimethylpentane	Soil Vapor
Acetone	Soil
Benzene	Soil / Soil Vapor
Cis-1,2-Dichloroethene	Soil Vapor
Cyclohexane	Soil Vapor
Methyl Ethyl Ketone	Soil
n-Hexane	Soil Vapor
o-Xylene	Soil Vapor
Trichloroethene (TCE)	Soil Vapor
Vinyl Chloride	Soil Vapor
Chlorinated VOCs	Soil / Groundwater / Soil Vapor
Total Volatiles	Soil / Groundwater / Soil Vapor
SEMI-VOLATILES	
1,2-Dichlorobenzene	Soil
2-Methylphenol (o-Cresol)	Soil
3 & 4 Methylphenol (m&p Cresol)	Soil
Benzo(a)anthracene	Soil
Benzo(a)pyrene	Soil
Benzo(b)flouranthene	Soil
Benzo(g,h,i)perylene	Soil
Benzo(k)flouranthene	Soil
Chrysene	Soil
Indeno (1,2,3-cd) pyrene	Soil
Phenanthrene	Soil
Diesel Fuel / Fuel Oils	Soil / Groundwater
Hydraulic Oil	Soil / Groundwater
Miscellaneous TBD	Soil / Groundwater
METALS	
Arsenic	Soil
Barium	Soil
Cadmium	Soil
Chromium, Trivalent	Soil
Copper	Soil
Iron	Groundwater
Lead	Soil
Magnesium	Groundwater
Manganese	Groundwater
Mercury	Soil
Nickel	Soil
Selenium	Soil
Silver	Soil
Sodium	Groundwater
Zinc	Soil
PESTICIDES	
4,4'-DDT	Soil
PCBS	
Total PCBs	Soil

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
VOLATILES				
1,2,4-Trimethylpentane	200 ppm	3000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis
Acetone	1,000 ppm	2,500 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis
Benzene	1 ppm	500 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]
Cis-1,2-Dichloroethene	50 ppm	50 ppm	Inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]
Cyclohexane	300 ppm	1,300 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma
Methyl Ethyl Ketone	200 ppm	3,000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis
n-Hexane	500 ppm	1,100 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose; nausea, headache; peripheral neuropathy: numb extremities, muscle weak; dermatitis; dizziness; chemical pneumonitis (aspiration liquid)

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
o-Xylene	100 ppm	900 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis
Trichloroethylene	100 ppm	1,000 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]
Vinyl Chloride	1 ppm	Not Determined	Inhalation, skin and/or eye contact (liquid)	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]
Total Volatiles	15 ppm	150 ppm	Inhalation, Skin Absorption, Ingestion	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
SEMI-VOLATILES				
1,2-Dichlorobenzene	50 ppm	200 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; liver, kidney damage; skin blisters
2-Methylphenol (o-Cresol)	5 ppm	250 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage
3 & 4 Methylphenol (m&p Cresol)	5 ppm	250 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage
Benzo(a)anthracene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(a)pyrene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(b)flouranthene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(k)flouranthene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Chrysene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Indeno (1,2,3-cd) pyrene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
METALS				
Arsenic	0.010 mg/m^3	5 mg/m^3	Inhalation, Ingestion, Skin Absorption, Skin and/or Eye Contact	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiration, hyperpigmentation of skin, [potential occupational carcinogen]
Barium	0.5 mg/m^3	50 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia
Cadmium	0.005 mg/m^3	9 mg/m^3	Inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]
Chromium, Trivalent	0.5 mg/m^3	25 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes; sensitization dermatitis
Copper	1 mg/m^3	100 mg/m^3	Inhalation, Ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational carcinogen]
Iron	10 mg/m^3	2500 mg/m^3	Inhalation	Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis)

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Lead	0.05 mg/m^3	100 mg/m^3	Inhalation, Ingestion, Skin and/or Eye Contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension
Manganese	5 mg/m^3	500 mg/m^3	Inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage
Mercury	0.1 mg/m^3	10 mg/m^3	Inhalation, Ingestion, Skin Absorption, Skin and/or Eye Contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Nickel	1 mg/m^3	10 mg/m^3	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria
Selenium	0.2 mg/m^3	1 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; In Animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage
Silver	0.01 mg/m^3	10 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance
Zinc	5 mg/m^3	500 mg/m^3	Inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
PESTICIDES				
4,4'-DDT	1 mg/m^3 [skin]	500 mg/m^3	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]
PCBS				
Total PCBs	0.05 mg/mg^3	5 mg/m^3	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

--- No exposure limits listed in the NIOSH Pocket Guide to Chemical Hazards dated November 2010.

TABLE 3
HAZARD ANALYSIS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Task	Potential Risk	Description	Control Measure
1, 2, 3, 4, 5	Lifting equipment	Improper lifting/carrying of equipment and materials	Follow safe lifting and general material handling
2	Noise	Loud sounds caused by the machines during drilling, or excavation	Wear proper PPE (hearing protection)
1, 2, 3	Working near heavy machinery	Close proximity to drill rig and/or construction equipment	Be aware of surroundings, wear safety vest and hard hat
1, 2, 3, 4, 5	Slips, trips, and falls	Any number of injuries from slips, trips, and falls in carrying out these tasks	Good housekeeping at site, constant awareness and focus on the task
1, 2, 3, 5	Inhalation of Dust	Breathing in visible dust from earthwork using drills or excavators	Wear proper PPE, monitor air for dust concentrations, use dust suppression techniques
2, 3, 4, 5	Inhalation of Volatiles	Breathing in volatiles from earthwork using drills or excavators causing dust	Wear proper PPE, monitor air for volatile concentrations, use dust suppression techniques
2	Utilities	Hitting utility lines during drilling and or excavating	Use proper mark out of underground utilities before beginning earthwork
2, 3, 4, 5	Skin contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
2, 3, 4, 5	Ingestion of contaminated material	Material falls on skin; gets into mouth	Wear proper PPE; follow safe work practices
2, 3, 4, 5	Skin and eye contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5	Heat Stress	Stress or exhaustion related to high temperatures	Hydrate and rest as needed
1, 2, 3, 4, 5	Cold Stress	Stress or exhaustion related to low temperatures; hypothermia	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5	Bites and stings	Bee stings, ticks, snake bites	Wear proper PPE, be watchful, follow safe work practices
1, 2, 3, 4, 5	Lacerations and abrasions	Many opportunities working with hand tools	Inspect equipment being used for sharp edges, wear proper PPE; follow safe work practices

TABLE 4
INSTRUMENTATION ACTION LEVELS
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

Instrument	Action Level	Level of Protection / Action Required
PID	Background to 5 ppm	Level D/No respirator; no further action required
	> 5 ppm for > 5 minutes	1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., by slowing drilling or excavation activities), contact HSO to review conditions and determine source and appropriate response action. 2. If PID readings remain above 5 ppm, temporarily discontinue work and upgrade to Level C protection. 3. If sustained PID readings fall below 1 ppm, downgrading to Level D protection may be permitted
	> 5 ppm but < 150 ppm for > 5 minutes	Level C/ 1. Discontinue all work; all workers shall move to an area upwind of the jobsite. 2. Evaluate potential causes of the excessive readings and allow work area to vent until VOC concentrations fall below 5 ppm. 3. Level C protection will continue to be used until PID readings fall below 1 ppm.
	> 30 ppm (steady state condition) within AOC zone	Stop Work / Suppress Emissions / Evacuate and re-evaluate.
	> 150 ppm	Evacuate the work area
Total Dust Aerosol Monitor	> 0.100 mg/m^3 above BKD (steady state condition) at perimeter of AOC zone for 15-minutes or visible dust.	Stop Work / Implement dust control / Continue dust monitoring if dust levels are less than 0.150 mg/m^3
	< 0.150 mg/m3 above BKD (following dust suppression measures)	Stop Work / implement dust control, continue work once levels are <0.150 mg/m^3
	>5 mg/m^3	Level C

Notes:

1. 1 ppm level based on OSHA Permissible Exposure Limit (PEL) for benzene.
2. 5 ppm level based on OSHA Short Term Exposure Limit (STEL) maximum exposure for vinyl chloride for any 15 minute period.
3. 150 ppm level based on NIOSH Immediately Dangerous to Life and Health (IDLH) for tetrachloroethylene

TABLE 5
PERSONAL PROTECTIVE EQUIPMENT
Louisiana Ave Landfill Auto Wrecking Project 7 Site
Brooklyn, New York

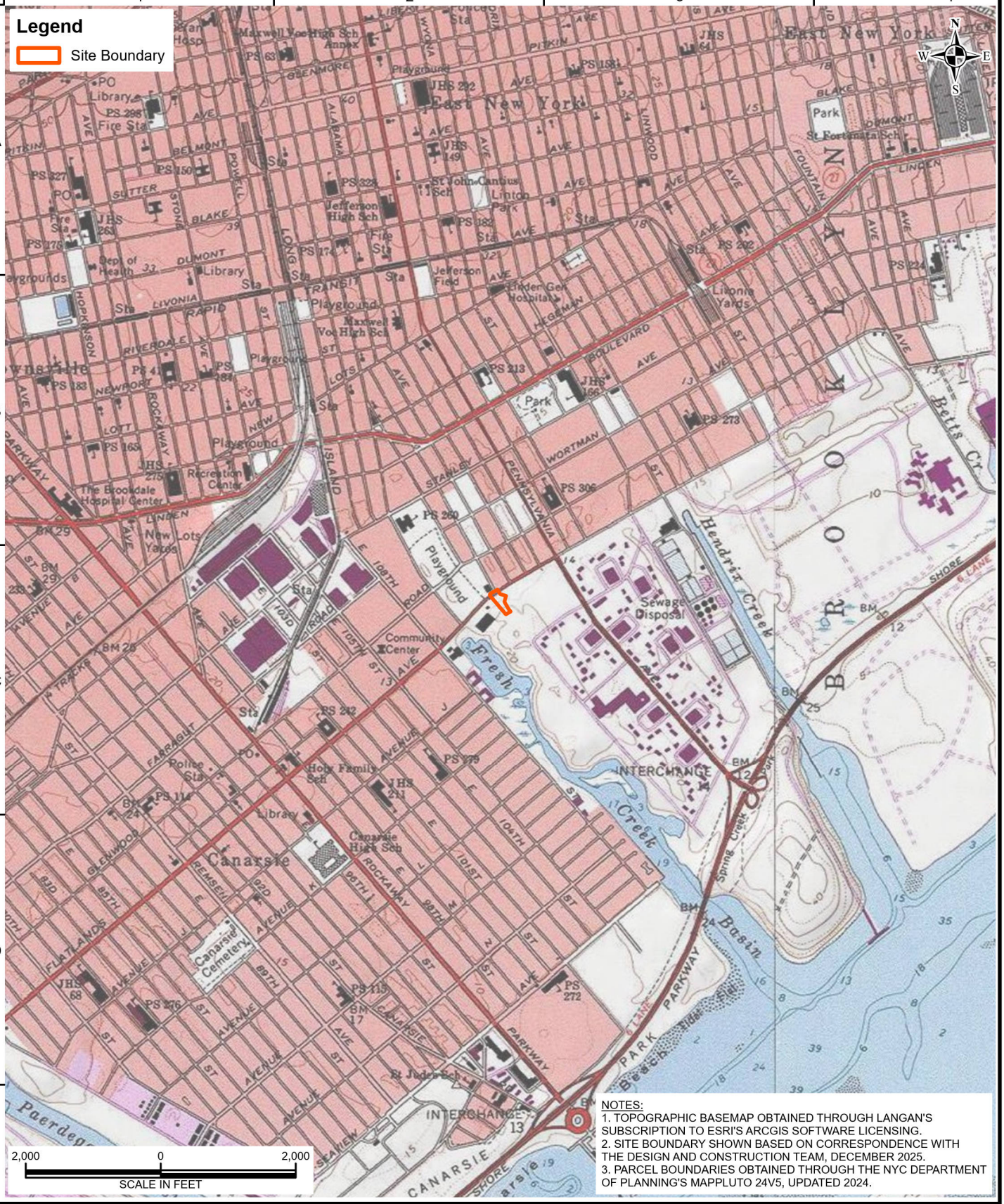
Respiratory Protection*:*

Level D:	No respirator required.
Level C:	Half-face, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols) and organic vapor cartridges. The respirator will be NIOSH-approved.
Level C - supplemental by task	Fullface, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols), acid gas, organic vapor cartridges. The respirator will be NIOSH-approved.

Personal Protective Clothing*:*

Level D:	Hard-hat, traffic vest (if working on or adjacent to the roadway), long sleeve work shirt & work pants of natural fibers, safety glasses or goggles, steel-toed boots, hearing protection (if needed), nitril inner gloves and leather outer gloves.
Level D - supplemental PPE by task	Tyvek disposal suit
Level C:	Chemically resistant outer boots and Chemical resistant Tyvek disposal suite.

FIGURES



NOTES:
1. TOPOGRAPHIC BASEMAP OBTAINED THROUGH LANGAN'S SUBSCRIPTION TO ESRI'S ARCGIS SOFTWARE LICENSING.
2. SITE BOUNDARY SHOWN BASED ON CORRESPONDENCE WITH THE DESIGN AND CONSTRUCTION TEAM, DECEMBER 2025.
3. PARCEL BOUNDARIES OBTAINED THROUGH THE NYC DEPARTMENT OF PLANNING'S MAPPLUTO 24V5, UPDATED 2024.

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

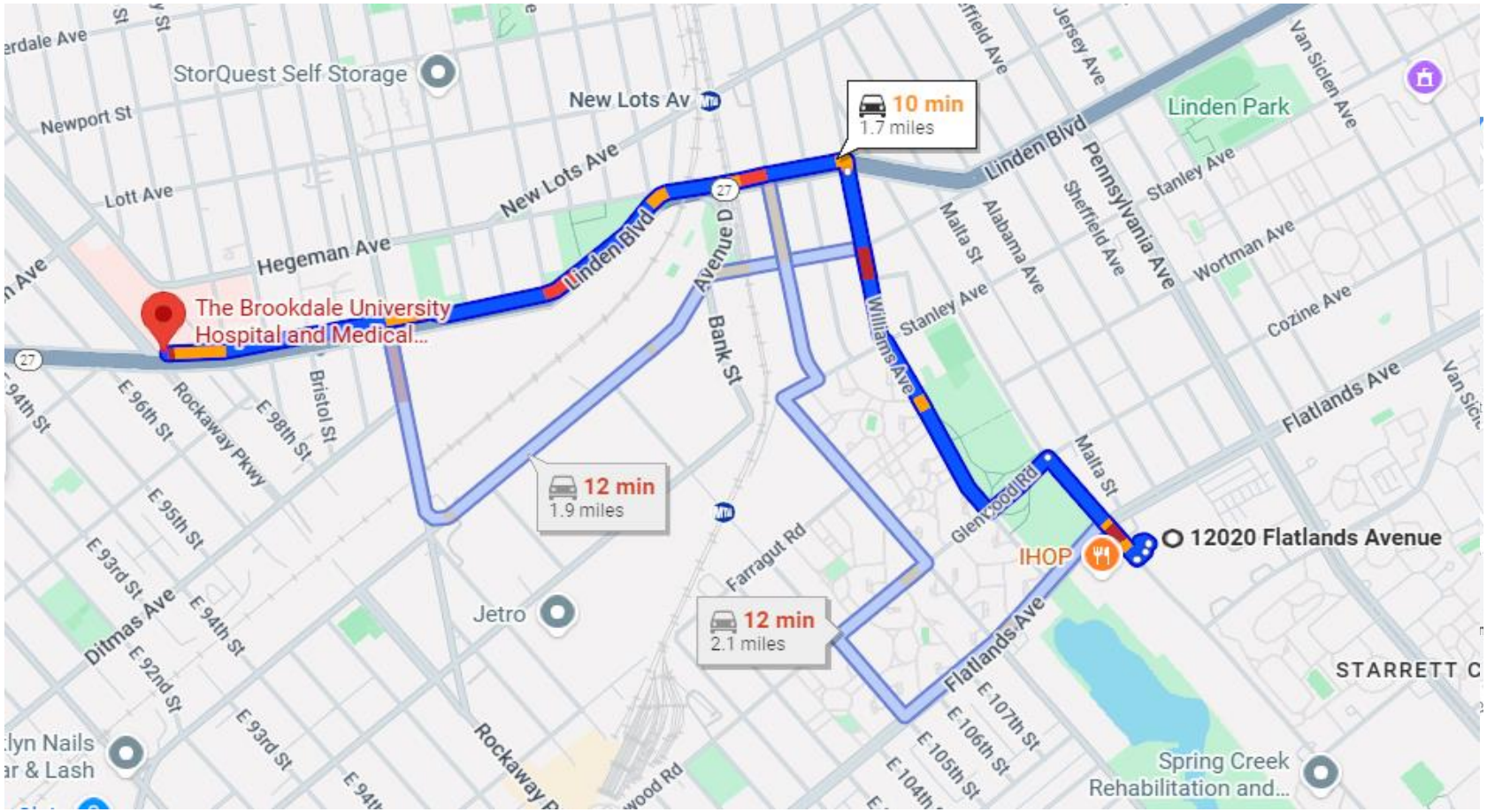
Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
SITE LOCATION PLAN

Project No.	Figure No.
100688801	1
Date: 1/12/2026	
Scale: 1"=2,000'	
Drawn By: RDB	

© 2025 Langan

Path: \\Langan.com\data\PAR\data8\100688801\Project Data\ArcGIS\APRX\Christian Cultural Center_Overview



Emergency Route to Brookdale University Hospital Emergency Room (Phone # (718) 240-5363) :

1 Head northeast on Louisiana Ave to Glenwood Rd
2 Turn left onto Glenwood Rd
3 Turn left onto Linden Blvd
4 Turn right onto Williams Ave
5 Turn left onto Linden Blvd
6 Exit to stay on Linden Blvd
7 Emergency room entrance will be on your right

MAP REFERENCE: Google Maps

LANGAN

Project

Louisiana Ave Landfill Auto Wrecking Project 7 Site
EMERGENGY HOSPITAL ROUTE MAP

Brooklyn **New York**

Project	DATE	SCALE	FIGURE NO.
100688807	**11/21/2025**	**NTS**	**2**

ATTACHMENT A

Health and Safety Briefing Statement

LANGAN

ATTACHMENT A

HEALTH AND SAFETY BRIEFING STATEMENT

The following personnel were present at a pre-job safety briefing conducted at _____(time) on _____ (date) at _____(location), and have read this Health and Safety Plan for the above Site and are familiar with its provisions:

Name	Signature
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Fully charged ABC class fire extinguisher available on Site? _____
Fully stocked First Aid Kit available on Site? _____
All project personnel advised of location of nearest phone? _____
All project personnel advised of location of designated medical facility? _____

_____
Name of Field Team Leader or Site Safety Officer

_____
Signature Date

ATTACHMENT B

Field Procedures Change Authorization Form

LANGAN

ATTACHMENT B

FIELD PROCEDURES CHANGE AUTHORIZATION FORM

Section to be changed:_____

Duration of Authorization Requested Date:_____

_____ Today only

_____ Duration of Task

_____ Other _____

_____

_____

Description of Procedures Modification:

_____

_____

_____

Justification:

_____ _____
Person Requesting Change Verbal Authorization Received From:

_____ _____
Name Name Time

_____ _____
Title Title

_____
Signature

Approvals:

_____

_____

_____

ATTACHMENT C

Unsafe Conditions and Practices Form

LANGAN

ATTACHMENT C

UNSAFE CONDITIONS AND PRACTICES FORM

DESCRIPTION OF CIRCUMSTANCES REGARDING UNSAFE CONDITION OR PRACTICE:

_____

_____

_____

_____

_____

_____

_____

IS THIS CONDITION EXISTING OR POTENTIAL?_____

REPORTED TO: _____

REPORTED BY:_____

DATE REPORTED:_____

COMMENTS:_____

_____

_____

ATTACHMENT D

Calibration Log

ATTACHMENT D

PROJECT:_____

DATE:_____

CALIBRATION LOG

Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calib Reading	Performed By:

ATTACHMENT E

Emergency Notification Numbers

ATTACHMENT E

EMERGENCY NOTIFICATION NUMBERS

The following list provides names and telephone numbers for emergency contact personnel.

ORGANIZATION	CONTACT	TELEPHONE
New York City Police Department		911
New York City Fire Department		911
Brookdale University Hospital		718-240-5363
WorkCare (Non-Emergency Medical Treatment)		1-888-449-7787
Langan Incident/Injury Hotline		1-800-952-6426 or 973-560-4699
Langan Project Manager	Ashley Sandve	973-560-4900
CHEMTREC	(US) (worldwide)	800-262-8200 703-741-5500
TSCA HOTLINE		202-554-1404
RCRA HOTLINE		800-424-9346
CDC	(regional poison control)	800-232-4636 800-222-1222
BUREAU OF ALCOHOL, TOBACCO & FIREARMS	(local)	800-800-3855 202-648-7777
NATIONAL RESPONSE CENTER		800-424-8802
PESTICIDE INFORMATION SERVICE		800-858-7378
BUREAU OF EXPLOSIVES, A.A. RAILWAYS	(Support Services)	202-639-2265 719-584-7151
FEDERAL EXPRESS - HAZARDOUS MATERIAL INFO		800-463-3339 *call and say 'Hazardous Materials'

ATTACHMENT F

Accident / Incident Report Form

LANGAN

ATTACHMENT F

INCIDENT REPORT

LANGAN EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Submit a Separate Report for Each Employee and/or Incident)

Date: _____

Employee's Name:_____ Employee No:_____

Sex: M _____ F _____ Age: _____

Region: _____ Location:_____

Project: _____ Project No: _____

Incident:_____

Type: Possible Exposure _____ Exposure _____ Physical Injury _____

Location: _____

Date of Incident: _____ Time of Incident: _____

Date of Report Incident: _____

Person(s) to Whom Incident was Reported: _____

Weather Conditions During Incident: Temperature _____ Humidity _____

Wind Speed and Direction: _____ Cloud Cover: _____

Clear: _____ Precipitation: _____

Materials Potentially Encountered: _____

Chemical (give name of description - liquid, solid, gas, vapor, fume, mist):

_____

_____

Radiological:_____

Other: _____

Nature of the Exposure/Injury: (State the nature of the exposure/injury in detail and list the parts of the body affected. Attach extra sheets if necessary).

_____

_____

_____

_____

_____

Did you receive medical care? Yes _____ No _____ If so, when _____

Where? On-Site _____ Off-Site _____

By Whom: Name of Paramedic: _____

Name of Physician: _____

Other: _____

If Off-Site, name facility (hospital, clinic, etc):_____

_____

Length of stay at the facility?_____

Was the Site Safety Officer contacted? Yes _____ No _____ When?_____

Was the Corporate Health and Safety Officer contacted? Yes _____ No _____

If so, who was the contact?_____

Did the exposure/injury result in permanent disability? Yes _____ No _____

If so, explain:_____

_____

_____

_____

Has the employee returned to work? Yes _____ No _____

List the names of other persons affected during this incident:

_____

_____

_____

_____

_____

List the names of persons who witnessed the exposure/injury incident:

_____

_____

_____

_____

_____

_____

_____

Possible cause of the exposure/injury incident: _____

_____

_____

_____

_____

_____

What was the name and title of the field team leader or immediate supervisor at the site of the incident?

_____

Was the operation being conducted under an established Health and Safety Plan?

Yes _____ No _____ If yes, attach a copy. If no, explain

_____

_____

_____

_____

_____

_____

Describe protective equipment and clothing used by the employee:

_____

_____

_____

_____

_____

_____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure? If so, explain:

_____

_____

_____

What was the employee doing when the exposure/injury occurred? (Describe briefly as Site Reconnaissance, Site Characterization, or Sampling, etc.):

_____

_____

_____

_____

Where exactly on site or off site did the exposure/injury occur?

_____

_____

_____

_____

_____

How did the exposure/injury occur? (Describe fully what factors led up to and/or contributed to the incident):

_____

_____

_____

_____

_____

Name of person(s) initiating report, job title, phone number:

_____

_____

_____

_____ _____

Employee Signature Date

_____ _____

Site Safety Officer Signature or Field Team Leader Signature Date

ATTACHMENT G

Jobsite Safety Inspection Checklist

LANGAN

LANGAN

JOBSITE SAFETY INSPECTION CHECKLIST

Client: _____ Inspection Date: _____

Site: _____ Inspector: _____

Employees: _____

Notes:_____
_____
_____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remarks
GENERAL				
Appropriate PPE being worn by Langan employees and subcontractors?				
Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
Air monitoring readings recorded on the air monitoring data sheet/field log book?				
Incident reporting procedures known?				
Site security an issue?				
Vehicle /pedestrian traffic issue?				
Adequate size/type fire extinguisher supplied?				
Evidence that drilling operator is responsible for the safety of his rig.				
First Aid kit available?				
PERSONAL PROTECTIVE EQUIPMENT				
Eye Protection?				
Head protection?				
Safety Shoes?				
Safety vests?				
Hand protection?				
Other?				
Deficiencies??				
HOUSEKEEPING				
Work area kept clean/tidy to minimize potential hazards?				
Waste being disposed of quickly and properly				
Adequate lighting for job?				
Portable water available?				
HAND TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are proper tools being used?				
Are tools safety stored when not in use?				
Have tools been inspected prior to use?				
Are employees familiar with using tools?				
Is additional PPE required for tools? Available?				
POWER TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are tools properly grounded?				
Safety guards in place and used correctly?				
Competent instruction / supervision?				
Cords include in inspection?				

HAZWOPER				
Employees have current 40-hr./8-hr./Supervisor HAZWOPER training?				
Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
Respiratory protection readily available?				
Subcontract workers have current 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
Subcontract workers have respirators readily available?				
HEALTH & SAFETY PLAN				
HASP available on site for inspection?				
Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and subcontractors?				
Hospital route map with directions posted on site?				
Emergency Notification List posted on site?				
Personnel trained in CPR/First Aid on site?				
MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
Project site safe practices ("Standing Orders") posted?				
Health & Safety Incident Report forms available?				
Decontamination procedures being followed as outlined in HASP?				
UNDERGROUND UTILITY				
Mark outs of underground utilities done prior to initiating any subsurface activities?				
Underground utilities located and authorities contacted before digging?				
Visually observed mark-outs?				
Is subsurface work within three feet of underground utilities?				
- Is so, is or was soft dig techniques used?				
Drilling performed in areas free from underground utilities?				
EXCAVATION / TRENCH				
Are excavations/trenches over 5 feet deep sloped, shored or a trench box used?				
Operations supervised by a Competent Person?				
Is Competent Person preforming daily inspections of excavation/trench?				
Adequate barricades in place?				
Have underground utilities been identified?				
Ladders / means of egress in trench with 25-foot of every worker?				
Has PE designed or approved protective system?				
Excavated material and other objects placed more than 2 feet away from excavation edge?				
Public protected from exposure to open excavation?				
CONFINED / PERMIT-ENTRY CONFINED SPACE				
People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
Confined space entry permit is completed and posted?				
All persons knowledgeable about the conditions and characteristics of the confined space?				
All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
Attendant and/or supervisor certified in basic first aid and CPR?				
Confined space atmosphere checked before entry and continuously while the work is going on?				
Results of confined space atmosphere testing recorded?				
Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
ELECTRICAL SAFETY				
Equipment at least 10 feet from overhead power lines?				
Is equipment grounded?				
GFCI used and tested where required?				
Are extension cords rated for this work being used and are they properly maintained?				
Electrical dangers posted at site?				

FLAMMABLE LIQUIDS				
Are flammable liquids used at site?				
Are flammable liquids stored in appropriate containers?				
Are flammable liquids kept away from combustion sources?				
Do flammable liquid containers have warning labels?				
LADDERS				
Are ladders used at site?				
Were ladders inspected prior to use?				
Are ladders in good working condition?				
Are ladders secured to prevent slipping, sliding or falling?				
Do side rails extend three feet above top of landing area?				
Are top two steps of stepladders being used?				
Is extension on ladder facing out?				
Are ladders sufficient for task?				
Are ladders sufficient for task?				

Unsafe acts observed? _____

Additional remarks _____

Notes:_____

Distribution: Project Manager - Name: _____
Health & Safety Officer - Name: _____
Health & Safety Manager- Name: Anthony Moffa, CHMM

ATTACHMENT H

Safety Data Sheets
(SDS)

LANGAN

Safety Data Sheet

1,1-Dichloro-2,2-bis(4-chlorophenyl-d_4)ethylene

Section 1. Chemical product and company identifications

Product code: D-3005
Chemical formula: $C_{14}D_8Cl_4$
CAS: 93952-19-3
CAS (unlabelled): 72-55-9
Synonyms: 4,4'-DDE, 2,2-Bis(4-chlorophenyl)-1,1-dichloroethylene

Supplier / Manufacturer:

C/D/N Isotopes Inc.
88 Leacock Street
Pointe-Claire (Québec) H9R 1H1
Phone: 514-697-6254
Toll-Free (Canada & USA): 1-800-565-4696
Fax: 514-697-6148
Website: www.cdnisotopes.com

In case of emergency:

TOXYSCAN HOTLINE: 1-855-780-0599

Section 2. Hazards identifications

Physical state: Solid
Warning: Harmful if swallowed. Suspected of causing cancer.
Routes of entry: Inhalation, skin and eyes

GHS (Globally Harmonized System of Classification and Labelling of Chemicals):

GHS Classification:
- Acute toxicity, Oral (Category 4)
- Carcinogenicity (Category 2)

GHS Label elements:
- Pictograms: 
- Signal word: Warning

Hazards statement:
- H302 Harmful if swallowed.
- H351 Suspected of causing cancer.

Precautionary statement: - P281 Use personal protective equipment as required.

Section 3. Composition and information on ingredients

Name	CAS	Concentration %
1,1-Dichloro-2,2-bis(4-chlorophenyl-d_4)ethylene	93952-19-3	> 98

Section 4. First aid measures

Eye contact: Flush eyes with water as a precaution.
Skin contact: Wash off with soap and plenty of water. Consult a physician.
Inhalation: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
Ingestion: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
General advice: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

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Section 5. Firefighting measures

Flammability of the product: Not flammable or combustible.
Lower explosion limit: No data available.
Upper explosion limit: No data available.
Auto-ignition temperature: No data available.
Flash point: No data available.
Products of combustion: Hazardous decomposition products formed under fire conditions: Carbon oxides, hydrogen chloride gas.
Firefighting media and instructions: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special protective equipment for firefighters: Wear self-contained breathing apparatus for firefighting if necessary.

Section 6. Accidental release measures

Personal precautions: Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
Methods for cleaning up: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

Section 7. Handling and storage

Handling: Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.
Storage: Store at room temperature. Adequate ventilation. Protect from light.

Section 8. Exposure Controls, Personal Protections

Engineering controls: Use mechanical exhaust or laboratory fumehood to avoid exposure.
Eyes: Safety glasses with side-shields conforming to NIOSH (US).
Respiratory: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US).
Hands: Handle with gloves. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
Skin/body: Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Section 9. Physical and chemical properties (unlabelled)

Molecular weight: 318.03 g/mol
Physical status: Solid
Color: White-pale yellow
Odour: No data available
Density: No data available
Melting point: 88 - 90 °C (190 - 194 °F)
Boiling point: 336 °C (637 °F)
Vapour pressure: < 0.00001 hPa (< 0.00001 mmHg)
Vapour density: No data available
Partition coefficient (octanol/water): log Pow: 6.51
Water solubility: 0.04 mg/L

Section 10. Stability and reactivity

Stability and reactivity: Stable under recommended storage conditions.
Incompatibility: Strong oxidizing agents, strong bases.
Products of combustion: Hazardous decomposition products formed under fire conditions: Carbon oxides, hydrogen chloride gas.
Reactivity conditions: No data available.

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Section 11. Toxicological information (unlabelled)

Toxicological data: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene

Information on ingredients:

Name	CAS	LD_{50}	LC_{50}
1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene	72-55-9	Oral - rat - 880 mg/kg	No data available

Potential acute effects

- **Eyes:** May cause eye irritation.
- **Skin:** Harmful if absorbed through skin. May cause skin irritation.
- **Inhalation:** May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion:** Harmful if swallowed.

Potential chronic effects

- **Carcinogenic effects:** This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification. Limited evidence of carcinogenicity in animal studies. IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- **Mutagenic effects:** No data available.
- **Teratogenic effects:** No data available.
- **Medical conditions aggravated by overexposure:** No data available.

Section 12. Ecological information

Ecological data:

Name	Results	Species	Period
1,1-Dichloro-2,2-bis	0.2 - 0.3 mg/l LC50	Lepomis macrochirus	96 h
(4-chlorophenyl)ethylene	0.03 - 0.04 mg/l LC50	Oncorhynchus mykiss	96 h
	0.05 - 0.18 mg/l LC50	Salmo salar	96 h

Effects on environment: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Mobility: No data available.
Environmental precautions: No data available.
Persistence and degradability: No data available.
Bioaccumulative potential: Gambusia affinis (Mosquito fish) - 33 d. Bioconcentration factor (BCF): 12,037.

Section 13. Disposal considerations

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

Section 14. Transportation information

Classification DOT/IMDG/IATA label:

Shipping name: Not dangerous goods
UN number: None
Class: None
Packaging group: None

Additional information: None

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Section 15. Regulatory information

UNITED STATES:
NFPA classification



Health: 1
Flammable: 0
Reactivity: 0
Specials conditions: None

Legend: 4: Severe, 3: High, 2: Moderate, 1: Slightly, 0: Not hazardous

U.S. Federal regulations:

TSCA 8(b) inventory: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene
SARA 302/304/311/312 extremely hazardous substances: Not Listed
SARA 302/304 emergency planning and notification: Not Listed
SARA 302/304/311/312 hazardous chemicals: Not Listed
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard: Not Listed
CWA (Clean Water Act) 307: Not Listed
CWA (Clean Water Act) 311: Not Listed
CAA (Clean Air Act) 112 accidental release prevention: Not Listed
CAA (Clean Air Act) 112 regulated flammable substances: Not Listed
CAA (Clean Air Act) 112 regulated toxic substances: Not Listed

State regulations:

DEA List I Chemicals (Precursor Chemicals): Not Listed
DEA List II Chemicals (Essential Chemicals): Not Listed
Substances in Massachusetts: Not Listed
Dangerous substances in New Jersey: Not Listed
New York – Dangerous substances with acute effects: Not Listed
Dangerous substances in Pennsylvania – right to know: Not Listed

WHMIS (Canada):



Not WHMIS controlled.

Section 16. Additional information

References:

- ANSI Z400.1, MSDS Standard, 2001.
- Manufacturer's Material Safety Data Sheet.
- 29CFR Part1910.1200 OSHA MSDS Requirements.
- 49CFR Table List of Hazardous Materials, UN#, Proper Shipping Names, PG. -Canada
- Gazette Part II, Vol. 122, No. 2 Registration SOR/88-64 31 December, 1987 Hazardous Products Act "Ingredient Disclosure List".
- Federal act on the controlled products
- Canadian Transport of Dangerous Goods, Regulations and Schedules, Clear Language version 2002.
- Toxicological repertory, HSC.
- Material safety data sheet from the components.

Date of issue: **February 20th, 2017**
Version: 1
Elaborated by: **Toxyscan Inc., 1-866-780-0599**
Notice to reader: To the best of our knowledge, the information contained herein is accurate. However, C/D/N Isotopes Inc., Toxyscan Inc., or any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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Safety Data Sheet

Revision Date: 12/23/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**32203 / 4,4'-DDT Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	8
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1
Flammable Liquid Category 2
Acute Toxicity - Inhalation Dust / Mist Category 3
Acute Toxicity - Dermal Category 3
Acute Toxicity - Oral Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
Toxic if swallowed, in contact with skin or if inhaled.
Causes damage to organs.

GHS Precautions:

Safety Precautions:
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF SWALLOWED: Immediately call a POISON CENTER/doctor/....
IF ON SKIN: Wash with plenty of soap and water.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF exposed: Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician if you feel unwell.
Specific treatment see section 4.
Rinse mouth.
Take off immediately all contaminated clothing and wash it before reuse.
In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.900000
4,4'-DDT	50-29-3	200-024-3	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA
4,4'-DDT	50-29-3	500 mg/m3 IDLH		1 mg/m3 TWA	1 mg/m3 TWA (listed under Dichlorodiphenyltrichloroethane)

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available.
Odor:	Mild
Physical State:	No data available.
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	1.1 (air = 1)
Boiling Point:	No data available.
Melting Point:	-98 °C
Flash Point:	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
Autoignition Temperature:	464 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	No data available.
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	99.9
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation, Skin, GI Tract, Respiratory Tract
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.
Skin Contact:	Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Eye Contact:	Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.
Ingestion Toxicity:	Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	Contains a known human reproductive and/or developmental hazard.
Inhalation:	Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)
Skin Contact:	Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Ingestion:	Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Inhalation LC50 Rat 22500 ppm 8 h
DDT	50-29-3	Dermal LD50 Rabbit 300 - 2820 mg/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
DDT	50-29-3	Present

ACGIH:

Chemical Name	CAS No.	
DDT	50-29-3	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
DDT	50-29-3	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
DDT	50-29-3	Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview:	Moderate ecological hazard. This product may be dangerous

to plants and/or wildlife.

Mobility: No data
Persistence: No data
Bioaccumulation: No data
Degradability: Biodegrades slowly.
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3(6.1)
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X
4,4'-DDT	50-29-3	X	-	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
DDT	50-29-3	Prop 65 Cancer
Methanol	67-56-1	Prop 65 Devolop Tox
p,p''-DDT	50-29-3	Prop 65 Devolop Tox
p,p''-DDT	50-29-3	Prop 65 Rep Female
p,p''-DDT	50-29-3	Prop 65 Rep Male

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
4,4'-DDT	50-29-3	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 09/30/14
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose

prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Version 4.7
Revision Date 05/23/2016
Print Date 06/23/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657
Brand : Aldrich
Index-No. : 033-001-00-X

CAS-No. : 7440-38-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H331 Toxic if inhaled.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.

P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Hazardous components

Component	Classification	Concentration
Arsenic		
	Acute Tox. 4; Acute Tox. 3; Aquatic Acute 1; Aquatic Chronic 1; H302, H331, H410	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

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

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

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

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

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

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen		
		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Arsenic	7440-38-2	inorganic arsenic plus methylated metabolites	35µg As/l	In urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of the workweek (After four or five consecutive working days			

		with exposure)			
		inorganic arsenic plus methylated metabolites	35µg As/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of the workweek (After four or five consecutive working days with exposure)			

8.2 Exposure controls

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

Personal protective equipment

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

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

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

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

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

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

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Pieces Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available

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

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

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

10.5 Incompatible materials
Oxidizing agents, Halogens, Palladium undergoes a violent reaction with arsenic, Zinc, Platinum oxide, Nitrogen trichloride, Bromine azide

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Arsenic oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

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

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

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

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

IARC:	1 - Group 1: Carcinogenic to humans (Arsenic)
NTP:	Known to be human carcinogen (Arsenic)
	Known to be human carcinogen (Arsenic)
OSHA:	OSHA specifically regulated carcinogen (Arsenic)

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CG0525000

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9.9 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

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

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

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

Poison Inhalation Hazard: No

IMDG
UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant:yes

IATA
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

15. REGULATORY INFORMATION

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

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

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Arsenic	7440-38-2	2008-10-10

16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H302	Harmful if swallowed.
H331	Toxic if inhaled.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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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: 4.7 Revision Date: 05/23/2016 Print Date: 06/23/2016

SAFETY DATA SHEET

Version 5.6
Revision Date 06/02/2016
Print Date 07/20/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Benz[*a*]anthracene
Product Number	:	48563
Brand	:	Supelco
Index-No.	:	601-033-00-9
CAS-No.	:	56-55-3

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

Identified uses	:	Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

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

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word: Danger

Hazard statement(s)

H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.

P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

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

Hazardous components

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

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

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

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

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

6.3 Methods and materials for containment and cleaning up

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

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

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

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

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

Personal protective equipment

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

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

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

Splash contact
Material: Nitrile rubber

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

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 157 - 159 °C (315 - 318 °F)
f)	Initial boiling point and boiling range	437.6 °C (819.7 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available

t) Oxidizing properties No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - > 200 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

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

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)
NTP:	Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
NTP:	Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

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

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Marine pollutant:yes

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

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

15. REGULATORY INFORMATION

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

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

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

Pennsylvania Right To Know Components

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

New Jersey Right To Know Components

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

California Prop. 65 Components

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

16. OTHER INFORMATION

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

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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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: 5.6 Revision Date: 06/02/2016 Print Date: 07/20/2017

SAFETY DATA SHEET

Revision Date 22-May-2017 **Revision Number** 2

1. Identification

Product Name **Benzo[a]pyrene, 98%**

Cat No. : **AC105600010; AC105601000**

Synonyms Benzo[def]chrysene.; 3,4-Benzopyrene; 3,4-Benzpyrene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

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

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

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

Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 1A
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 1A

Label Elements

Signal Word
Danger

Hazard Statements
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
May damage fertility or the unborn child



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Avoid breathing dust/fume/gas/mist/vapors/spray
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Benzo[a]pyrene	50-32-8	> 96

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes.

Inhalation Move to fresh air.

Ingestion Do not induce vomiting.

Most important symptoms/effects May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point
Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up No information available.

7. Handling and storage

Handling Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Benzo[a]pyrene		TWA: 0.2 mg/m³		

Legend

OSHA - Occupational Safety and Health Administration

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Dark yellow
Odor	aromatic
Odor Threshold	No information available
pH	
Melting Point/Range	175 179 °C
Boiling Point/Range	°C @ 760 mmHg

Flash Point	
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Specific Gravity	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C20H12
Molecular Weight	252.31

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products No information available

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

Irritation No information available

Sensitization No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzo[a]pyrene	50-32-8	Group 1	Reasonably Anticipated	A2	X	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Benzo[a]pyrene	Group III Chemical	Not applicable	Not applicable

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

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

Component	log Pow
Benzo[a]pyrene	6.06

13. Disposal considerations

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

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Benzo[a]pyrene - 50-32-8	U022	-

14. Transport information

DOT

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

TDG

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

IATA

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

IMDG/IMO

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

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzo[a]pyrene	X	X	-	200-028-5	-		X	-	-	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Benzo[a]pyrene	50-32-8	> 96	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Benzo[a]pyrene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Benzo[a]pyrene	1 lb	-

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

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Benzo[a]pyrene	50-32-8	Carcinogen	0.06 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzo[a]pyrene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N

DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

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

Revision Date 22-May-2017
Print Date 22-May-2017
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

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

End of SDS

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Barium**

Cat No. : **AC317860000; AC317860250; AC317861000; AC317865000**

Synonyms None Known.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

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

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

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

Flammable solids	Category 2
Acute oral toxicity	Category 3
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Toxic if swallowed
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Wear protective gloves/protective clothing/eye protection/face protection
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Response
Call a POISON CENTER or doctor/physician if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store locked up
Store in a closed container
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
Barium	7440-39-3	99.9

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Contact with water liberates toxic gas. Water reactive. Combustible material. Produce flammable gases on contact with water.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	W

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Handle under inert gas, protect from moisture. Wear personal protective equipment.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Protect from moisture. Never allow product to get in contact with water during storage. Store under an inert atmosphere.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Barium	TWA: 0.5 mg/m^3	(Vacated) TWA: 0.5 mg/m^3	

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

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration

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

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Solid
Appearance	Grey
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	725 °C / 1337 °F
Boiling Point/Range	1640 °C / 2984 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	10 mmHg @ 1094 °C
Vapor Density	No information available
Relative Density	3.51 @ 20 °C
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	Ba
Molecular Weight	137.34

10. Stability and reactivity

Reactive Hazard Yes

Stability Moisture sensitive. Air sensitive.

Conditions to Avoid Exposure to air. Incompatible products. Exposure to moisture.

Incompatible Materials Acids, Water, Alcohols, Halogens

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information
Oral LD50 Category 3. ATE = 50 - 300 mg/kg.
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Barium	132 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Barium	7440-39-3	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available
Endocrine Disruptor Information No information available

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

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

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

14. Transport information

DOT

UN-No	UN1400
Proper Shipping Name	BARIUM
Hazard Class	4.3
Packing Group	II

TDG

UN-No	UN1400
Proper Shipping Name	BARIUM
Hazard Class	4.3
Packing Group	II

IATA

UN-No	UN1400
Proper Shipping Name	Barium
Hazard Class	4.3
Packing Group	II

IMDG/IMO

UN-No	UN1400
Proper Shipping Name	Barium
Hazard Class	4.3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Barium	X	X	-	231-149-1	-		X	-	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Barium	7440-39-3	99.9	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Barium	1000 lb	-

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

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Barium	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class
B4 Flammable solid
B6 Reactive flammable material
D2B Toxic materials
D1A Very toxic materials



16. Other information

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

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
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End of SDS

Safety Data Sheet

Revision Date: 12/08/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31272 / Benzo(b)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	9
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:





GHS Classification:	Flammable Liquid Category 2 Serious Eye Damage/Eye Irritation Category 2 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Causes serious eye irritation. May cause drowsiness or dizziness.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. If eye irritation persists: Get medical advice/attention. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.900000
benzo (b) fluoranthene	205-99-2	205-911-9	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from

incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	500 ppm STEL 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA 500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (b) fluoranthene	205-99-2	ND		No TLV	No data available.

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

Medical Conditions Aggravated By Exposure: Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color: Depends upon product selection
Odor: Strong
Physical State: No data available.
pH: No data available.
Vapor Pressure: No data available.
Vapor Density: 2.0 (air = 1)
Boiling Point: No data available.
Melting Point: -95.4 °C Melting Point
Flash Point: 39
Flammability: Highly Flammable
Upper Flammable/Explosive Limit, % in air: No data available.
Lower Flammable/Explosive Limit, % in air: No data available.
Autoignition Temperature: 465 deg C
Decomposition Temperature: No data available.
Specific Gravity: 0.7845 g/cm3 at 25 °C
Evaporation Rate: No data available.
Odor Threshold: ND
Solubility: Complete; 100%
Partition Coefficient: n-octanol in water: No data available.
VOC % by weight: 0
Molecular Weight: 58.08

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to Avoid: No data available.
Materials to Avoid / Chemical Incompatiability: Strong oxidizing agents Strong acids
Hazardous Decomposition Products: Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin
Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Can cause minor skin irritation, defatting, and dermatitis.
Eye Contact:	Can cause minor irritation, tearing and reddening.
Ingestion Irritation:	May be harmful if swallowed.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:
NIOSH:

Chemical Name	**CAS No.**	**LD50/LC50**
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Oral LD50 Rat 5800 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h

Component Carcinogenic Data:
OSHA:

Chemical Name	**CAS No.**	
Benzo(b)fluoranthene	205-99-2	Present

ACGIH:

Chemical Name	**CAS No.**	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen
Benzo[b]fluoranthene	205-99-2	A2 - Suspected Human Carcinogen

NIOSH:

Chemical Name	**CAS No.**
No data available.	

NTP:

Chemical Name	**CAS No.**
No data available.	

IARC:

Chemical Name	**CAS No.**	**Group No.**
No data.		Group 1
No data.		Group 2A
Benzo(b)fluoranthene	205-99-2	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	This material is not expected to be harmful to the ecology.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	No data
Ecological Toxicity Data:	No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product:	Spent or discarded material is a hazardous waste.
Disposal Methods:	Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging:	Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Acetone

UN Number: UN1090
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (b) fluoranthene	205-99-2	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[b]fluoranthene	205-99-2	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (b) fluoranthene	205-99-2	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 03/23/15
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

1 Identification

Product identifier

Product name: Benzene

Stock number: L14012
CAS Number:
71-43-2
EC number:
200-753-7
Index number:
601-020-00-8
Relevant identified uses of the substance or mixture and uses advised against.
Identified use: SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com
Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

2 Hazard(s) identification

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)



GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.



GHS08 Health hazard

Muta. 1B H340 May cause genetic defects.
Carc. 1A H350 May cause cancer.
STOT RE 1 H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.



GHS07

Skin Irrit. 2 H315 Causes skin irritation.
Eye Irrit. 2 H319 Causes serious eye irritation.
Hazards not otherwise classified No information known.

Label elements
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms



GHS02 GHS07 GHS08

Signal word Danger
Hazard statements
H225 Highly flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
H304 May be fatal if swallowed and enters airways.
Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor/…
P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
WHMIS classification
B2 - Flammable liquid
D2A - Very toxic material causing other toxic effects



Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)



Health (acute effects) = 2
Flammability = 3
Physical Hazard = 1

(Contd. on page 2)

Product name: Benzene

(Contd. of page 1)

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients

Chemical characterization: Substances
CAS# Description:
71-43-2 Benzene
Identification number(s):
EC number: 200-753-7
Index number: 601-020-00-8

4 First-aid measures

Description of first aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing Seek medical treatment.
Information for doctor
Most important symptoms and effects, both acute and delayed No further relevant information available.
Indication of any immediate medical attention and special treatment needed No further relevant information available.

5 Fire-fighting measures

Extinguishing media
Suitable extinguishing agents Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Carbon monoxide and carbon dioxide
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Keep away from ignition sources
Environmental precautions: Do not allow product to reach sewage system or any water course.
Methods and material for containment and cleaning up:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Prevention of secondary hazards: Keep away from ignition sources.
Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.
Information about protection against explosions and fires:
Protect against electrostatic charges.
Fumes can combine with air to form an explosive mixture.
Keep ignition sources away.

Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles: Store in a cool location.
Information about storage in one common storage facility:
Do not store together with acids.
Store away from strong bases.
Store away from oxidizing agents.
Store away from halogens.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.
Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

(Contd. on page 3)

Product name: Benzene

(Contd. of page 2)

Control parameters

Components with limit values that require monitoring at the workplace:

71-43-2 Benzene (100.0%)

PEL (USA)	Short-term value: 15* mg/m³, 5* ppm Long-term value: 3* mg/m³, 1* ppm *table Z-2 for exclusions in 29CFR1910.1028(d)
REL (USA)	Short-term value: 1 ppm Long-term value: 0.1 ppm See Pocket Guide App. A
TLV (USA)	Short-term value: 8 mg/m³, 2.5 ppm Long-term value: 1.6 mg/m³, 0.5 ppm Skin; BEI
EL (Canada)	Short-term value: 2.5 ppm Long-term value: 0.5 ppm Skin; ACGIH A1; IARC 1
EV (Canada)	Short-term value: 2.5 ppm Long-term value: 0.5 ppm Skin

Ingredients with biological limit values:

71-43-2 Benzene (100.0%)

BEI (USA)	25 µg/g creatinine Medium: urine Time: end of shift Parameter Parameter: S-Phenylmercapturic acid (background 500 µg/g creatinine Medium: urine Time: end of shift Parameter: t,t-Muconic acid (background)

Additional information: No data

Exposure controls
Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
Maintain an ergonomically appropriate working environment.
Breathing equipment: Use suitable respirator when high concentrations are present.
Recommended filter device for short term use:
Use a respirator with organic vapor/acid gas cartridges as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).
Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.
Material of gloves Fluorocarbon rubber (Viton)
Penetration time of glove material (in minutes) Not determined
Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties
General Information
Appearance:

Form:	Liquid
Color:	Colorless
Odor:	Aromatic
Odor threshold:	Not determined.
pH-value:	Not determined.
Change in condition	
Melting point/Melting range:	5 °C (41 °F)
Boiling point/Boiling range:	80 °C (176 °F)
Sublimation temperature / start:	Not determined
Flash point:	-11 °C (12 °F)
Flammability (solid, gaseous)	Not determined.
Ignition temperature:	555 °C (1031 °F)
Decomposition temperature:	Not determined
Auto igniting:	Not determined.
Danger of explosion:	Product is not explosive. However, formation of explosive air/vapor mixtures is possible.
Explosion limits:	
Lower:	1.2 Vol %
Upper:	8 Vol %
Vapor pressure at 20 °C (68 °F):	101 hPa (76 mm Hg)
Density at 20 °C (68 °F):	0.874 g/cm³ (7.294 lbs/gal)
Relative density	Not determined.
Vapor density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water at 25 °C (77 °F):	1.8 g/l
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
dynamic at 20 °C (68 °F):	0.66 mPas
kinematic:	Not determined.

(Contd. on page 4)

Product name: Benzene

(Contd. of page 3)

Other information No further relevant information available.

10 Stability and reactivity

Reactivity No information known.
Chemical stability Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions Reacts with strong oxidizing agents
Conditions to avoid No further relevant information available.
Incompatible materials:
Acids
Oxidizing agents
Bases
Halogens
Hazardous decomposition products: Carbon monoxide and carbon dioxide

11 Toxicological information

Information on toxicological effects
Acute toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.

LD/LC50 values that are relevant for classification:

Oral	LD50	930 mg/kg (rat)
Dermal	LD50	>9400 µL/kg (rabbit)
Inhalative	LC50/7H	10000 ppm/7H (rat)

Skin irritation or corrosion: Causes skin irritation.
Eye irritation or corrosion: Causes serious eye irritation.
Sensitization: No sensitizing effects known.
Germ cell mutagenicity:
May cause genetic defects.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.
Carcinogenicity:
May cause cancer.
EPA-A: human carcinogen: sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.
IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity.
ACGIH A1: Confirmed human carcinogen: Agent is carcinogenic to humans based on epidemiologic studies of, or convincing clinical evidence in, exposed humans.
EPA-K: Known human carcinogens.
Carcinogen as defined by OSHA.
NTP-K: Known to be carcinogenic: sufficient evidence from human studies.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.
Reproductive toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for this substance.
Specific target organ system toxicity - repeated exposure:
Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
Specific target organ system toxicity - single exposure: No effects known.
Aspiration hazard: May be fatal if swallowed and enters airways.
Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information: To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

12 Ecological information

Toxicity
Aquatic toxicity: No further relevant information available.
Persistence and degradability No further relevant information available.
Bioaccumulative potential No further relevant information available.
Mobility in soil No further relevant information available.
Additional ecological information:
General notes:
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Avoid transfer into the environment.
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects No further relevant information available.

13 Disposal considerations

Waste treatment methods
Recommendation Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

UN-Number	
DOT, IMDG, IATA	UN1114
UN proper shipping name	
DOT	RQ Benzene
IMDG, IATA	BENZENE
Transport hazard class(es)	
DOT	



Class	3 Flammable liquids.
Label	3
Class	3 (F1) Flammable liquids

(Contd. on page 5)

Product name: Benzene

(Contd. of page 4)

Label **IMDG, IATA**	3
	
Class **Label**	3 Flammable liquids. 3
Packing group **DOT, IMDG, IATA**	II
Environmental hazards:	Not applicable.
Special precautions for user **EMS Number:**	Warning: Flammable liquids F-E,S-D
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.
Transport/Additional information:	
DOT **Hazardous substance:** **Marine Pollutant (DOT):**	 10 lbs, 4.54 kg No
UN "Model Regulation":	UN1114, Benzene, 3, II

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms



GHS02 GHS07 GHS08

Signal word Danger
Hazard statements
H225 Highly flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
H304 May be fatal if swallowed and enters airways.
Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor/…
P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)
71-43-2 | Benzene

California Proposition 65

Prop 65 - Chemicals known to cause cancer
71-43-2 | Benzene

Prop 65 - Developmental toxicity
71-43-2 | Benzene

Prop 65 - Developmental toxicity, female Substance is not listed.

Prop 65 - Developmental toxicity, male
71-43-2 | Benzene

Information about limitation of use:
Workers are not allowed to be exposed to this hazardous material. Exceptions can be made by the authorities in certain cases.
For use only by technically qualified individuals.
Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006. Substance is not listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use) Substance is not listed.
Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department
Date of preparation / last revision 11/23/2015 / -
Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
vPvB: very Persistent and very Bioaccumulative

(Contd. on page 6)

Product name: Benzene

(Contd. of page 5)

ACGIH: American Conference of Governmental Industrial Hygienists (USA)
OSHA: Occupational Safety and Health Administration (USA)
NTP: National Toxicology Program (USA)
IARC: International Agency for Research on Cancer
EPA: Environmental Protection Agency (USA)

SAFETY DATA SHEET

Version 4.6
Revision Date 12/29/2015
Print Date 05/01/2016

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 # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 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 or doctor/ physician. 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 or doctor/ physician.
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	<= 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
Beryllium 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.

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): 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
Berylium foil	7440-41-7	TWA	2.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	25.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		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	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		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		

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
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 to be human carcinogen (Berylium foil)
	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 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: 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

New Jersey Right To Know Components

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

California Prop. 65 Components

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

Safety Data Sheet

Revision Date: 12/30/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31274 / Benzo(k)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:





GHS Classification:	Flammable Liquid Category 2 Serious Eye Damage/Eye Irritation Category 2 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Causes serious eye irritation. May cause drowsiness or dizziness.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. If eye irritation persists: Get medical advice/attention. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.900000
benzo (k) fluoranthene	207-08-9	205-916-6	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from

incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	500 ppm STEL 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA 500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (k) fluoranthene	207-08-9	ND		No TLV	No data available.

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

Medical Conditions Aggravated By Exposure: Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color: Depends upon product selection
Odor: Strong
Physical State: No data available.
pH: No data available.
Vapor Pressure: No data available.
Vapor Density: 2.0 (air = 1)
Boiling Point: No data available.
Melting Point: -95.4 °C Melting Point
Flash Point: 39
Flammability: Highly Flammable
Upper Flammable/Explosive Limit, % in air: No data available.
Lower Flammable/Explosive Limit, % in air: No data available.
Autoignition Temperature: 465 deg C
Decomposition Temperature: No data available.
Specific Gravity: 0.7845 g/cm3 at 25 °C
Evaporation Rate: No data available.
Odor Threshold: ND
Solubility: Complete; 100%
Partition Coefficient: n-octanol in water: No data available.
VOC % by weight: 0
Molecular Weight: 58.08

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to Avoid: No data available.
Materials to Avoid / Chemical Incompatiability: Strong oxidizing agents Strong acids
Hazardous Decomposition Products: Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin
Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Can cause minor skin irritation, defatting, and dermatitis.
Eye Contact:	Can cause minor irritation, tearing and reddening.
Ingestion Irritation:	May be harmful if swallowed.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:
NIOSH:

Chemical Name	**CAS No.**	**LD50/LC50**
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Oral LD50 Rat 5800 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h

Component Carcinogenic Data:
OSHA:

Chemical Name	**CAS No.**	
Benzo(k)fluoranthene	207-08-9	Present

ACGIH:

Chemical Name	**CAS No.**	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen

NIOSH:

Chemical Name	**CAS No.**
No data available.	

NTP:

Chemical Name	**CAS No.**
No data available.	

IARC:

Chemical Name	**CAS No.**	**Group No.**
No data.		Group 1
No data.		Group 2A
Benzo(k)fluoranthene	207-08-9	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	This material is not expected to be harmful to the ecology.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	No data
Ecological Toxicity Data:	No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product:	Spent or discarded material is a hazardous waste.
Disposal Methods:	Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging:	Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:	
DOT Proper Shipping Name:	Acetone
UN Number:	UN1090

Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (k) fluoranthene	207-08-9	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[k]fluoranthene	207-08-9	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (k) fluoranthene	207-08-9	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 05/15/15
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Creation Date 14-May-2010 **Revision Date** 23-Dec-2014 **Revision Number** 1

1. Identification

Product Name **Carbazole**

Cat No. : **AC108260000; AC108260010; AC108260050; AC108260250; AC108262500; AC108265000**

Synonyms 9-Azafluorene; Dibenzopyrrole; Diphenylenimine

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

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

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

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

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation
May cause cancer



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
9H-Carbazole	86-74-8	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. Obtain medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point 220 °C / 428 °F
Method - No information available

Autoignition Temperature 540 °C / 1004 °F
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products
Nitrogen oxides (NOx) 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	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
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 Sweep up or vacuum up spillage and collect in suitable container for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not ingest. Use only in area provided with appropriate exhaust ventilation.

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

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

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

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Solid
Appearance	Beige
Odor	pungent
Odor Threshold	No information available
pH	No information available
Melting Point/Range	240 - 246 °C / 464 - 474.8 °F
Boiling Point/Range	355 °C / 671 °F @ 760 mmHg
Flash Point	220 °C / 428 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	400 mmHg @ 323 °C
Vapor Density	Not applicable
Relative Density	1.1
Solubility	insoluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	540 °C / 1004 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C12 H9 N
Molecular Weight	167.21

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents, Strong bases

Hazardous Decomposition Products Nitrogen oxides (NOx), 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
9H-Carbazole	>5000 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

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

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen. Limited evidence of a carcinogenic effect.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
9H-Carbazole	86-74-8	Group 2B	Not listed	Not listed	X	Not listed

Mutagenic Effects Not mutagenic in AMES Test

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

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
9H-Carbazole	6.7 mg/L EC50 = 60 h	1 mg/L LC50 48 h	EC50 = 10.6 mg/L 15 min EC50 = 11.6 mg/L 30 min EC50 = 13.6 mg/L 5 min	Not listed

Persistence and Degradability Insoluble in water Persistence is unlikely
Bioaccumulation/ Accumulation No information available.

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

Component	log Pow
9H-Carbazole	3.84

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 substance, solid, n.o.s.
Proper technical name 9H-Carbazole
Hazard Class 9
Packing Group III

TDG

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

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

IMDG/IMO
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
9H-Carbazole	X	X	-	201-696-0	-		X	X	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization
Acute Health Hazard Yes
Chronic Health Hazard Yes
Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category

9H-Carbazole	86-74-8	Carcinogen	4.1 µg/day	Carcinogen

State Right-to-Know Not applicable

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 D2A Very toxic materials



16. Other information

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

Creation Date 14-May-2010
Revision Date 23-Dec-2014
Print Date 23-Dec-2014
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

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

End of SDS

SAFETY DATA SHEET

Version 5.4
Revision Date 04/21/2015
Print Date 05/13/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Chlordane - Sandy Loam 2

Product Number : CRM825
Brand : Sigma-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 # : (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 1A), H350
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), H373
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)

H350	May cause cancer.
H373	May cause damage to organs through prolonged or repeated exposure if inhaled.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.

P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Hazardous components

Component		Classification	Concentration
Quartz			
CAS-No. EC-No.	14808-60-7 238-878-4	Carc. 2; STOT RE 2; H351, H373	>= 90 - <= 100 %
Chlordane			
CAS-No. EC-No. Index-No.	57-74-9 200-349-0 602-047-00-8	Acute Tox. 3; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H301 + H311, H351, H410	< 0.1 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
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
silicon oxides

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

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

6.3 Methods and materials for containment and cleaning up

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

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

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

Store at Room Temperature.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Quartz	14808-60-7	TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Suspected human carcinogen		
		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Lung cancer Pulmonary fibrosis Suspected human carcinogen		

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
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
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. 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	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
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:	1 - Group 1: Carcinogenic to humans (Quartz)
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:	Known to be human carcinogen (Quartz)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

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

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence
Nerves. - (Chlordane)

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.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

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

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

CAS-No. Revision Date

Quartz	14808-60-7	1994-04-01
Chlordane	57-74-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Quartz	14808-60-7	1994-04-01
Chlordane	57-74-9	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Quartz	14808-60-7	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
Chlordane	57-74-9	2007-09-28
Quartz	14808-60-7	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
H301 + H311	Toxic if swallowed or in contact with skin
H350	May cause cancer.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H412	Harmful to aquatic life with long lasting effects.
STOT RE	Specific target organ toxicity - repeated exposure

HMIS Rating

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

NFPA Rating

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

Further information

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Preparation Information

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

Version: 5.4 Revision Date: 04/21/2015 Print Date: 05/13/2016

SAFETY DATA SHEET

Methyl Chloride (R40)

Section 1. Identification

GHS product identifier : Methyl Chloride (R40)

Chemical name : chloromethane

Other means of identification : methyl chloride; Methane, chloro-; Methane, chloro- (methyl chloride)

Product use : Synthetic/Analytical chemistry.

Synonym : methyl chloride; Methane, chloro-; Methane, chloro- (methyl chloride)

SDS # : 001036

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas
ACUTE TOXICITY (inhalation) - Category 4
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (central nervous system (CNS)) - Category 2

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.
Harmful if inhaled.
Suspected of causing cancer.
May cause damage to organs through prolonged or repeated exposure. (central nervous system (CNS))

Precautionary statements

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Section 2. Hazards identification

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Never Put cylinders into unventilated areas of passenger vehicles. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use only outdoors or in a well-ventilated area. Do not breathe gas. Use and store only outdoors or in a well ventilated place.

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Store locked up. Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : Liquid can cause burns similar to frostbite.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : chloromethane

Other means of identification : methyl chloride; Methane, chloro-; Methane, chloro- (methyl chloride)

CAS number/other identifiers

CAS number : 74-87-3

Product code : 001036

Ingredient name	%	CAS number
chloromethane	100	74-87-3

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

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Section 4. First aid measures

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Harmful if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

Ingestion : Adverse symptoms may include the following:
frostbite

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

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

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Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
carbonyl halides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

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Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
chloromethane	**ACGIH TLV (United States, 3/2012).** **Absorbed through skin.** TWA: 50 ppm 8 hours. TWA: 103 mg/m³ 8 hours. STEL: 100 ppm 15 minutes. STEL: 207 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 50 ppm 8 hours. TWA: 105 mg/m³ 8 hours. STEL: 100 ppm 15 minutes. STEL: 210 mg/m³ 15 minutes. **OSHA PEL Z2 (United States, 11/2006).** TWA: 100 ppm 8 hours. CEIL: 200 ppm AMP: 300 ppm 5 minutes.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

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Section 8. Exposure controls/personal protection

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied compressed gas.]

Color : Colorless.

Molecular weight : 50.49 g/mole

Molecular formula : C-H3-Cl

Boiling/condensation point : -23.7°C (-10.7°F)

Melting/freezing point : -97°C (-142.6°F)

Critical temperature : 143.65°C (290.6°F)

Odor : Mild. Sweetish.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: 10°C (50°F)

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Section 9. Physical and chemical properties

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 8.1%
Upper: 17.4%

Vapor pressure : 58.7 (psig)

Vapor density : 1.8 (Air = 1)

Specific Volume (ft^3/lb) : 1.0977

Gas Density (lb/ft^3) : 0.911 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 5.32 g/l

Partition coefficient: n-octanol/water : 0.91

Auto-ignition temperature : 632°C (1169.6°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow gas to accumulate in low or confined areas.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

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Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
chloromethane	LC50 Inhalation Gas.	Rat	8300 ppm	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
chloromethane	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
chloromethane	Category 2	Not determined	central nervous system (CNS)

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Harmful if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
frostbite

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Section 11. Toxicological information

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

Ingestion : Adverse symptoms may include the following:
frostbite

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
chloromethane	Acute LC50 270000 µg/l Marine water	Fish - Menidia beryllina	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
chloromethane	0.91	-	low

Mobility in soil

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Section 12. Ecological information

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Methyl chloride (I,T); Methane, chloro- (I, T)	74-87-3	Listed	U045

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1063	UN1063	UN1063	UN1063	UN1063
UN proper shipping name	METHYL CHLORIDE, OR REFRIGERANT GAS R 40	METHYL CHLORIDE; OR REFRIGERANT GAS R 40	METHYL CHLORIDE, OR REFRIGERANT GAS R 40	METHYL CHLORIDE (REFRIGERANT GAS R 40)	METHYL CHLORIDE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 100 lbs / 45.4 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 5 kg **Cargo aircraft** Quantity limitation: 100 kg	**Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden	-	-	**Passenger and Cargo Aircraft** Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 100 kg

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Section 14. Transport information

	Special provisions T50				

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Water Act (CWA) 307: chloromethane

Clean Air Act (CAA) 112 regulated toxic substances: chloromethane

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Sudden release of pressure
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
chloromethane	100	Yes.	Yes.	No.	Yes.	Yes.

SARA 313

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Section 15. Regulatory information

	Product name	CAS number	%
Form R - Reporting requirements	chloromethane	74-87-3	100
Supplier notification	chloromethane	74-87-3	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
chloromethane	No.	Yes.	No.	No.

Canada inventory : This material is listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class B-6: Reactive flammable material
Class D-2A: Material causing other toxic effects (Very toxic).

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

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Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class B-6: Reactive flammable material
Class D-2A: Material causing other toxic effects (Very toxic).

Hazardous Material Information System (U.S.A.)

Health	*	2
Flammability		4
Physical hazards		2

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 5/20/2015.

Date of issue/Date of revision : 5/20/2015.

Date of previous issue : 10/15/2014.

Version : 0.03

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act

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Section 16. Other information

(EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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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 5.3
Revision Date 03/04/2015
Print Date 05/13/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Chrysene

Product Number : 35754
Brand : Sigma-Aldrich
Index-No. : 601-048-00-0

CAS-No. : 218-01-9

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

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{18}H_{12}$
Molecular weight	:	228.29 g/mol
CAS-No.	:	218-01-9
EC-No.	:	205-923-4
Index-No.	:	601-048-00-0

Hazardous components

Component	Classification	Concentration
Chrysene		
	Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, H350, H410	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
Carbon oxides

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

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

6.3 Methods and materials for containment and cleaning up

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

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

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

7.3 Specific end use(s)

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen with unknown relevance to humans		
Chrysene	218-01-9	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar		

		products. cyclohexane-extractable fraction See Appendix C See Appendix A

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Chrysene	218-01-9	1-Hydroxypyrene (1-HP)		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

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

Personal protective equipment

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

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

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

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

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 252 - 254 °C (486 - 489 °F) - lit.
f)	Initial boiling point and boiling range	448 °C (838 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.73
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - > 320 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

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

Carcinogenicity

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

Possible human carcinogen

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

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GC0700000

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

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

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)
Marine pollutant:yes

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

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

15. REGULATORY INFORMATION

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

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

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

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date

Chrysene	218-01-9	1994-04-01

Pennsylvania Right To Know Components

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

New Jersey Right To Know Components

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

California Prop. 65 Components

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

16. OTHER INFORMATION

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

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

HMIS Rating

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

NFPA Rating

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

Further information

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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: 5.3 Revision Date: 03/04/2015 Print Date: 05/13/2016

SAFETY DATA SHEET

Creation Date 22-Sep-2009 **Revision Date** 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **cis-1,2-Dichloroethylene**

Cat No. : **AC113380000; AC113380025; AC113380100; AC113380500**

Synonyms cis-Acetylene dichloride.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

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

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

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

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

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Harmful if inhaled
Causes serious eye irritation
Causes skin irritation
May cause respiratory irritation



Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Avoid breathing dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Take precautionary measures against static discharge
Do not eat, drink or smoke when using this product
Response
Call a POISON CENTER or doctor/physician if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
Rinse mouth
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store in a well-ventilated place. Keep cool
Store in a closed container
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
cis-1,2-Dichloroethylene	156-59-2	97

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Use water spray to cool unopened containers. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point 6 °C / 42.8 °F
Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits
Upper 12.80%
Lower 9.70%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may travel to source of ignition and flash back.

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

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.

Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Ensure adequate ventilation. Wear personal protective equipment. Use explosion-proof equipment. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing dust/fume/gas/mist/vapours/spray. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
cis-1,2-Dichloroethylene	TWA: 200 ppm		

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
cis-1,2-Dichloroethylene			TWA: 200 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

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

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-80 °C / -112 °F
Boiling Point/Range	60 °C / 140 °F @ 760 mmHg
Flash Point	6 °C / 42.8 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	12.80%
Lower	9.70%
Vapor Pressure	201 mmHg @ 25 °C
Vapor Density	3.34 (Air = 1.0)
Relative Density	1.280
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

Incompatible Materials Bases

Hazardous Decomposition Products Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
cis-1,2-Dichloroethylene	156-59-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

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

12. Ecological information

Ecotoxicity

Do not empty into drains. Do not flush into surface water or sanitary sewer system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
cis-1,2-Dichloroethylene	Not listed	Not listed	EC50 = 721 mg/L 5 min EC50 = 905 mg/L 30 min	Not listed

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

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

14. Transport information

DOT

UN-No	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IATA

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
cis-1,2-Dichloroethylene	X	-	X	205-859-7	-		-	X	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes

Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA

Component	Hazardous Substances RQs	CERCLA EHS RQs
cis-1,2-Dichloroethylene	1000 lb	-

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

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
cis-1,2-Dichloroethylene	X	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B2 Flammable liquid
D1B Toxic materials
D2B Toxic materials



16. Other information

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

Creation Date 22-Sep-2009
Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally

Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

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

End of SDS

SAFETY DATA SHEET

COPPER

Section 1. Identification

GHS product identifier	:	COPPER
Chemical name	:	Mixture
CAS number	:	Mixture
Other means of identification	:	CC01053472
Product type	:	liquid

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

Product use	:	Industrial applications. Plastics.
Supplier's details	:	**POLYONE CORPORATION** ColorMatrix Group Inc. 680 North Rocky River Drive, Berea, Ohio, 44017-1628, USA +1 216 622 0100
Emergency telephone number (with hours of operation)	:	**CHEMTREC 1-800-424-9300 (24hrs for spill, leak, fire, exposure or accident).**

Section 2. Hazards identification

This mixture has not been evaluated as a whole for health effects. Information provided on health effects of this product is based on the individual components. However, some vapors or contaminants may be released upon heating and the end-user (fabricator) must take the necessary precautions (mechanical ventilation, respiratory protection, etc.) to protect employees from exposure. See sections 8 and 11 for special precautions. After handling, always wash hands thoroughly with soap and water.

OSHA/HCS status	:	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	:	SKIN CORROSION/IRRITATION - Category 2

GHS label elements

Hazard pictograms :



Signal word : Warning
Hazard statements : Causes skin irritation.

Precautionary statements

General : Not applicable.
Prevention : Wear protective gloves. Wash hands thoroughly after handling.
Response : IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention.
Storage : Not applicable.
Disposal : Not applicable.
Supplemental label elements : None known.
Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Chemical name : Mixture
Other means of identification : CC01053472

CAS number/other identifiers

Ingredient name	%	CAS number
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	Not available.
Titanium dioxide	5 - 10	13463-67-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	:	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	:	Causes serious eye irritation.
Inhalation	:	No known significant effects or critical hazards.
Skin contact	:	Causes skin irritation.
Ingestion	:	Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact	:	Adverse symptoms may include the following: pain or irritation

watering
redness

Inhalation	:	No specific data.
Skin contact	:	Adverse symptoms may include the following: irritation redness
Ingestion	:	No specific data.

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

Notes to physician	:	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	:	No specific treatment.
Protection of first-aiders	:	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media	:	In case of fire, use water spray (fog), foam, dry chemical or CO_2.
Unsuitable extinguishing media	:	None known.
Specific hazards arising from the chemical	:	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	:	Decomposition products may include the following materials: carbon dioxide carbon monoxide metal oxide/oxides
Special protective actions for fire-fighters	:	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	:	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	:	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	:	If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	:	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill	:	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	:	Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	:	Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene	:	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
Conditions for safe storage, including any incompatibilities	:	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Titanium dioxide	**OSHA PEL 1989 (1989-03-01)** PEL: Permissible Exposure Level 10 mg/m3 Form: Total dust **OSHA PEL (1993-06-30)** PEL: Permissible Exposure Level 15 mg/m3 Form: Total dust **ACGIH TLV (1996-05-18)** TLV-TWA: Threshold Limit Value - Time weighted average PEL: Permissible Exposure Level 10 mg/m3

Appropriate engineering controls	:	Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
Environmental exposure controls	:	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures	:	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated

clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state	:	liquid [liquid]
Color	:	BROWN
Odor	:	Faint odor.
Odor threshold	:	Not available.
pH	:	Not available.
Melting point	:	Not available.
Boiling point	:	Not available.
Flash point	:	Not available.
Burning time	:	Not available.

Burning rate	:	Not available.
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	**Lower:** Not available. **Upper:** Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Relative density	:	Not available.
Solubility	:	Not available.
Solubility in water	:	insoluble in water.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	**Dynamic:** Not available. **Kinematic:** Not available.

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	Stable under recommended storage and handling conditions (see Section 7).
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Keep away from extreme heat and oxidizing agents.
Incompatible materials	:	Keep away from strong acids. Oxidizer.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

This mixture has not been evaluated as a whole for health effects. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Titanium dioxide				

	LC50 Inhalation	Rat - Male	6.82 Mg/l	4 h
	LD50 Dermal	Rabbit	> 5,000 mg/kg	-

Conclusion/Summary : Mixture.Not fully tested.

Irritation/Corrosion

Conclusion/Summary
Skin : Mixture.Not fully tested.
Eyes : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Sensitization

Conclusion/Summary
Skin : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Mutagenicity

Conclusion/Summary : Mixture.Not fully tested.

Carcinogenicity

Conclusion/Summary : Mixture.Not fully tested.

Classification

Product/ingredient name	OSHA	IARC	NTP
Titanium dioxide		2B	

Reproductive toxicity

Conclusion/Summary : Mixture.Not fully tested.

Teratogenicity

Conclusion/Summary : Mixture.Not fully tested.

Specific target organ toxicity (single exposure)
Not available.

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard

Product/ingredient name	Result

Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.
Inhalation : No known significant effects or critical hazards.
Skin contact : Causes skin irritation.
Ingestion : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness
Inhalation : No specific data.
Skin contact : Adverse symptoms may include the following:
irritation
redness
Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

Conclusion/Summary : Mixture.Not fully tested.

General : No known significant effects or critical hazards.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (dusts and mists)	7.81 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Titanium dioxide			
	Acute LC50 > 1,000,000 µg/l Marine water	Fish - Mummichog	96 h
	Acute LC50 > 1,000 mg/l Fresh water	Fish - Fathead minnow	96 h
	Acute LC50 13 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute LC50 6.5 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 19.3 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 27.8 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 35.306 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h

Conclusion/Summary : Not available.

Persistence and degradability

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
Titanium dioxide		352.00	low

Mobility in soil

Soil/water partition coefficient (KOC)	:	Not available.
Other adverse effects	:	No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Acute hazardous waste "P" List: Not listed

United States - RCRA Toxic hazardous waste "U" List: Not listed

Section 14. Transport information

U.S. DOT Classification	:	Not regulated for transportation.
ICAO/IATA	:	Not classified as dangerous good under transport regulations.
IMO/IMDG (maritime)	:	Not classified as dangerous good under transport regulations.

Section 15. Regulatory information

U.S. Federal regulations : **United States - TSCA 12(b) - Chemical export notification:** None of the components are listed.
United States - TSCA 4(a) - Final Test Rules: Not listed
United States - TSCA 4(a) - ITC Priority list: Not listed
United States - TSCA 4(a) - Proposed test rules: Not listed

United States - TSCA 4(f) - Priority risk review: Not listed
United States - TSCA 5(a)2 - Final significant new use rules: Not listed
United States - TSCA 5(a)2 - Proposed significant new use rules: Not listed
United States - TSCA 5(e) - Substances consent order: Not listed
United States - TSCA 6 - Final risk management: Not listed
United States - TSCA 6 - Proposed risk management: Not listed
United States - TSCA 8(a) - Chemical risk rules: Not listed
United States - TSCA 8(a) - Dioxin/Furane precusor: Not listed
United States - TSCA 8(a) - Chemical Data Reporting (CDR): Not determined
United States - TSCA 8(a) - Preliminary assessment report (PAIR): Not listed
United States - TSCA 8(c) - Significant adverse reaction (SAR): Not listed
United States - TSCA 8(d) - Health and safety studies: Not listed
United States - EPA Clean water act (CWA) section 307 - Priority pollutants: Not listed
United States - EPA Clean water act (CWA) section 311 - Hazardous substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Flammable substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Toxic substances: Not listed
United States - Department of commerce - Precursor chemical: Not listed

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	:	Not listed
Clean Air Act Section 602 Class I Substances	:	Not listed
Clean Air Act Section 602 Class II Substances	:	Not listed
DEA List I Chemicals (Precursor Chemicals)	:	Not listed
DEA List II Chemicals (Essential Chemicals)	:	Not listed

US. EPA CERCLA Hazardous Substances (40 CFR 302)

not applicable

SARA 311/312

Classification	:	Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Classification
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	AH
Titanium dioxide	5 - 10	CH

SARA 313
Not applicable.

State regulations

Massachusetts : The following components are listed:
Mica
Iron oxide
Titanium dioxide

New York : None of the components are listed.

New Jersey : The following components are listed:
Mica
Iron oxide
Titanium dioxide

Pennsylvania : The following components are listed:
Iron oxide
Titanium dioxide

California Prop. 65
WARNING: This product contains a chemical known to the State of California to cause cancer.

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada inventory : All components are listed or exempted.

International regulations

International lists : **Australia inventory (AICS):** All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.
Malaysia Inventory (EHS Register): Not determined.
EINECS: All components are listed or exempted.
Japan inventory: Not determined.
China inventory (IECSC): All components are listed or exempted.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): Not determined.

Philippines inventory (PICCS): All components are listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals	:	Not listed
Chemical Weapons Convention List Schedule II Chemicals	:	Not listed
Chemical Weapons Convention List Schedule III Chemicals	:	Not listed

Section 16. Other information

History

Date of printing	:	05/21/2015
Date of issue/Date of revision	:	05/18/2015
Date of previous issue	:	10/30/2014
Version	:	1.1
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	:	Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Particularly this information may not be valid for such material used in conjunction with any other materials or in any process, unless specified in the text.

Safety Data Sheet

Revision Date: 01/06/17
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31276 / Dibenzo(a,h)anthracene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	7
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:	Carcinogenicity Category 2
GHS Signal Word:	Warning
GHS Hazard:	Suspected of causing cancer.
GHS Precautions:	
Safety Precautions:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF exposed or concerned: Get medical advice/attention.
Storage:	Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.
Single Exposure Target Organs:	No data available.
Repeated Exposure Target Organs:	No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Dichloromethane	75-09-2	200-838-9	99.900000
dibenz (a,h) anthracene	53-70-3	200-181-8	0.100000

4. FIRST-AID MEASURES

Inhalation:	Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately
Eyes:	Immediately flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention and monitor the eye daily as advised by your physician. Serious harm (damage) may result if treatment is delayed. Continue to flush eyes while awaiting medical attention
Skin Contact:	Wash with soap and water. Remove contaminated clothing, launder immediately, and discard contaminated leather goods. Get medical attention immediately.
Ingestion:	Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS. Never give anything by mouth to an unconscious person

5. FIRE- FIGHTING MEASURES

Extinguishing Media:	Use alcohol resistant foam, carbon dioxide, or dry chemical when fighting fires. Water or foam may cause frothing if liquid is burning but it still may be a useful extinguishing agent if carefully applied to the surface of the fire. Do Not direct a stream of water into the hot burning liquid. Use methods suitable to fight surrounding fire.
Fire and/or Explosion Hazards:	No data.
Fire Fighting Methods and Protection:	Use methods for the surrounding fire.
Hazardous Combustion Products:	Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment:	Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.
Methods for Clean-up:	Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions:	Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area.
Storage Technical Measures and Conditions:	Store in a cool dry place. Isolate from incompatible materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Dichloromethane	75-09-2	2300 ppm IDLH	No data available.	50 ppm TWA	25 ppm TWA; 125 ppm STEL (15 min. TWA)
dibenz (a,h) anthracene	53-70-3	No data available.	No data available.	No data available.	No data available.

Personal Protection:

Engineering Measures:	Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.
Respiratory Protection:	Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying

	liquid, or airborne material. Do not wear contact lenses. Have an eye wash station available.
Skin Protection:	Avoid skin contact by wearing chemically resistant gloves, an apron and other protective equipment depending upon conditions of use. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work.
Medical Conditions Aggravated By Exposure:	Eye disease Skin disease including eczema and sensitization Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	Colorless
Odor:	Strong
Physical State:	No data available.
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	2.93 (air = 1)
Boiling Point:	No data available.
Melting Point:	-96.7 °C
Flash Point:	No data available.
Upper Flammable/Explosive Limit, % in air:	No data available.
Lower Flammable/Explosive Limit, % in air:	No data available.
Autoignition Temperature:	556 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	1.3254 - 1.3258 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	ND
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	0
Molecular Weight:	No data available.

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.Contamination High temperatures
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents Caustics (bases)
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation Absorption Ingestion Skin contact Eye contact
Target Organs Potentially Affected By Exposure:	Skin, Cardiovascular System, Eyes, Liver
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Inhalation may cause severe central nervous system depression (including unconsciousness).
Skin Contact:	Contact causes severe skin irritation and possible burns.
Skin Absorption:	Harmful if absorbed through the skin. May cause severe irritation and systemic damage.
Eye Contact:	Contact with the eyes may cause moderate to severe eye injury. Eye contact may result in tearing and reddening, but not likely to permanently injure eye tissue. Temporary vision impairment (cloudy or blurred vision) is possible.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic

damage upon prolonged and/or repeated exposure (see "Target Organs)

Skin Absorption: Upon prolonged or repeated exposure, harmful if absorbed through the skin. May cause severe irritation and systemic damage

Component Toxicological Data:
NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methane, dichloro-	75-09-2	Inhalation LC50 Rat 53 mg/L 6 h

Component Carcinogenic Data:
OSHA:

Chemical Name	CAS No.	
Methylene chloride	75-09-2	25 ppm TWA (8 hr.); 125 ppm STEL (15 min.); 12.5 ppm Action Level (see 29 CFR 1910.1051); effective date for respiratory protection for certain employers to acheive the 8-hour TWA PEL is August 31, 1998; the start up date to install engineering controls is December 10, 1998.; {OSHA - 29 CFR 1910 Specifically Regulate
Dibenz[a,h]anthracene	53-70-3	Present

ACGIH:

Chemical Name	CAS No.	
Dichloromethane	75-09-2	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
Methylene chloride	75-09-2	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
Dichloromethane	75-09-2	Group 2A
Dibenz[a,h]anthracene	53-70-3	Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife. Keep out of waterways.
Mobility: No data
Persistence: No data
Bioaccumulation: No data
Degradability: No data
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Incinerate spent or discarded material a permitted hazardous waste facility.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Dichloromethane
UN Number: UN1593
Hazard Class: 6.1
Packing Group: III

International:

IATA Proper Shipping Name:	Dichloromethane
UN Number:	UN1593
Hazard Class:	6.1
Packing Group:	III

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Dichloromethane	75-09-2	X	X	-	X
dibenz (a,h) anthracene	53-70-3	X	X	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Dichloromethane Dichloromethane (Methylene chloride)	75-09-2	Prop 65 Cancer
Dibenz[a,h]anthracene	53-70-3	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Dichloromethane	75-09-2	X	X	X	X
dibenz (a,h) anthracene	53-70-3	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 05/15/14

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available.

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Version 5.5
Revision Date 05/27/2016
Print Date 07/04/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Dieldrin

Product Number : 33491
Brand : Sigma-Aldrich
Index-No. : 602-049-00-9

CAS-No. : 60-57-1

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 # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 2), H300
Acute toxicity, Dermal (Category 1), H310
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Oral (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)
H300 + H310 Fatal if swallowed or in contact with skin
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure if swallowed.
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.
P262	Do not get in eyes, on skin, or on clothing.
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 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P350 + P310	IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 1,2,3,4,10,10-Hexachloro-1,4,4a,5,6,7,8,8a-octahydro-6,7-epoxy-1,4:5,8-dimethanonaphthalene

Formula : $C_{12}H_8Cl_6O$

Molecular weight : 380.91 g/mol

CAS-No. : 60-57-1

EC-No. : 200-484-5

Index-No. : 602-049-00-9

Hazardous components

Component	Classification	Concentration
Dieldrin		
	Acute Tox. 2; Acute Tox. 1; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H300 + H310, H351, H372, H410	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

4.2 Most important symptoms and effects, both acute and delayed

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

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

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

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

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

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

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

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
Dieldrin	60-57-1	TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Reproductive effects Confirmed animal carcinogen with unknown relevance to humans		

		Danger of cutaneous absorption		
		TWA	0.250000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A Potential for dermal absorption		
		TWA	0.250000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Liver damage Reproductive effects Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.25 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A Potential for dermal absorption		
		TWA	0.25 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.25 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		PEL	0.25 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

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: 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: 143 - 144 °C (289 - 291 °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, Hydrogen chloride gas
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 - 38.3 mg/kg

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 is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
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
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: IO1750000

Discomfort, Headache, Nausea, Vomiting, Dizziness, Tremors, tonic convulsions, clonic spasms, Coma., respiratory failure, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Blood - Irregularities - Based on Human Evidence
Blood - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Carassius auratus (goldfish) - 1.6 µg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 79.5 µg/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: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solids, organic, n.o.s. (Dieldrin)
Reportable Quantity (RQ): 1 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Dieldrin)

Marine pollutant:yes

IATA

UN number: 2811 Class: 6.1 Packing group: I

Proper shipping name: Toxic solid, organic, n.o.s. (Dieldrin)

IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components

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

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Dieldrin	CAS-No. 60-57-1	Revision Date 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
H300	Fatal if swallowed.
H300 + H310	Fatal if swallowed or in contact with skin
H310	Fatal in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.

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: 5.5 Revision Date: 05/27/2016 Print Date: 07/04/2016

SAFETY DATA SHEET

Version 5.7
Revision Date 06/03/2016
Print Date 07/04/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Diesel Fuel No. 2

Product Number : UST147
Brand : Sigma-Aldrich

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336
Specific target organ toxicity - repeated exposure, Oral (Category 2), Liver, Blood, H373
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, H373

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs (Liver, Blood) through prolonged or repeated exposure if swallowed.
H373	May cause damage to organs (Central nervous system) through prolonged or repeated exposure if inhaled.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Hazardous components

Component		Classification	Concentration
Methylene chloride			
CAS-No. EC-No. Index-No.	75-09-2 200-838-9 602-004-00-3	Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; STOT SE 3; STOT RE 2; H315, H319, H335, H336, H351, H373, H373	>= 90 - <= 100 %
Fuels, diesel, no. 2			
CAS-No. EC-No. Index-No.	68476-34-6 270-676-1 649-227-00-2	Flam. Liq. 4; Carc. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H227, H304, H336, H351, H411	>= 0.1 - < 1 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

4.2 Most important symptoms and effects, both acute and delayed

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

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

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

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

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

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

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

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

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

Store at Room Temperature.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Potential Occupational Carcinogen See Appendix A		
Methylene chloride	75-09-2	TWA	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		

		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Substance listed; for more information see OSHA document 1910.1052		
		Substance listed; for more information see OSHA document 1910.1052		
		See Table Z-2		
		PEL	25.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		
		STEL	125.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		
		PEL	25 ppm 87 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		see section 5202		
		STEL	125 ppm 435 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		see section 5202		
Fuels, diesel, no. 2	68476-34-6	TWA	100.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		
		TWA	100.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		
		TWA	100 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Methylene chloride	75-09-2	Dichloromethane	0.3000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

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

Personal protective equipment

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

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

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

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

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

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

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: OSHA specifically regulated carcinogen (Methylene chloride)

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

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

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1593 Class: 6.1 Packing group: III EMS-No: F-A, S-A

Proper shipping name: DICHLOROMETHANE, SOLUTION

IATA
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution

15. REGULATORY INFORMATION

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

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-09-28

16. OTHER INFORMATION

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

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H227	Combustible liquid.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs (/$/*_2ORG_REP_ORA/$/) through prolonged or repeated exposure if swallowed.
H411	Toxic to aquatic life with long lasting effects.
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating
Health hazard: 2
Chronic Health Hazard: *

Flammability:	0
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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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: 5.7 Revision Date: 06/03/2016 Print Date: 07/04/2016

SAFETY DATA SHEET

Creation Date 06-Aug-2010 **Revision Date** 30-Oct-2014 **Revision Number** 2

1. Identification

Product Name **Ethylbenzene**

Cat No. : **AC433800000; AC433800010; AC433801000**

Synonyms Ethylbenzol; Phenylethane

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

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

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

Classification

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

Flammable liquids	Category 2
Acute Inhalation Toxicity - Vapors	Category 4
Carcinogenicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
May be fatal if swallowed and enters airways
Harmful if inhaled
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of causing cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Ethylbenzene	100-41-4	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention. Aspiration into lungs can produce severe lung damage.

Ingestion Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting. Call a physician or Poison Control Center immediately. If vomiting occurs naturally, have victim lean forward.

Most important symptoms/effects Breathing difficulties. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: May cause central nervous system depression

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media Do not use a solid water stream as it may scatter and spread fire

Flash Point 15 °C / 59 °F
Method - No information available

Autoignition Temperature 432 °C / 810 °F
Explosion Limits
Upper 6.8%
Lower 1.2%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge Yes

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

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

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Ensure adequate ventilation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Ethylbenzene	TWA: 20 ppm	(Vacated) TWA: 100 ppm (Vacated) TWA: 435 mg/m³ (Vacated) STEL: 125 ppm (Vacated) STEL: 545 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	IDLH: 800 ppm TWA: 100 ppm TWA: 435 mg/m³ STEL: 125 ppm STEL: 545 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Ethylbenzene	TWA: 100 ppm TWA: 434 mg/m³ STEL: 125 ppm STEL: 543 mg/m³	TWA: 100 ppm TWA: 435 mg/m³ STEL: 125 ppm STEL: 545 mg/m³	TWA: 20 ppm

Legend

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

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

Personal Protective Equipment

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

Skin and body protection Long sleeved clothing.

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

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-95 °C / -139 °F
Boiling Point/Range	136 °C / 276.8 °F
Flash Point	15 °C / 59 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.8%
Lower	1.2%
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	0.860
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available

Autoignition Temperature	432 °C / 810 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C8 H10
Molecular Weight	106.17

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

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

Incompatible Materials Strong oxidizing agents

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

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylbenzene	3500 mg/kg (Rat)	15400 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation May cause eye, skin, and respiratory tract irritation

Sensitization No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Ethylbenzene	100-41-4	Group 2B	Not listed	A3	X	Not listed

IARC: (International Agency for Research on Cancer)
Group 2B - Possibly Carcinogenic to Humans
IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans

ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: May cause central nervous system depression

Endocrine Disruptor Information No information available

Other Adverse Effects See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains. The product contains following substances which are hazardous for the environment. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Ethylbenzene	2.6 - 11.3 mg/L EC50 72 h 438 mg/L EC50 > 96 h 4.6 mg/L EC50 = 72 h 1.7 - 7.6 mg/L EC50 96 h	9.6 mg/L LC50 96 h 9.1 - 15.6 mg/L LC50 96 h 32 mg/L LC50 96 h 7.55 - 11 mg/L LC50 96 h 4.2 mg/L LC50 96 h 11.0 - 18.0 mg/L LC50 96 h	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h	1.8 - 2.4 mg/L EC50 48 h

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Ethylbenzene	3.118

13. Disposal considerations

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

14. Transport information

DOT

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

TDG

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

IATA

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed The product is classified and labeled

according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Ethylbenzene	X	X	-	202-849-4	-		X	X	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Ethylbenzene	100-41-4	>95	0.1

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Ethylbenzene	X	1000 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Ethylbenzene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Ethylbenzene	1000 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Ethylbenzene	100-41-4	Carcinogen	54 µg/day 41 µg/day	Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethylbenzene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B2 Flammable liquid
D2A Very toxic materials



16. Other information

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

Creation Date 06-Aug-2010
Revision Date 30-Oct-2014
Print Date 30-Oct-2014
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

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

End of SDS

SAFETY DATA SHEET

Version 4.17
Revision Date 03/03/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Trichlorofluoromethane

Product Number : 254991
Brand : Aldrich

CAS-No. : 75-69-4

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

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Dermal (Category 4), H312

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)
H312 Harmful in contact with skin.

Precautionary statement(s)
P280 Wear protective gloves/ protective clothing.
P302 + P352 + P312 IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P363 Wash contaminated clothing before reuse.
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 : Fluorotrichloromethane
CFC-11

Formula	:	CCl_3F CCl_3F
Molecular weight	:	137.37 g/mol
CAS-No.	:	75-69-4
EC-No.	:	200-892-3

Hazardous components

Component	Classification	Concentration
Trichlorofluoromethane		
	Acute Tox. 4; H312	<= 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, Hydrogen chloride gas, Hydrogen fluoride

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.
For personal protection see section 8.

6.2 Environmental precautions
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.

Recommended storage temperature 2 - 8 °C

Contents under pressure.
Storage class (TRGS 510): Non Combustible 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
Trichlorofluoromethane	75-69-4	C	1,000.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Cardiac sensitization Not classifiable as a human carcinogen		
		C	1,000.000000 ppm 5,600.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1,000.000000 ppm 5,600.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

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: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 30 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 respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
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	-110.99 - -109.99 °C (-167.78 - -165.98 °F)
f)	Initial boiling point and boiling range	23.7 °C (74.7 °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	885.7 hPa (664.3 mmHg) at 20.0 °C (68.0 °F) 2,701.2 hPa (2,026.1 mmHg) at 55.0 °C (131.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.494 g/cm3 at 25 °C (77 °F)
n)	Water solubility	1 g/l
o)	Partition coefficient: n-octanol/water	log Pow: 2.53
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 18.0 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
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Sodium/sodium oxides, Potassium, Magnesium, Aluminum, Zinc

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 15,000 mg/kg

LC50 Inhalation - Rat - 0.3 h - 130000 ppm
Remarks: Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold. Respiratory disorder

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: PB6125000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated., Nausea, Dizziness, Headache, Vomiting, Diarrhoea, Abdominal pain, Weakness, Unconsciousness

Liver -

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

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: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Trichlorofluoromethane)
Reportable Quantity (RQ): 5000 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
Trichlorofluoromethane	75-69-4	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Trichlorofluoromethane	75-69-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Trichlorofluoromethane	75-69-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Trichlorofluoromethane	75-69-4	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
H312	Harmful in contact with skin.

HMIS Rating

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

NFPA Rating

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

Further information

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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: 4.17 Revision Date: 03/03/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Halocarbon R-12 (Dichlorodifluoromethane)

Section 1. Identification

GHS product identifier : Halocarbon R-12 (Dichlorodifluoromethane)

Chemical name : dichlorodifluoromethane

Other means of identification : ASPEN R-12, Methane, dichlorodifluoro-; Refrigerant 12; Propellant 12; Halon 122; Genetron 12; Freon 12; Fluorocarbon 12; Difluorodichloromethane; DICHLORODIFLUOROMETHANE (FC 12); CFC-12

Product use : Synthetic/Analytical chemistry.

Synonym : ASPEN R-12, Methane, dichlorodifluoro-; Refrigerant 12; Propellant 12; Halon 122; Genetron 12; Freon 12; Fluorocarbon 12; Difluorodichloromethane; DICHLORODIFLUOROMETHANE (FC 12); CFC-12

SDS # : 001018

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : GASES UNDER PRESSURE - Liquefied gas
HAZARDOUS TO THE OZONE LAYER - Category 1

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.
Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position.

Prevention : Use and store only outdoors or in a well ventilated place.

Response : Not applicable.

Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Refer to manufacturer/supplier for information on recovery/recycling.

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Section 2. Hazards identification

Hazards not otherwise classified : Liquid can cause burns similar to frostbite.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : dichlorodifluoromethane

Other means of identification : ASPEN R-12, Methane, dichlorodifluoro-; Refrigerant 12; Propellant 12; Halon 122; Genetron 12; Freon 12; Fluorocarbon 12; Difluorodichloromethane; DICHLORODIFLUOROMETHANE (FC 12); CFC-12

CAS number/other identifiers

CAS number : 75-71-8

Product code : 001018

Ingredient name	%	CAS number
Methane, dichlorodifluoro-	100	75-71-8

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

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Section 4. First aid measures

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

Ingestion : Adverse symptoms may include the following:
frostbite

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

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
carbonyl halides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

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Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Avoid breathing gas. Avoid release to the environment. Refer to special instructions/safety data sheet. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

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Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
Methane, dichlorodifluoro-	**ACGIH TLV (United States, 3/2012).** TWA: 4950 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **NIOSH REL (United States, 1/2013).** TWA: 4950 mg/m³ 10 hours. TWA: 1000 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 4950 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 4950 mg/m³ 8 hours. TWA: 1000 ppm 8 hours.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

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Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied gas]

Color : Colorless.

Molecular weight : 120.91 g/mole

Molecular formula : C-Cl2-F2

Boiling/condensation point : -29.8°C (-21.6°F)

Melting/freezing point : -158°C (-252.4°F)

Critical temperature : 111.85°C (233.3°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : [Product does not sustain combustion.]

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : 84.9 (psia)

Vapor density : 4.2 (Air = 1)

Specific Volume (ft^3/lb) : 3.1746

Gas Density (lb/ft^3) : 0.315

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.3 g/l

Partition coefficient: n-octanol/water : 2.16

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

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Section 10. Stability and reactivity

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

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Section 11. Toxicological information

Ingestion : Adverse symptoms may include the following:
frostbite

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Methane, dichlorodifluoro-	2.16	6.17	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

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Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Dichlorodifluoromethane; Methane, dichlorodifluoro-	75-71-8	Listed	U075

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1028	UN1028	UN1028	UN1028	UN1028
UN proper shipping name	DICHLORODIFLUOROMETHANE OR REFRIGERANT GAS R 12	DICHLORODIFLUOROMETHANE; OR REFRIGERANT GAS R 12	DICHLORODIFLUOROMETHANE OR REFRIGERANT GAS R 12	DICHLORODIFLUOROMETHANE (REFRIGERANT GAS R 12)	DICHLORODIFLUOROMETHANE
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 5000 lbs / 2270 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 75 kg **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** T50	**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75	-	-	**Passenger and Cargo Aircraft** Quantity limitation: 75 kg **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

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Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

TSCA 12(b) annual export notification: dichlorodifluoromethane

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Methane, dichlorodifluoro-	100	No.	Yes.	No.	No.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	dichlorodifluoromethane	75-71-8	100
Supplier notification	dichlorodifluoromethane	75-71-8	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

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Section 15. Regulatory information

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

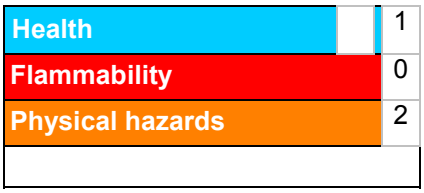
Canada

WHMIS (Canada) : Class A: Compressed gas.
CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Section 16. Other information

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 5/21/2015.

Date of issue/Date of revision : 5/21/2015.

Date of previous issue : 5/21/2015.

Version : 2

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Other special considerations : WARNING: Contains (Dichlorodifluoromethane), a substance which harms the public health and environment by destroying ozone in the upper atmosphere.

Notice to reader

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Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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1. IDENTIFICATION

Product Identifier: No. 2 Fuel Oil

Synonyms: No. 2 Heating Oil, #2 Fuel Oil, Heating Oil Plus™, Low Sulfur Heating Oil (LSHO), Ultra Low Sulfur Heating Oil (ULSHO)

Intended use of the product: Fuel

Contact:
Global Companies LLC
Water Mill Center
800 South St.
Waltham, MA 02454-9161
www.globalp.com

Contact Information: EMERGENCY TELEPHONE NUMBER (24 hrs.): CHEMTREC (800) 424-9300
COMPANY CONTACT (business hours): 800-542-0778

2. HAZARD IDENTIFICATION

According to OSHA 29 CFR 1910.1200 HCS

Classification of the Substance or Mixture

Classification (GHS-US):

Flam. Liquid	Category 3	H226
Skin Corrosion/Irritation	Category 2	H315
Aspiration Hazard	Category 1	H304
Acute toxicity – Inhalation	Category 4	H332
STOT SE	Category 3	H336
Carcinogenicity	Category 2	H350
Aquatic Chronic	Category 2	H411
Eye damage/Irritation	Category 2	H319

Labeling Elements



Signal Word (GHS-US): **Danger**

Hazard Statements (GHS-US):
H226 – Flammable liquid and vapor.
H315 – Causes Skin irritation.
H304 – May be fatal if swallowed and enters airways.
H332—Harmful if inhaled.
H336 – May cause drowsiness or dizziness.
H350 – May cause cancer.
H411 – Toxic to aquatic life with long lasting effects.
H319 – May cause eye damage/irritation.

Precautionary Statements (GHS-US):
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 - Keep container tightly closed.
P240 – Ground/bond container and receiving equipment.

P241 – Use explosion-proof electrical/ventilating/lighting equipment pursuant to applicable electrical code.
P242 – Use only non-sparking tools.
P243 – Take precautionary measures against static discharge.
P261 – Avoid breathing dust/fume/gas/mist/vapors/spray.
P264 – Wash skin thoroughly after handling.
P271 – Use only outdoors or in a well-ventilated area.
P273 – Avoid release to the environment.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P303+361+353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse with water/shower.
P308+311 - If exposed or concerned: Get medical advice/attention.
P301+310 - If swallowed: Immediately call a poison center/doctor/…
P331 - Do NOT induce vomiting.
P370+P378 – In case of fire use firefighting foam or other appropriate media for Class B fires to extinguish.
P403+235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 – Dispose of contents/container in accordance with local/regional/national/international regulation.

Other information:

NFPA 704
Health: 1
Fire: 2
Reactivity: 0



3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Composition Information
Mixture

Name	Product Identifier (CAS#)	% (w/w)	Classification
No. 2 Fuel Oil	68476-30-2	95-100	Flam Liq. 3, H226; Skin Irrit. 2, H315; Aspiration 1, H304; STOT SE 3, H336; Carc.2. H350; Aquatic chronic 2, H411
Methyl Esters	N/A	0-5	N/A
Naphthalene	91-20-3	0.1	Carc. 2, H351; Acute Tox. 4, H302; Aquatic Acute 1, H400; Aquatic Chronic 1, H411

Additional Formulation Information:
No. 2 Fuel Oil consists of C9+ hydrocarbons resulting from distillation of crude oil.

Low Sulfur Heating Oil typically contains less than 500 ppm of sulfur

Ultra Low Sulfur Heating Oil typically contains less than 15 ppm of sulfur

4. FIRST AID MEASURES

Route	Measures
Inhalation	Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.
Ingestion	Aspiration Hazard: DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Ingestion may cause gastrointestinal disturbances including irritation, nausea, vomiting, and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory failure, and death.
Eye Contact	In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention. In case of contact lenses, remove immediately.
Skin Contact	Remove contaminated clothing and shoes. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and of the area of the body burned.

Most Important Symptoms
Contact with eyes and face may cause irritation. Long-term exposure may cause dermatitis (itching, irritation, pain and swelling).

Inhalation may cause irritation and significant or long term exposure could cause respiratory insufficiency and pulmonary edema.

Ingestion may cause aspiration, gastrointestinal disturbance, and CNS effects.

Immediate Medical Attention and Special Treatment
For contact with skin or eyes, immediately wash or flush contaminated eyes with gently flowing water. If possible, irrigate each eye continuously with 0.9% saline (NS). If ingested, rinse mouth. Do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

If inhaled, administer oxygen or establish a patent airway if breathing is labored. Suction if necessary. Monitor closely, anticipate seizures. Consider orotracheal or nostracheal intubation of airway control if patient is unconscious or is in severe respiratory distress.

Discard any clothing or shoes contaminated as they may be flammable.

5. FIRE-FIGHTING MEASURES

Extinguishing Media
Foam, carbon dioxide, dry chemical are most suitable

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, C02, water spray, firefighting foam, or Halon. Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment.

LARGE FIRES: Foam, carbon dioxide, dry chemical. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific Hazards / Products of Combustion
Moderate fire hazard when exposed to heat or flame with a very low flash point. Product is flammable and easily ignited when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Combustion may produce smoke, carbon monoxide and other products of incomplete combustion.

Special Precautions and Protective Equipment for Firefighters
Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water.

For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

Fighting Equipment/Instructions
Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH- approved pressure-demand self-contained breathing apparatus with full face piece and protective clothing.

Refer to Section 9 for fire properties of this chemical including flash point, auto ignition temperature, and explosive limits.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY SPCC, SPILL CONTINGENCY or EMERGENCY PLAN.

Personal Precautions
Due to high vapor density, flammable / toxic vapors may be present in low lying areas, dikes, pits, drains, or trenches. Vapors may accumulate in low lying areas and reach ignitable concentrations. Ventilate the area. Use of non-sparking tools and intrinsically safe equipment is recommended. Potential for flammable atmosphere should be monitored using a combustible gas indicator positioned downwind of the spill area. Refer to Sections 2 and 7 for further hazard warnings and handling instructions.

Use appropriate personal protective equipment to prevent eye/skin contact and absorption. Use NIOSH approved respiratory protection, if warranted, to prevent exposures above permissible limits. Refer to Section 8. Contaminated clothing should not be near sources of ignition.

Emergency Measures
As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Consider wind direction. Secure all ignition sources (flame, spark, hot work, hot metal, etc.) from area. Evaluate the direction of product travel, diking sewers, etc. to confirm spill areas. Do not touch or walk-through spilled material. For large spills, isolate initial action distance downwind 1,000 ft. (300 m).

Environmental Precautions
Stop the spill to prevent environmental release if it can be done safely. Product is toxic to aquatic life. Take action to isolate environmental receptors including drains, storm sewers and natural water bodies. Keep on impervious surface if at all possible. Use water sparingly to prevent product from spreading. Foam and absorbents may be used to reduce / prevent airborne release.

Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Follow federal, state or local requirements for reporting environmental release where necessary. Refer to Section 15 for further information.

Containment and Clean-Up Methods
Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of firefighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with dry earth, sand or other non-combustible, inert oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container with clean, non-sparking tools for reclamation or disposal. Response and cleanup crews must be properly trained and must utilize proper protective equipment. Refer to Section 8 for appropriate protective equipment.

7. HANDLING AND STORAGE

USE ONLY AS A FUEL.
DO NOT SIPHON BY MOUTH.

Handling Precautions
Handle as a flammable liquid. Keep away from heat, sparks, and open flame. No smoking. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer pursuant to NFPA 70 and API RP 2003 to

reduce the possibility of static-initiated fire or explosion. Follow precautions to prevent static initiated fire.

Use good personal hygiene practices. Use only with protective equipment specified in Section 8. Avoid repeated and/or prolonged skin exposure. Use only outdoors or in well ventilated areas. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API RP 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage
Large quantities of fuel oil are stored in tanks or portable containers at an ambient storage temperature. Separate from incompatible chemicals (Refer to Section 10) by distance or secondary containment. Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers that are clearly labeled. Label all secondary containers that this material is transferred into with the chemical name and associated hazard(s). Empty product containers or vessels may contain flammable vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Storage tanks should have a venting system. If stored in small containers, the area should be well ventilated, away from ignition sources and protected from potential damage or vehicular traffic. Post “No Smoking” signs in product storage areas. This storage area should comply with NFPA 30 “Flammable and Combustible Liquid Code” or applicable building code. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 “Cleaning Mobile Tanks in Flammable and Combustible Liquid Service” and API RP 2015 “Safe Entry and Cleaning of Petroleum Storage Tanks”.

Incompatibles
Keep away from strong oxidizers, ignition sources and heat.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits

Component	CAS #	List	Value
No. 2 Fuel Oil	68476-30-2	ACGIH TLV-TWA	100 mg/m3*
Naphthalene	91-20-3	ACGIH TLV-TWA OSHA PEL ACGIH STEL	10 ppm 10 ppm 15 ppm

*Critical effects; Skin; A3; CNS impairment.

Engineering Controls
Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Intrinsically safe equipment and non-sparking tools shall be used in circumstances where concentrations may exceed lower flammable limits. Grounding and bonding shall be used to prevent accumulation and discharge of static electricity. Emergency shower and eyewash should be provided in proximity to handling areas in the event of exposure to decontaminate.

Personal Protective Equipment

Exposure	Equipment
Eye / Face	Wear appropriate chemical protective glasses or goggles or face shields to prevent skin and eye contact especially caused from splashing.
Skin	Wear appropriate personal protective clothing to prevent skin contact. Gloves constructed of nitrile, neoprene or PVC are recommended when handling this material. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure.

Exposure	Equipment
Respiratory	A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Thermal	Product is stored at ambient temperature. No thermal protection is required except for emergency operations involving actual or potential for fire. Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Value	
Appearance	Clear or straw-colored liquid dyed red for distribution	
Odor	Mild petroleum distillate odor.	
Odor Threshold	<1 ppm	
pH	Not available	
Melting Point	-15 ˚F (-26 ˚C)	
Boiling Point Range	320 to 690 ˚F (160 to 366 ˚C)	
Flash Point	>125.6 ˚F (52 ˚C) PMCC	
Evaporation Rate	Slow, varies with conditions	
Flammability	Flammable liquid	
Flammable Limits	0.6 % - 7.5%	
Vapor Pressure	0.009 psia @ 70 ˚F	
Vapor Density	>1	(air=1)
Specific Gravity	0.81-0.88 @ 60 ˚F (16 ˚C)	(water=1)
Solubility	Insoluble in water; miscible with other petroleum solvents.	
Partition Coefficient (N-octanol/water)	Log Kow range of 3.3 to >.6.0	
Autoignition Temperature	494 ˚F (257 ˚C)	
Decomposition Temperature	When heated it emits acrid smoke and irritating vapors.	
Viscosity	>3 cSt	
Percent Volatiles	95-100	

10. STABILITY AND REACTIVITY

Stability
This is a stable material that is flammable liquid (OSHA/GHS hazard category 3). Stable during transport.

Reactivity
Material is not self-reacting. Flammable concentrations may be present in air. Compound can react with oxidizing materials.

Possibility of Hazardous Reactions
Hazardous polymerization will not occur.

Incompatibility
Keep away from strong oxidizers such as nitric and sulfuric acids.

Conditions to Avoid
Avoid high temperatures, open flames, sparks, static electricity, welding, smoking and other ignition sources.

Hazardous Decomposition Products
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:
Acute Toxicity (Inhalation LC50)

No. 2 Fuel Oil (68476-30-2)
LC50 Inhalation Rat >4.6 mg/l/4h

Acute Toxicity (Dermal LD50)

No. 2 Fuel Oil (68476-30-2)
LD50 Dermal Rabbit >2000 mg/kg

Acute Toxicity (Oral LD50)

No. 2 Fuel Oil (68476-30-2)
LD50 Oral Rat >12000 mg/kg

Acute Toxicity (Oral LD50)

Methyl Esters
LD50 Oral Rat >14400 mg/kg

Skin Corrosion/Irritation: Prolonged and repeated contact may cause skin irritation leading to dermatitis. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

Serious Eye Damage/Irritation: Causes serious eye irritation.

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: OSHA: NO, IARC: Group 3, NTP: NO, ACGIH: NOIC:A3, NIOSH: NO

IARC: Group 3 – Not classifiable as to their carcinogenicity to humans ACGIH: A3 – Confirmed animal carcinogen with unknown relevance to humans

Petroleum middle distillates have been shown to produce skin tumors in laboratory animals following repeated and prolonged exposures. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

This product is similar to Diesel Fuel. IARC classifies whole diesel fuel exhaust particulates (byproduct of combustion of this material) carcinogenic to humans (Group 1) and NIOSH regards diesel fuel exhaust particulate as a potential occupational carcinogen.

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Specific Target Organ Toxicity (Single Exposure): Inhalation exposure may cause drowsiness or dizziness by inhalation exposure.

Aspiration Hazard: The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Potential Health Effects: Vapor irritating to skin, eyes, nose, and throat. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

WARNING: The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

12. ECOLOGICAL INFORMATION

Toxicity
This material is expected to be toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

Data for Component: No. 2 Fuel Oil (68476-30-2)

Material is toxic to aquatic organisms based on an acute basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Material is a long-term aquatic hazard based on a chronic basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Persistence and Degradation: This material is not expected to be readily biodegradable.

Bioaccumulative Potential: Not available

Mobility in Soil: Not available

Other Adverse Effects: None known

Other Information: Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options. May be considered a hazardous waste if disposed. Direct solid waste (landfill) or incineration at a solid waste facility is not permissible. Do not discharge to sanitary or storm sewer. Personnel handling waste containers should follow precautions provided in this document.

Shipping containers must be DOT authorized packages. Follow licensure and regulations for transport of hazardous material and hazardous waste as applicable.

14. TRANSPORT INFORMATION

US DOT

UN Identification Number	NA 1993
Proper Shipping Name	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PGIII
Shipping Label	Combustible liquid
Placard / Bulk Package	Combustible liquid, 1993
Emergency Response Guidebook Guide Number	128

IATA Information

UN Identification Number	UN 1993
Proper Shipping Name	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PGIII
ICAO Label	3
Packing Instructions Cargo	355
Max Quantity Per Package Cargo	220L
Packing Instructions Passenger	344Y
Max Quantity per Package	60L

ICAO

UN Identification Number	UN 1993
Shipping Name / Description	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PG III
IMDG Label	3

IMDG

UN Identification Number	UN 1993
Shipping Name / Description	Heating Oil, Light
Hazard Class and Packing Group	3, PGIII
IMDG Label	3
EmS Number	N/A
Marine Pollutant	Yes

15. REGULATORY INFORMATION

U.S. Federal, State, and Local Regulatory Information
Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning And Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	Yes
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Clean Water Act (Oil Spills)
Any spill or release of this product to “navigable waters” (Essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA Section 103 and SARA Section 304 (Release to the Environment)
The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts this material. This product does not contain any chemicals subject to the reporting requirements of CERCLA Section 103 or SARA 304.

SARA Section 313- Supplier Notification
This product does not contain any chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

EPA Notification (Oil Spills)
If the there is a discharge of more than 1,000-gallons of oil into or upon navigable waters of the United States, or if it is the second spill event of 42 gallons or more of oil into water within a twelve (12) month period, a written report must be submitted to the Regional Administrator of the EPA within sixty days of the event.

Pennsylvania Right to Know Hazardous Substance list:
The following product components are cited in the Pennsylvania Special Hazardous Substance List, and are present at levels which require reporting.

Component	CAS	Amount
No. 2 Fuel Oil	68476-30-2	100%

New Jersey Right to Know Hazardous Substance list:
The following product components are cited in the New Jersey Right to Know Hazardous Substance List, and are present at levels which require reporting.

Component	CAS	Amount
No. 2Fuel Oil	68476-30-2	100%

California Proposition 65 WARNING: This product contains chemicals known to the State of California to cause Cancer or Reproductive Toxicity.

Component	CAS	Amount
Naphthalene	91-20-3	<0.1%

U.S. Toxic Substances Control Act
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

CEPA - Domestic Substances List (DSL)
All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

Canadian Regulatory Information (WHMIS)
Class B3 – Combustible Liquid
Class D2A – Materials causing other toxic effects. (Very Toxic)

16. OTHER INFORMATION

Version	4
Issue Date	May 20, 2016
Prior Issue Date	May 3, 2015

Description of Revisions
Revised to meet Globally Harmonized System for chemical hazard communication requirements pursuant to OSHA regulatory revisions 77 FR 17884, March 26, 2012.

Abbreviations

˚F	Degrees Fahrenheit (temperature)
<	Less than
=	Equal to
>	Greater than
AP	Approximately
C	Centigrade (temperature)
kg	Kilogram
L	Liter
mg	Milligrams
mL	Milliliter
mm^2	Square millimeters
mmHg	Millimeters of mercury (pressure)
N/A	Not applicable
N/D	Not determined
ppm	Parts per million
sec	Second
ug	Micrograms

Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Level
ANSI	American National Standards Institute
API	American Petroleum Institute
CAS	Chemical Abstract Service
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation
EC50	Ecological concentration 50%
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
GHS	Global Harmonized System

HMIS	Hazardous Materials Information System
IARC	International Agency for Research On Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
Koc	Soil Organic Carbon
LC50	Lethal concentration 50%
LD50	Lethal dose 50%
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act Reauthorization Act of 1986 Title III
REL	Recommended Exposure Limit (NIOSH)
RVP	Reid Vapor Pressure
SARA	Superfund Amendments and
SCBA	Self Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
UN	United Nations
UNECE	United Nations Economic Commission for Europe
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

Disclaimer of Expressed and Implied Warranties

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

** End of Safety Data Sheet **

SAFETY DATA SHEET

Issuing Date no data available **Revision Date** 29-Oct-2015 **Revision Number** 1

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Number	**019**
Product Name	**Hexavalent Chromium - 1000 mg/L, 125 mL**
Synonyms	None

Recommended use of the chemical and restrictions on use

Recommended Use	Laboratory use only
Uses advised against	No information available

Details of the supplier of the safety data sheet

Supplier	ERA a Waters Company
Supplier Address	16341 Table Mountain Parkway, Golden, CO 80403 USA
Non-Emergency Telephone Number	+1-303-431-8454
Supplier Email	sdsinfo@waters.com

Emergency telephone number

Company Emergency Phone Number	In case of EMERGENCY call CHEMTREC Day or Night Within USA and Canada: 800-424-9300 International Call Collect: +1-703-527-3887

2. HAZARDS IDENTIFICATION

Classification

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

Respiratory sensitization	Category 1
Skin sensitization	Category 1
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 1B

GHS Label elements, including precautionary statements

Emergency Overview

Signal word **Danger**

Hazard Statements

May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
May damage fertility or the unborn child



Appearance Yellow **Physical state** Liquid->Liquid **Odor** Odorless

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Avoid breathing dust/fume/gas/mist/vapors/spray
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Precautionary Statements - Response
IF exposed or concerned: Get medical advice/attention
Specific treatment (see supplemental first aid instructions on this label)
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Inhalation
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

Precautionary Statements - Storage
Store locked up
Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Not applicable
Unknown Toxicity
0 % of the mixture consists of ingredient(s) of unknown toxicity
Other information

Harmful to aquatic life with long lasting effects
Repeated or prolonged skin contact may cause allergic reactions with susceptible persons
Interactions with Other Chemicals
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Note: only the components contributing to the product's GHS hazard classification are listed in this section.

Synonyms None.

Chemical Name	CAS-No	Percent
Potassium Dichromate	7778-50-9	0.25

4. FIRST AID MEASURES

First aid measures

General Advice Show this safety data sheet to the doctor in attendance.
Eye contact Rinse thoroughly with plenty of water, also under the eyelids. If symptoms persist, call a physician.
Skin contact Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.
Inhalation MAY CAUSE ALLERGIC RESPIRATORY REACTION. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Seek immediate medical attention/advice.
Ingestion May produce an allergic reaction. If an allergic reaction occurs, stop use and seek medical help right away. Do NOT induce vomiting. Rinse mouth immediately and drink plenty of

water. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately.

Self-protection of the first aider Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Use personal protective equipment as required. Wear personal protective clothing (see section 8).

Most important symptoms and effects, both acute and delayed

Most Important Symptoms and Effects Itching. Rashes. Hives. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing.

Indication of any immediate medical attention and special treatment needed

Notes to Physician May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media

CAUTION: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

Product is or contains a sensitizer. May cause sensitization by skin contact. May cause sensitization by inhalation and skin contact.

Uniform Fire Code Sensitizer: Liquid

Hazardous Combustion Products

Carbon oxides.

Explosion Data

Sensitivity to Mechanical Impact No.

Sensitivity to Static Discharge No.

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.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Refer to protective measures listed in Sections 7 and 8. Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers. Soak up with inert absorbent material.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse. Ensure adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment.

Conditions for safe storage, including any incompatibilities

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Incompatible Products None known based on information supplied.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Potassium Dichromate 7778-50-9	TWA: 0.05 mg/m³ Cr	TWA: 5 µg/m³ Action Level: 2.5 µg/m³ Cr (vacated) Ceiling: 0.1 mg/m³ Ceiling: 0.1 mg/m³ CrO3 applies to any operations or sectors for which the Hexavalent Chromium standard [29 CFR 1910.1026] is stayed or is otherwise not in effect	IDLH: 15 mg/m³ Cr(VI) TWA: 0.0002 mg/m³ Cr

ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits NIOSH IDLH Immediately Dangerous to Life or Health

Appropriate engineering controls

Engineering Measures Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Physical state	Liquid->Liquid		
Appearance	Yellow	**Odor**	Odorless
Color	No information available	**Odor Threshold**	No information available

Property	Values	Remarks Method
pH	5	None known
Melting / freezing point	no data available	None known
Boiling point / boiling range	no data available	None known
Flash Point	no data available	None known
Evaporation Rate	no data available	None known
Flammability (solid, gas)	no data available	None known

Flammability Limit in Air		
Upper flammability limit	no data available	
Lower flammability limit	no data available	
Vapor pressure	no data available	None known
Vapor density	no data available	None known
Specific Gravity	1	None known
Water Solubility	Soluble in water	None known
Solubility in other solvents	no data available	None known
Partition coefficient: n-octanol/water	no data available	None known
Autoignition temperature	no data available	None known
Decomposition temperature	no data available	None known
Kinematic viscosity	no data available	None known
Dynamic viscosity	no data available	None known
Explosive properties	no data available	
Oxidizing properties	no data available	

Other Information

Softening Point	no data available
Particle Size	no data available
Particle Size Distribution	

10. STABILITY AND REACTIVITY

Reactivity

no data available.

Chemical stability
Stable under recommended storage conditions.
Possibility of Hazardous Reactions
None under normal processing.
Hazardous Polymerization
Hazardous polymerization does not occur.
Conditions to avoid
None known based on information supplied.
Incompatible materials
None known based on information supplied.
Hazardous Decomposition Products
Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	.
Inhalation	May cause allergy or asthma symptoms or breathing difficulties if inhaled. Specific test data for the substance or mixture is not available. May cause sensitization in susceptible persons. (based on components).
Eye contact	Specific test data for the substance or mixture is not available.
Skin contact	Specific test data for the substance or mixture is not available. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. (based on components).
Ingestion	Specific test data for the substance or mixture is not available. May cause additional affects as listed under "Inhalation".

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Potassium Dichromate 7778-50-9	= 25 mg/kg (Rat) = 48 mg/kg (Rat)	= 1150 mg/kg (Rabbit) = 14 mg/kg (Rabbit)	-

Information on toxicological effects

Symptoms Itching. Rashes. Hives. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain, or flushing. Coughing and/ or wheezing.

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

Sensitization May cause sensitization in susceptible persons. May cause sensitization by skin contact. May cause sensitization by inhalation.

Mutagenic Effects There is no data for this product. Contains a known or suspected mutagen.

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

Chemical Name	ACGIH	IARC	NTP	OSHA
Potassium Dichromate 7778-50-9	A1	Group 1	Known	X

ACGIH (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)
Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)
X - Present

Reproductive toxicity Contains a known or suspected reproductive toxin.

STOT - single exposure No information available.

STOT - repeated exposure No information available.

Chronic toxicity No known effect based on information supplied. Prolonged exposure may cause chronic effects. Repeated contact may cause allergic reactions in very susceptible persons. Contains a known or suspected mutagen. Possible risk of irreversible effects. Contains a known or suspected carcinogen. Contains a known or suspected reproductive toxin.

Target Organ Effects Skin. Respiratory system. Eyes. May affect the genetic material in germ cells (sperm and eggs). Gastrointestinal tract (GI). Reproductive system.

Aspiration Hazard No information available.

Numerical measures of toxicity Product Information

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)
40,000.00 mg/kg
ATEmix (inhalation-dust/mist)
20.04 mg/L

12. ECOLOGICAL INFORMATION

Ecotoxicity

Harmful to aquatic life with long lasting effects.

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Potassium Dichromate 7778-50-9		96h LC50: > 139 mg/L (Cyprinus carpio) 96h LC50: 113.6 - 155.7 mg/L (Lepomis macrochirus) 96h LC50: = 320 mg/L (Lepomis macrochirus) 96h LC50: 65.6 - 137.6 mg/L (Lepomis macrochirus) 96h LC50: = 12.3 mg/L (Oncorhynchus mykiss) 96h LC50: 21.209 - 30.046 mg/L (Oryzias latipes) 96h LC50: 15.41 - 30.36 mg/L (Pimephales promelas) 96h LC50: 14 - 20.9 mg/L (Pimephales promelas) 96h LC50: 24.81 - 34.55 mg/L (Poecilia reticulata) 96h LC50: 23 - 41.2 mg/L (Poecilia reticulata) 96h LC50: = 26 mg/L (Morone saxatilis)		

Persistence and Degradability

No information available.

Bioaccumulation

No information available

Other adverse effects

No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements.

Contaminated Packaging Dispose of contents/containers in accordance with local regulations.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste
Potassium Dichromate 7778-50-9	Toxic Corrosive Ignitable

14. TRANSPORT INFORMATION

DOT Not regulated

Proper Shipping Name NON REGULATED

Hazard Class N/A

TDG Not regulated

MEX Not regulated

ICAO Not regulated

IATA Not regulated
Proper Shipping Name NON REGULATED
Special Provisions None

IMDG Not regulated
Special Provisions None
Marine Pollutant Not applicable

RID Not regulated
Special Provisions None

ADR Not regulated
Special Provisions None

ADN Not regulated

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	All components are listed either on the DSL or NDSL.
ENCS	Contact supplier for inventory compliance status
KECL	Contact supplier for inventory compliance status
PICCS	Contact supplier for inventory compliance status
AICS	Contact supplier for inventory compliance status

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS-No	Percent	SARA 313 - Threshold Values %
Potassium Dichromate - 7778-50-9	7778-50-9	0.25	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Potassium Dichromate 7778-50-9	10 lb	X		X

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)

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	RQ
Potassium Dichromate 7778-50-9	10 lb		RQ 10 lb final RQ RQ 4.54 kg final RQ

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

.

International Regulations

Component	Carcinogen Status	Exposure Limits
Potassium Dichromate 7778-50-9 (0.25)	A1	Mexico: TWA 0.05 mg/m³ Mexico: TWA 0.5 mg/m³

A1 - Confirmed Human Carcinogen

Canada
WHMIS Hazard Class
Not determined

16. OTHER INFORMATION

NFPA	**Health Hazards** 2	**Flammability** 0	**Instability** 0	**Physical and Chemical Hazards** -
HMIS	**Health Hazards** 2 *	**Flammability** 0	**Physical Hazard** 0	**Personal Protection** X

Chronic Hazard Star Legend * = Chronic Health Hazard

Prepared By
Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

Revision Date 29-Oct-2015

Revision Note No information available

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

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End of Safety Data Sheet

SAFETY DATA SHEET

Version 5.5
Revision Date 05/27/2016
Print Date 07/13/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Indeno[1,2,3-*cd*]pyrene

Product Number : 48499
Brand : Supelco

CAS-No. : 193-39-5

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

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

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 2), H351

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H351 Suspected of causing cancer.

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

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : $C_{22}H_{12}$
Molecular weight : 276.33 g/mol
CAS-No. : 193-39-5
EC-No. : 205-893-2

Hazardous components

Component	Classification	Concentration
Indeno[1,2,3-cd]pyrene		
	Carc. 2; H351	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

4.2 Most important symptoms and effects, both acute and delayed

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

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

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

6.3 Methods and materials for containment and cleaning up

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

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

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

Personal protective equipment

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

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available

d)	pH	No data available
e)	Melting point/freezing point	163.6 °C (326.5 °F)
f)	Initial boiling point and boiling range	536.0 °C (996.8 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

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

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)
NTP:	Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

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

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Indeno[1,2,3-cd]pyrene	CAS-No. 193-39-5	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No. 193-39-5	Revision Date 2007-09-28

Indeno[1,2,3-cd]pyrene

16. OTHER INFORMATION

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

Carc.	Carcinogenicity
H351	Suspected of causing cancer.

HMIS Rating

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

NFPA Rating

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

Further information

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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: 5.5 Revision Date: 05/27/2016 Print Date: 07/13/2017

Iron Filings, 40 mesh

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Iron Filings, 40 mesh**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: **S25369**

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Not classified for physical or health hazards under GHS.

Signal word :Warning

Hazard statements:
Precautionary statements:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Do not eat, drink or smoke when using this product

Combustible Dust Hazard: :
May form combustible dust concentrations in air (during processing).

Other Non-GHS Classification:

WHMIS
NFPA/HMIS



NFPA SCALE (0-4)



HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7439-89-6	Iron	100 %
		Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Loosen clothing as necessary and position individual in a comfortable position.Move exposed to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen.Get medical assistance if cough or other symptoms appear.

After skin contact: Rinse/flush exposed skin gently using soap and water for 15-20 minutes.Seek medical advice if discomfort or irritation persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea,Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition. Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.Thermal decomposition can lead to release of irritating gases and vapors.

Advice for firefighters:

Protective equipment: Use NIOSH-approved respiratory protection/breathing apparatus.

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.Use spark-proof tools and explosion-proof equipment.Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.Avoid inhaling gases, fumes, dust, mist, vapor, and aerosols.Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Use spark-proof tools and explosion-proof equipment.Ensure that air-handling systems are operational.Ensure adequate ventilation.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13. Should not be released into environment.

Methods and material for containment and cleaning up:

Keep in suitable closed containers for disposal.Wear protective eyeware, gloves, and clothing. Refer to Section 8.Always obey local regulations.Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Collect solids in powder form using vacuum with (HEPA filter). Evacuate personnel to safe areas.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Minimize dust generation and accumulation. Follow good hygiene procedures when handling chemical materials. Refer to Section 8.Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Store away from incompatible materials.Protect from freezing and physical damage.Keep away from food and beverages.Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store in cool, dry conditions in well sealed containers. Store with like hazards

SECTION 8 : Exposure controls/personal protection





Control Parameters:	, , OSHA PEL TWA (Total Dust) 15 mg/m3 (50 mppcf*) , , ACGIH TLV TWA (inhalable particles) 10 mg/m3
Appropriate Engineering controls:	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment.Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).Use under a fume hood
Respiratory protection:	Not required under normal conditions of use. Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls.When necessary use NIOSH approved breathing equipment.
Protection of skin:	Select glove material impermeable and resistant to the substance.Select glove material based on rates of diffusion and degradation.Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves.Wear protective clothing.

Eye protection: Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).Safety glasses or goggles are appropriate eye protection.

General hygienic measures: Perform routine housekeeping.Wash hands before breaks and at the end of work.Avoid contact with skin, eyes, and clothing.Before wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Solid	**Explosion limit lower**: **Explosion limit upper**:	Not determined Not determined
Odor:	Not Determined	**Vapor pressure**:	Not determined
Odor threshold:	Not determined	**Vapor density**:	Not determined
pH-value:	Not Determined	**Relative density**:	Not determined
Melting/Freezing point:	Not determined	**Solubilities**:	
Boiling point/Boiling range:	Not determined	**Partition coefficient (n-octanol/water)**:	Not determined
Flash point (closed cup):	Not determined	**Auto/Self-ignition temperature**:	Not determined
Evaporation rate:	Not determined	**Decomposition temperature**:	Not determined
Flammability (solid,gaseous):	Not determined	**Viscosity**:	a. Kinematic:Not determined b. Dynamic: Not determined
Density: Not determined			

SECTION 10 : Stability and reactivity

Reactivity: Nonreactive under normal conditions.
Chemical stability: Stable under normal conditions.
Possible hazardous reactions: None under normal processing
Conditions to avoid: Incompatible Materials.
Incompatible materials: Strong acids.Strong bases.Oxidizing agents.
Hazardous decomposition products:

SECTION 11 : Toxicological information

Acute Toxicity: No additional information.	
Chronic Toxicity: No additional information.	
Corrosion Irritation: No additional information.	
Sensitization:	No additional information.
Single Target Organ (STOT):	No additional information.
Numerical Measures:	No additional information.

Carcinogenicity:	No additional information.
Mutagenicity:	No additional information.
Reproductive Toxicity:	No additional information.

SECTION 12 : Ecological information

Ecotoxicity Persistence and degradability:
Bioaccumulative potential:
Mobility in soil:
Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Contact a licensed professional waste disposal service to dispose of this material.Dispose of empty containers as unused product.Product or containers must not be disposed with household garbage.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11).Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

Not Regulated.

UN proper shipping name

Not Regulated.

Transport hazard class(es)
Packing group:Not Regulated
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

None of the ingredients is listed

SARA Section 313 (Specific toxic chemical listings):

None of the ingredients is listed

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

None of the ingredients is listed

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

None of the ingredients is listed

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation

Effective date : 10.24.2014
Last updated : 03.23.2015

SAFETY DATA SHEET

Isobutylene

Section 1. Identification

GHS product identifier : Isobutylene

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

SDS # : 001031

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

CAS number/other identifiers

CAS number : 115-11-7

Product code : 001031

Ingredient name	%	CAS number
Isobutylene	100	115-11-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Isobutylene	**ACGIH TLV (United States, 3/2015).** TWA: 250 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied compressed gas.]

Color : Colorless.

Molecular weight : 56.12 g/mole

Molecular formula : C4-H8

Boiling/condensation point : -6.9°C (19.6°F)

Melting/freezing point : -140.7°C (-221.3°F)

Critical temperature : 144.75°C (292.6°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -76.1°C (-105°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 9.6%

Vapor pressure : 24.3 (psig)

Vapor density : 1.94 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.6845

Gas Density (lb/ft ^{3}) : 0.1496 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.263 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

SADT : Not available.

Section 9. Physical and chemical properties

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Section 11. Toxicological information

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Isobutylene	2.34	-	low

Section 12. Ecological information

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1055	UN1055	UN1055	UN1055	UN1055
UN proper shipping name	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** 19, T50	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2). **Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden **Special provisions** 29	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act (CAA) 112 regulated flammable substances: isobutylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Isobutylene	100	Yes.	Yes.	No.	No.	No.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

International lists

National inventory

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : This material is listed or exempted.

Malaysia : Not determined.

Section 15. Regulatory information

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Canada

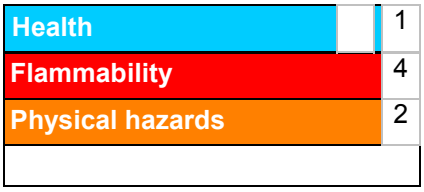
WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Flam. Gas 1, H220 Press. Gas Liq. Gas, H280	Expert judgment Expert judgment

History

Date of printing : 7/11/2016

Date of issue/Date of revision : 7/11/2016

Date of previous issue : No previous validation

Section 16. Other information

Version : 0.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 12-Sep-2014 **Revision Date** 12-Dec-2014 **Revision Number** 1

1. Identification

Product Name **Lead**

Cat No. : **L27-1RL**

Synonyms Lead metal.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Emergency Telephone Number
Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

2. Hazard(s) identification

Classification

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

Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Dusts and Mists	Category 4
Carcinogenicity	Category 1B
Reproductive Toxicity	Category 1A
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Harmful if swallowed
Harmful if inhaled
May cause drowsiness or dizziness
May cause cancer
May damage the unborn child. Suspected of damaging fertility
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
Other hazards
WARNING! This product contains a chemical known in the State of California to cause cancer. WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Lead	7439-92-1	> 99

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes.

Inhalation Move to fresh air.

Ingestion Do not induce vomiting.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available

Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up No information available.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Lead	TWA: 0.05 mg/m³	TWA: 50 µg/m³	IDLH: 100 mg/m³ TWA: 0.050 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Lead	TWA: 0.05 mg/m³	TWA: 0.15 mg/m³	TWA: 0.05 mg/m³

Legend

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

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

Personal Protective Equipment
Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Light blue
Odor	Odorless
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	327.4 °C / 621.3 °F
Boiling Point/Range	1740 °C / 3164 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1.3 mmHg @ 970 °C
Vapor Density	No information available
Relative Density	11.3
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	Pb
Molecular Weight	207.19

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	None under normal use conditions
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products	No information available

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

Irritation	No information available
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Lead	7439-92-1	Group 2B	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

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

12. Ecological information

(Bad file name)

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Lead	Not listed	1.32 mg/L LC50 96 h 1.17 mg/L LC50 96 h 0.44 mg/L LC50 96 h	Not listed	600 µg/L EC50 = 48 h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

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

14. Transport information

DOT Not regulated
TDG Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Lead	X	X	-	231-100-4	-		X	X	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Lead	7439-92-1	> 99	0.1

SARA 311/312 Hazardous Categorization

Acute Health Hazard Yes
Chronic Health Hazard Yes
Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Lead	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Lead	X		-

OSHA Occupational Safety and Health Administration
Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Lead	30 µg/m³ Action Level 50 µg/m³ TWA	-

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Lead	10 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Lead	7439-92-1	Carcinogen Developmental Female Reproductive Male Reproductive	15 µg/day	Developmental Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Lead	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2A Very toxic materials
D1B Toxic materials



16. Other information

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

Creation Date 12-Sep-2014
Revision Date 12-Dec-2014
Print Date 12-Dec-2014
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

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

End of SDS

SAFETY DATA SHEET

Creation Date 17-Jan-2011 **Revision Date** 03-Aug-2015 **Revision Number** 3

1. Identification

Product Name **Magnesium**

Cat No. : **AC191080000; AC191080025; AC191080100; AC191085000**

Synonyms Magnesium metal (ribbons/turnings)

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

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

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

Classification

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

Flammable solids	Category 1
Self-heating substances and mixtures	Category 2
Substances/mixtures which, in contact with water, emit flammable gases	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Self-heating in large quantities; may catch fire
In contact with water releases flammable gas



Precautionary Statements
Prevention
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Wear protective gloves/protective clothing/eye protection/face protection
Keep cool. Protect from sunlight
Keep away from any possible contact with water, because of violent reaction and possible flash fire
Handle under inert gas. Protect from moisture
Skin
Brush off loose particles from skin. Immerse in cool water/wrap with wet bandages
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Maintain air gap between stacks/pallets
Store away from other materials
Store in a dry place. Store in a closed container
Store bulk masses at temperatures not exceeding manufacturer recommendations
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
May form combustible dust concentrations in air

3. Composition / information on ingredients

Component	CAS-No	Weight %
Magnesium	7439-95-4	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration.

Ingestion Do not induce vomiting. Get medical attention.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical. approved class D extinguishers. clay. sodium carbonate. Do not use a solid water stream as it may scatter and spread fire.

Unsuitable Extinguishing Media No information available

Flash Point 500 °C / 932 °F
Method - No information available

Autoignition Temperature 472.8 °C / 883 °F
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture in air. Water reactive. Produce flammable gases on contact with water. Flammable.

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

NFPA

Health	Flammability	Instability	Physical hazards
0	4	2	W

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Remove all sources of ignition.

Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation. Remove all sources of ignition. Ground and bond containers when transferring material. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Use explosion-proof equipment. Use only non-sparking tools. Wash hands before breaks and immediately after handling the product. Ensure adequate ventilation. Wear personal protective equipment. Avoid dust formation.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Never allow product to get in contact with water during storage. Store under an inert atmosphere.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

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

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Solid
Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	7
Melting Point/Range	651 °C / 1203.8 °F
Boiling Point/Range	1107 °C / 2024.6 °F
Flash Point	500 °C / 932 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	negligible
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	472.8 °C / 883 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Mg
Molecular Weight	24.3

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions. Air sensitive. Water reactive.

Conditions to Avoid Protect from water. Exposure to air. Incompatible products. Exposure to moist air or water.

Incompatible Materials Acids, Strong oxidizing agents, Halogens, Acid chlorides

Hazardous Decomposition Products Magnesium oxides

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Magnesium	230 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

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

Irritation May cause irritation

Sensitization No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Magnesium	7439-95-4	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects,both acute and delayed	No information available
Endocrine Disruptor Information	No information available
Other Adverse Effects	See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability	Insoluble in water
Bioaccumulation/ Accumulation	No information available.
Mobility	Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

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

14. Transport information

DOT

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

TDG

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

IATA

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

IMDG/IMO

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Magnesium	X	X	-	231-104-6	-		X	-	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

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

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Magnesium	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class

B6 Reactive flammable material
B4 Flammable solid
F Dangerously reactive material



16. Other information

Prepared By

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

Creation Date 17-Jan-2011
Revision Date 03-Aug-2015
Print Date 03-Aug-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

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

End of SDS

SAFETY DATA SHEET

Version 4.6
Revision Date 10/09/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Manganese

Product Number : 266167
Brand : Aldrich

CAS-No. : 7439-96-5

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute aquatic toxicity (Category 2), H401

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

2.2 GHS Label elements, including precautionary statements

Pictogram none

Signal word none

Hazard statement(s)
H401 Toxic to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Mn
Molecular weight : 54.94 g/mol
CAS-No. : 7439-96-5
EC-No. : 231-105-1

Hazardous components

Component	Classification	Concentration
Manganese		
	Aquatic Acute 2; H401	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
Manganese/manganese oxides

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

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

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Moisture sensitive. Handle and store under inert gas.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC)		
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) varies		
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		

		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment varies		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment varies		

8.2 Exposure controls

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

Personal protective equipment

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

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

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: chips Colour: grey, brown, silver
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,244 °C (2,271 °F) - lit.
f)	Initial boiling point and boiling range	1,962 °C (3,564 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	7.3 g/mL at 25 °C (77 °F)
n)	Water solubility	0.0007 g/l at 20 °C (68 °F) - slightly soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Avoid moisture.

10.5 Incompatible materials
acids, Halogens, Bases, Phosphorus, Sulphur oxides, Hydrogen peroxide, Oxidizing agents, Nitric acid, Sodium Hydroxide, Carbon dioxide (CO_2), Nitryl Flouride, Steam

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 420)

LC50 Inhalation - Rat - male and female - 4 h - > 5.14 mg/l
(OECD Test Guideline 403)

Dermal: No data available

No data available

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

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 72 h
(OECD Test Guideline 405)

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	semi-static test NOEC - Oncorhynchus mykiss (rainbow trout) - 3.6 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Immobilization NOEC - Daphnia magna (Water flea) - 1.6 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Growth inhibition EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - 4.5 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	Respiration inhibition EC50 - Sludge Treatment - 1,000 mg/l - 3 h (OECD Test Guideline 209)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

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

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

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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

Aquatic Acute	Acute aquatic toxicity
H401	Toxic to aquatic life.

HMIS Rating

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

NFPA Rating

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

Further information

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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: 4.6 Revision Date: 10/09/2015 Print Date: 05/01/2016

Safety Data Sheet
Mercury (Metallic)

SDS Revision Date: **05/01/2015**

1. Identification

1.1. Product identifier

Product Identity	Mercury (Metallic)
Alternate Names	Quicksilver; Hydrargyrum; Liquid Silver

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

Intended use	See Technical Data Sheet.
Application Method	See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name	WM Mercury Waste Inc. 21211 Durand Avenue Union Grove, WI 53182
Emergency	
CHEMTREC (USA)	(800) 424-9300
Customer Service: WM Mercury Waste Inc.	(800) 741-3343

2. Hazard(s) identification

2.1. Classification of the substance or mixture

Acute Tox. 2;H330	Fatal if inhaled.
Repr. 1B;H360D	May damage the unborn child.
STOT RE 1;H372	Causes damage to organs through prolonged or repeated exposure. Specific Target Organs: (Central Nervous System)
Aquatic Chronic 1;H410	Very toxic to aquatic life with long lasting effects.

2.2. Label elements

Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.



Danger

H330 Fatal if inhaled.

H360D May damage the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

SDS Revision Date: **05/01/2015**

[Prevention]:

P201 Obtain special instructions before use.

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

P260 Do not breathe mist / vapors / spray.

P264 Wash thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P281 Use personal protective equipment as required.

P284 Wear respiratory protection.

[Response]:

P304+340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P308+313 IF exposed or concerned: Get medical advice / attention.

P310 Immediately call a POISON CENTER or doctor / physician.

P314 Get Medical advice / attention if you feel unwell.

P320 Specific treatment is urgent (see information on this label).

P391 Collect spillage.

[Storage]:

P403+233 Store in a well ventilated place. Keep container tightly closed.

P405 Store locked up.

[Disposal]:

P501 Dispose of contents / container in accordance with local / national regulations.

3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

Ingredient/Chemical Designations	Weight %	GHS Classification	Notes
Mercury **CAS Number: 0007439-97-6**	**100**	**Repr. 1B;H360D** **Acute tox. 2;H330** **STOT RE 1;H372** **Aquatic Acute 1;H400** **Aquatic Chronic 1;H410**	**[1][2]**

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

[1] Substance classified with a health or environmental hazard.

[2] Substance with a workplace exposure limit.

[3] PBT-substance or vPvB-substance.

*The full texts of the phrases are shown in Section 16.

4. First aid measures

4.1. Description of first aid measures

General In all cases of doubt, or when symptoms persist, seek medical attention.
Never give anything by mouth to an unconscious person.

Inhalation Remove to fresh air, keep patient warm and at rest. If breathing is irregular or stopped, give artificial respiration. If unconscious place in the recovery position and obtain immediate medical attention. Give nothing by mouth.

Eyes Irrigate copiously with clean water for at least 15 minutes, holding the eyelids apart and seek medical attention.

Skin Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser.

Ingestion If swallowed, wash out mouth with water, obtain immediate medical attention. Keep at rest. Do NOT induce vomiting.

4.2. Most important symptoms and effects, both acute and delayed

Overview **Eye:** Contact with eyes may cause severe irritation, and possible eye burns. Vapors may cause eye irritation.
Skin: May cause skin irritation. May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, and personality changes.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause effects similar to those for inhalation exposure.
Inhalation: Causes respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. May cause severe respiratory tract irritation.
Chronic: Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, and personality changes.

Notes to Physician: Treat symptomatically and supportively.
Antidote: The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel. The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. See section 2 for further details.

Inhalation Fatal if inhaled.

5. Fire-fighting measures

5.1. Extinguishing media

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition: Mercury/mercury oxides.

Do not breathe mist / vapors / spray.

5.3. Advice for fire-fighters

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Combustion generates toxic fumes.

ERG Guide No. 172

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Put on appropriate personal protective equipment (see section 8).

6.2. Environmental precautions

Do not allow spills to enter drains or waterways.

Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

6.3. Methods and material for containment and cleaning up

Vacuum or sweep up material and place into a suitable disposal container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section).

7. Handling and storage

7.1. Precautions for safe handling

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid breathing dust, vapor, mist, or gas. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

See section 2 for further details. - [Prevention]:

7.2. Conditions for safe storage, including any incompatibilities

Handle containers carefully to prevent damage and spillage.

Incompatible materials: Acetylene, ammonia, boron phosphodiiodide, chlorine, chlorine dioxide, methyl azide, sodium carbide, halogens, strong oxidizers.

Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Poison room locked.

See section 2 for further details. - [Storage]:

7.3. Specific end use(s)

No data available.

SDS Revision Date: **05/01/2015**

8. Exposure controls and personal protection

8.1. Control parameters

Exposure

CAS No.	Ingredient	Source	Value
0007439-97-6	Mercury	OSHA	TWA 0.1 mg/m3
		ACGIH	Alkyl compounds TWA: 0.01 mg/m3 STEL 0.03 mg/m3 Skin Aryl compounds TWA: 0.05 mg/m3 C 0.1 mg/m3 Skin Elemental/Inorganic 0.025mg/m3 Skin
		NIOSH	No Established Limit
		Supplier	No Established Limit

Carcinogen Data

CAS No.	Ingredient	Source	Value
0007439-97-6	Mercury	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: Yes; Group 4: No;

8.2. Exposure controls

Respiratory Follow the OSHA respirator regulations found in 29CFR §1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

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

Skin Wear appropriate protective clothing to prevent skin exposure. Wear appropriate gloves to prevent skin exposure.

Engineering Controls Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits suitable respiratory protection must be worn.

Other Work Practices Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

See section 2 for further details. - [Prevention]:

9. Physical and chemical properties

Appearance	Silver Liquid
Odor	Odorless
Odor threshold	Not Measured
pH	Not Applicable
Melting point / freezing point	-38.87 deg C

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Initial boiling point and boiling range	356.5 deg C @ 760.00mmHg
Flash Point	Not Measured
Evaporation rate (Ether = 1)	Not Available
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	**Lower Explosive Limit:** Not Measured **Upper Explosive Limit:** Not Measured
Vapor pressure (Pa)	0.002 mmHg @ 25C
Vapor Density	7 (Air=1)
Specific Gravity	13.5400g/cm3 (Water=1)
Solubility in Water	Insoluble
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature	Not Measured
Decomposition temperature	Not Available
Viscosity (cSt)	1.554 cP 20.00
Molecular Formula	Hg
Molecular Weight	200.59

9.2. Other information

No other relevant information.

10. Stability and reactivity

10.1. Reactivity

Hazardous Polymerization will not occur.

10.2. Chemical stability

Stable under normal circumstances.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

High temperatures, incompatible materials, metals.

10.5. Incompatible materials

Acetylene, ammonia, boron phosphodiiodide, chlorine, chlorine dioxide, methyl azide, sodium carbide, halogens, strong oxidizers.

10.6. Hazardous decomposition products

Mercury/mercury oxides.

11. Toxicological information

Acute toxicity

Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LC50, mg/L/4hr	Inhalation Dust/Mist LC50, mg/L/4hr	Inhalation Gas LC50, ppm

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Mercury - (7439-97-6)	37.00, Rat - Category: 2	No data available	No data available	No data available	No data available

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification	Category	Hazard Description
Acute toxicity (oral)	2	Fatal if swallowed.
Acute toxicity (dermal)	---	Not Applicable
Acute toxicity (inhalation)	2	Fatal if inhaled.
Skin corrosion/irritation	---	Not Applicable
Serious eye damage/irritation	---	Not Applicable
Respiratory sensitization	---	Not Applicable
Skin sensitization	---	Not Applicable
Germ cell mutagenicity	---	Not Applicable
Carcinogenicity	---	Not Applicable
Reproductive toxicity	1B	May damage the unborn child.
STOT-single exposure	---	Not Applicable
STOT-repeated exposure	1	Causes damage to organs through prolonged or repeated exposure.
Aspiration hazard	---	Not Applicable

12. Ecological information

12.1. Toxicity

Very toxic to aquatic life with long lasting effects.

No additional information provided for this product. See Section 3 for chemical specific data.

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Mercury - (7439-97-6)	Not Available	0.0052, Daphnia magna	Not Available

12.2. Persistence and degradability

There is no data available on the preparation itself.

12.3. Bioaccumulative potential

Not Measured

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

SDS Revision Date: **05/01/2015**

This product contains no PBT/vPvB chemicals.

12.6. Other adverse effects

No data available.

13. Disposal considerations

13.1. Waste treatment methods

Observe all federal, state and local regulations when disposing of this substance.

14. Transport information

	DOT (Domestic Surface Transportation)	IMO / IMDG (Ocean Transportation)	ICAO/IATA
14.1. UN number	UN2809	UN2809	UN2809
14.2. UN proper shipping name	UN2809, Mercury, 8, III	Mercury	Mercury
14.3. Transport hazard class(es)	**DOT Hazard Class:** 8 (6.1)	**IMDG:** 8 **Sub Class:** 6.1	**Air Class:** 8
14.4. Packing group	III	III	III

14.5. Environmental hazards

IMDG Marine Pollutant: Yes (Mercury)

14.6. Special precautions for user

No further information

15. Regulatory information

Regulatory Overview The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented.

Toxic Substance Control Act (TSCA) All components of this material are either listed or exempt from listing on the TSCA Inventory.

WHMIS Classification D1A

US EPA Tier II Hazards

Fire: No
Sudden Release of Pressure: No
Reactive: No
Immediate (Acute): Yes
Delayed (Chronic): Yes

EPCRA 311/312 Chemicals and RQs (lbs):

Mercury (1.00)

EPCRA 302 Extremely Hazardous:

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

SDS Revision Date: **05/01/2015**

EPCRA 313 Toxic Chemicals:

Mercury

Proposition 65 - Carcinogens (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Developmental Toxins (>0.0%):
Mercury

Proposition 65 - Female Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Male Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

New Jersey RTK Substances (>1%):

Mercury

Pennsylvania RTK Substances (>1%):

Mercury

16. Other information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases appearing in section 3 is:

H330 Fatal if inhaled.

H360D May damage the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall WM Mercury Waste Inc. be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages.

End of Document

Safety Data Sheet

Material Name: Hess 10W30 Motor Oil

SDS No. 8957
US GHS

Synonyms: Valvoline Product Code 52670413

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Skin Corrosion/Irritation – Category 2
Specific Target Organ Toxicity – Category 3 (narcosis)
Carcinogenicity - Category 1B

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

WARNING

Hazard Statements

Causes skin irritation.
May cause cancer.
May cause drowsiness or dizziness.

Precautionary Statements

Prevention

Wash hands and forearms thoroughly after handling.
Wear protective gloves/protective clothing/eye protection.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing fume/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.

Response

If on skin: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.
If exposed or concerned: Get medical advice/attention.
If inhaled: Remove person to fresh air and keep in a position comfortable for breathing. Call poison center or doctor if you feel unwell.

Storage

Store locked up.
Store in a well-ventilated place.
Keep container tightly closed.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
64742-65-0	Petroleum distillates, solvent dewaxed heavy paraffinic	83-93

Petroleum-based lubricating oil with detergent/dispersant engine oil package with zinc compounds.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

If symptoms develop, move individual away from exposure and into fresh air. Flush eyes gently with water while holding eyelids apart. If symptoms persist or there is visual difficulty, seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

First Aid: Ingestion

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

First Aid: Notes to Physician

Acute aspiration of large amounts of oil-laden material may produce a serious aspiration hazard. Patients who aspirate these oils should be followed for the development of long-term sequelae. Repeated aspiration of mineral oil can produce chronic inflammation of the lungs (i.e. lipoid pneumonia) that may progress to pulmonary fibrosis. Symptoms are often subtle and radiological changes appear worse than clinical abnormalities. Occasionally, persistent cough, irritation of the upper respiratory tract, shortness of breath with exertion, fever, and bloody sputum occur. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.
Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. No special fire hazards are known to be associated with this product. Dense smoke may be generated while burning.

Hazardous Combustion Products

May form: carbon dioxide and carbon monoxide, oxides of sulfur, nitrogen and phosphorous, various hydrocarbons.

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or gaseous extinguishing agent.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

SMALL SPILL: Absorb liquid on vermiculite, floor absorbent or other absorbent material. Persons not wearing proper personal protective equipment should be excluded from area of spill.

LARGE SPILL: Prevent run-off to sewers, streams, or other bodies of water. If run-off occurs, notify authorities as required, that a spill has occurred. Persons not wearing proper personal protective equipment should be excluded from area of spill until clean-up has been completed.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks."

Incompatibilities

Avoid contact with: acids, halogens, strong oxidizing agents.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

ACGIH, OSHA, and NIOSH have not developed exposure limits for any of this product's components.

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Not normally required. However, wear resistant gloves such as nitrile rubber to prevent irritation which may result from prolonged or repeated skin contact with product.

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

To prevent repeated or prolonged skin contact, wear impervious clothing and boots. Wear normal work clothing covering arms and legs.

Hygiene Measures

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Dry, clear and bright	**Odor:**	None
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	ND	**Vapor Density:**	ND
Boiling Point:	>425 °F (218.3°C) @ 760.00 mmHg	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	0.881 @ 60°F (16°C)
Evaporation Rate:	Slower than ethyl ether	**VOC:**	ND
Viscosity:	<= 3300.0 cps @ -20°C; 10.0 - 11.0 cst @ 100°C	**Octanol/H2O Coeff.:**	ND
Flash Point:	430 °F (221.1 °C)	**Flash Point Method:**	COC
Upper Flammability Limit (UFL):	ND	**Lower Flammability Limit (LFL):**	ND
Burning Rate:	ND	**Auto Ignition:**	ND

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

None

Incompatible Products

Avoid contact with: acids, halogens, strong oxidizing agents.

Hazardous Decomposition Products

May form: aldehydes, carbon dioxide and carbon monoxide, hydrogen sulfide, oxides of sulfur, nitrogen and phosphorus, toxic fumes, various hydrocarbons.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if large amounts are swallowed.

B: Component Analysis - LD50/LC50

Petroleum distillates, solvent dewaxed heavy paraffinic (64742-65-0)

Inhalation LC50 Rat >4.7 mg/L 4 h; Oral LD50 Rat >5000 mg/kg; Dermal LD50 Rabbit >5000 mg/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

May cause mild skin irritation. Prolonged or repeated contact may dry the skin. Symptoms include redness, burning, drying and cracking of the skin, and skin burns. Additional symptoms of skin contact include: acne. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

May cause mild eye irritation. Symptoms include stinging, tearing, and redness.

Potential Health Effects: Ingestion

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful.

Potential Health Effects: Inhalation

It is possible to breathe this material under certain conditions of handling and use (for example, during heating, spraying, or stirring). Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful. Symptoms usually occur at air concentrations higher than the recommended exposure limits.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This product is not reported to have any mutagenic effects.

Carcinogenicity

A: General Product Information

May cause cancer.

Used motor oil has been shown to cause skin cancer in laboratory animal continually exposed by repeated applications.

B: Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity repeat exposure effects.

Aspiration Respiratory Organs Hazard

Acute aspiration of large amounts of oil-laden material may produce a serious aspiration hazard.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Petroleum distillates, solvent dewaxed heavy paraffinic (64742-65-0)

Test & Species	Conditions
96 Hr LC50 Oncorhynchus mykiss	>5000 mg/L
48 Hr EC50 Daphnia magna	>1000 mg/L

Persistence/Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT Information

Shipping Name: Not Regulated

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	--	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

ZINC C1-C14 ALKYLDITHIOPHOSPHATE (CAS No. 68649-42-3)

State Regulations

Component Analysis - State

None of this product's components are listed on the state lists from CA, MA, MN, NJ, PA, or RI.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Petroleum distillates, solvent dewaxed heavy paraffinic	64742-65-0	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	1
Fire	1
Reactivity	0



HMIS® Hazard Rating

Health	1*	Slight
Fire	1	Slight
Physical	0	Minimal
		*Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

Literature References

None

Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

SAFETY DATA SHEET

Version 5.5
Revision Date 05/27/2016
Print Date 07/13/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Methyl *tert*-butyl ether

Product Number : 48027
Brand : Supelco
Index-No. : 603-181-00-X

CAS-No. : 1634-04-4

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
Skin irritation (Category 2), H315

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.
H315 Causes skin irritation.

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.
P264 Wash skin thoroughly after handling.
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.
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 : MTBE
tert-Butyl methyl ether
Methyl *tert*-butyl ether

Formula : $C_5H_{12}O$
Molecular weight : 88.15 g/mol
CAS-No. : 1634-04-4
EC-No. : 216-653-1
Index-No. : 603-181-00-X
Registration number : 01-2119452786-27-XXXX

Hazardous components

Component	Classification	Concentration
tert-Butyl methyl ether		
	Flam. Liq. 2; Skin Irrit. 2; H225, H315	<= 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.

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.
Storage class (TRGS 510): 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
tert-Butyl methyl ether	1634-04-4	TWA	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Kidney damage Confirmed animal carcinogen with unknown relevance to humans		
		PEL	40 ppm 144 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
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: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 230 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
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 AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

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	Melting point/range: -108.6 °C (-163.5 °F)
f)	Initial boiling point and boiling range	55 - 56 °C (131 - 133 °F) - lit.
g)	Flash point	-33.0 °C (-27.4 °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: 15.1 %(V) Lower explosion limit: 1.6 %(V)
k)	Vapour pressure	1,018.7 hPa (764.1 mmHg) at 55.0 °C (131.0 °F) 279.2 hPa (209.4 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.74 g/cm3 at 25 °C (77 °F)

n)	Water solubility	42 g/l at 20 °C (68 °F) - OECD Test Guideline 105
o)	Partition coefficient: n-octanol/water	log Pow: 1.06
p)	Auto-ignition temperature	374.0 °C (705.2 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	0.464 mm2/s at 20 °C (68 °F) - 0.409 mm2/s at 40 °C (104 °F) -
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
Oxidizing agents, 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 - 4,000 mg/kg

LC50 Inhalation - Rat - 4 h - 23576 ppm

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

Respiratory or skin sensitisation
Will not occur

Germ cell mutagenicity
No data available

Carcinogenicity

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KN5250000

Nausea, Vomiting, Dizziness, Central nervous system depression, Aspiration or inhalation may cause chemical pneumonitis., MTBE (methyl-tert-butyl ether) is reported to metabolize to tert-butyl alcohol and formaldehyde by microsomal demethylation, MTBE (methyl-tert-butyl ether) should be considered a "potential human carcinogen" due to an increase in leydig interstitial cell tumors of testes in male rats and an increase in lymphomas, leukemias, and uterine sarcomas in female rats., In another unpublished study MTBE was shown to be carcinogenic due to "increased incidence of a rare type of kidney tumor" in male rats and an "increase in the incidence of hepatocellular adenomas" in female mice., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 672.00 mg/l - 96 h
	LC50 - other fish - > 1,000.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 472 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 491 mg/l - 96 h

12.2 Persistence and degradability

Biodegradability	Result: 0 % - Not readily biodegradable. (OECD Test Guideline 301D)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber 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: 2398 Class: 3 Packing group: II
Proper shipping name: Methyl tert-butyl ether
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 2398 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHYL tert-BUTYL ETHER

IATA
UN number: 2398 Class: 3 Packing group: II
Proper shipping name: Methyl tert-butyl ether

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
tert-Butyl methyl ether	1634-04-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
tert-Butyl methyl ether	1634-04-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
tert-Butyl methyl ether	1634-04-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
tert-Butyl methyl ether	1634-04-4	2007-07-01

16. OTHER INFORMATION

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

Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H315	Causes skin irritation.
Skin Irrit.	Skin irritation

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

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Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 27-Sep-2010 **Revision Date** 12-Oct-2015 **Revision Number** 3

1. Identification

Product Name **Naphthalene**

Cat No. : **N7-500**

Synonyms Tar camphor; Naphthalin; Coal tar camphor

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Emergency Telephone Number
Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

2. Hazard(s) identification

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

Flammable solids	Category 2
Acute oral toxicity	Category 4
Carcinogenicity	Category 1B
Target Organs - Liver, Kidney.	

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Harmful if swallowed
May cause cancer



Precautionary Statements
Prevention

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment

Response

IF exposed or concerned: Get medical attention/advice

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Ingestion

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth

Fire

In case of fire: Use CO2, dry chemical, or foam for extinction

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Very toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Naphthalene	91-20-3	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms/effects . Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media No information available

Flash Point 78 °C / 172.4 °F
Method - No information available

Autoignition Temperature	Not applicable 526 °C / 978.8 °F
Explosion Limits	
Upper	5.9 vol %
Lower	0.9 vol %
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material. Containers may explode when heated. Do not allow run-off from fire fighting to enter drains or water courses.

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

NFPA

Health	Flammability	Instability	Physical hazards
2	2	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal. Remove all sources of ignition.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation. Avoid ingestion and inhalation. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Keep away from open flames, hot surfaces and sources of ignition.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Naphthalene	TWA: 10 ppm Skin	(Vacated) TWA: 10 ppm (Vacated) TWA: 50 mg/m³ (Vacated) STEL: 15 ppm (Vacated) STEL: 75 mg/m³ TWA: 10 ppm TWA: 50 mg/m³	IDLH: 250 ppm TWA: 10 ppm TWA: 50 mg/m³ STEL: 15 ppm STEL: 75 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Naphthalene	TWA: 10 ppm TWA: 52 mg/m³ STEL: 15 ppm STEL: 79 mg/m³	TWA: 10 ppm TWA: 50 mg/m³ STEL: 15 ppm STEL: 75 mg/m³	TWA: 10 ppm STEL: 15 ppm Skin

Legend

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

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

Personal Protective Equipment

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

Skin and body protection Long sleeved clothing.

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

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

9. Physical and chemical properties

Physical State	Solid
Appearance	White
Odor	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	79 - 82 °C / 174.2 - 179.6 °F
Boiling Point/Range	218 °C / 424.4 °F
Flash Point	78 °C / 172.4 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	5.9 vol %
Lower	0.9 vol %
Vapor Pressure	0.08 mbar @ 20 °C
Vapor Density	Not applicable
Specific Gravity	0.990
Solubility	slightly soluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable 526 °C / 978.8 °F
Decomposition Temperature	540 °C
Viscosity	Not applicable
Molecular Formula	C10H8
Molecular Weight	128.17

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions.

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

Incompatible Materials Strong oxidizing agents

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

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Naphthalene	LD50 = 490 mg/kg (Rat) LD50 = 1110 mg/kg (Rat)	LD50 > 20 g/kg (Rabbit) LD50 = 1120 mg/kg (Rabbit)	LC50 > 340 mg/m³ (Rat) 1 h

Toxicologically Synergistic Products No information available

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

Irritation No information available

Sensitization No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Naphthalene	91-20-3	Group 2B	Reasonably Anticipated	A3	X	Not listed

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity Teratogenic effects have occurred in experimental animals.

STOT - single exposure None known

STOT - repeated exposure Liver Kidney

Aspiration hazard No information available

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

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

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

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Naphthalene	EC50: = 0.4 mg/L, 72h (Skeletonema costatum)	LC50 96 h 1-6.5 mg/L (Pimephales promelas)	EC50 = 0.93 mg/L 30 min EC50 > 20 mg/L 18 h	EC50: 1.09 - 3.4 mg/L, 48h Static (Daphnia magna) EC50: = 1.96 mg/L, 48h Flow through (Daphnia magna) LC50: = 2.16 mg/L, 48h (Daphnia magna)

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Naphthalene	3.3

13. Disposal considerations

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

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Naphthalene - 91-20-3	U165	-

14. Transport information

DOT
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

TDG
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

IATA
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

IMDG/IMO
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Naphthalene	X	X	-	202-049-5	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Naphthalene	91-20-3	>95	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Naphthalene	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Naphthalene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Naphthalene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Naphthalene	91-20-3	Carcinogen	5.8 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Naphthalene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Moderate risk, Grade 2

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class
B3 Combustible liquid
D1B Toxic materials
D2A Very toxic materials



16. Other information

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

Creation Date 27-Sep-2010
Revision Date 12-Oct-2015
Print Date 12-Oct-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

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

End of SDS

SAFETY DATA SHEET

Version 4.7
Revision Date 12/28/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Nickel

Product Number : 268259
Brand : Aldrich
Index-No. : 028-002-00-7

CAS-No. : 7440-02-0

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ni
Molecular weight	:	58.69 g/mol
CAS-No.	:	7440-02-0
EC-No.	:	231-111-4
Index-No.	:	028-002-00-7

Hazardous components

Component	Classification	Concentration
Nickel		
	Skin Sens. 1; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H412	<= 100 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

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

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

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

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

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

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

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

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture
Nickel/nickel oxides

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

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

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

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

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

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Nickel	7440-02-0	TWA	1.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	1.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

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

Personal protective equipment

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

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

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

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

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Foil Colour: white, silver, metallic
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,453 °C (2,647 °F) - lit.
f)	Initial boiling point and boiling range	2,732 °C (4,950 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	1 hPa (1 mmHg) at 1,810 °C (3,290 °F)
l)	Vapour density	No data available
m)	Relative density	8.9 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
acids, Oxidizing agents, Sulphur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminium, Fluorine, Ammonia

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
May cause sensitisation by skin contact.

Germ cell mutagenicity
No data available

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
NTP:	Reasonably anticipated to be a human carcinogen (Nickel)
	Reasonably anticipated to be a human carcinogen (Nickel)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: QR5950000

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

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 1.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1 mg/l - 48 h

12.2 Persistence and degradability
Not applicable

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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

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

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

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

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

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Nickel	7440-02-0	2007-09-28

16. OTHER INFORMATION

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

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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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: 4.7 Revision Date: 12/28/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Creation Date 10-Dec-2009 **Revision Date** 26-May-2017 **Revision Number** 4

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **AC445690000; ACR445690010; AC445690025; AC445691000**

Synonyms Perchloroethylene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

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

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

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

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>95

4. First-aid measures

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. If skin irritation persists, call a physician.

Inhalation Move 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/effects None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

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

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products
Chlorine Hydrogen chloride gas Phosgene
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation.
Environmental Precautions Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation. Avoid ingestion and inhalation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m^3 Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm	TWA: 100 ppm TWA: 670 mg/m^3 TWA: 200 ppm TWA: 1250 mg/m^3 STEL: 200 ppm STEL: 1340 mg/m^3

Legend

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

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

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

Skin and body protection Long sleeved clothing.

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

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Density	1.619
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C2 Cl4
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines, Aluminium

Hazardous Decomposition Products Chlorine, Hydrogen chloride gas, Phosgene

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes and skin

Sensitization 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
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest

pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

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

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.88

13. Disposal considerations

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

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1

Packing Group III

IMDG/IMO

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Subsidiary Hazard Class P
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		X	X	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Tetrachloroethylene	127-18-4	>95	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard Yes
Chronic Health Hazard Yes
Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard No

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Tetrachloroethylene	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Tetrachloroethylene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive

Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Tetrachloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant Y
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

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

Creation Date 10-Dec-2009
Revision Date 26-May-2017
Print Date 26-May-2017
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

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

End of SDS

SAFETY DATA SHEET

Section 1. Identification

CHS Inc.
P.O. Box 64089
Mail station 525
St. Paul, MN 55164-0089

Transportation Emergency (CHEMTREC) : **1-800-424-9300**
Technical Information : **1-651-355-8443**
SDS Information : **1-651-355-8445**

Product name	:	Regular, Midgrade & Premium Unleaded Gasoline	**SDS no.**	:	0147- M6A0
Common name	:	Unleaded Gasoline, Premium Unleaded Gasoline	**Revision date**	:	11/15/2013
Chemical name	:	Light Petroleum Distillate	**Chemical formula**	:	Mixture
Chemical family	:	Mixed Petroleum Hydrocarbon			

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

Not available.

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture :
FLAMMABLE LIQUIDS - Category 1
SKIN CORROSION/IRRITATION - Category 2
GERM CELL MUTAGENICITY - Category 1B
CARCINOGENICITY - Category 1A
TOXIC TO REPRODUCTION (Fertility) - Category 2
TOXIC TO REPRODUCTION (Unborn child) - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1
ASPIRATION HAZARD - Category 1
AQUATIC HAZARD (ACUTE) - Category 3
AQUATIC HAZARD (LONG-TERM) - Category 3

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements :
Extremely flammable liquid and vapor.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
Suspected of damaging fertility or the unborn child.
May be fatal if swallowed and enters airways.
May cause drowsiness and dizziness.
Causes damage to organs through prolonged or repeated exposure.
Harmful to aquatic life with long lasting effects.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Hazardous Material Information System (U.S.A.)	**Health :**	2 *	**Flammability :**	4	**Physical hazards :**	0
National Fire Protection Association (U.S.A.)	**Health :**	2	**Flammability :**	4	**Instability :**	0

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Chemical name : Light Petroleum Distillate

Other means of identification : Unleaded Gasoline, Premium Unleaded Gasoline

Ingredient name	%	CAS number
Toluene	10 - 30	108-88-3
Xylene	10 - 30	1330-20-7
Tert-butyl methyl ether	10 - 30	1634-04-4
Benzene	1 - 5	71-43-2
1,2,4-Trimethylbenzene	1 - 5	95-63-6
Ethylbenzene	1 - 5	100-41-4
n-Hexane	1 - 5	110-54-3
Butyl ethyl ether	0.1 - 1	628-81-9
Naphthalene	0.1 - 1	91-20-3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : If material comes in contact with the eyes, immediately wash the eyes with large amounts of water for 15 minutes, occasionally lifting the lower and upper lids. Get medical attention.

Inhalation : If person breathes in large amounts of material, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the person warm and at rest. Get medical attention as soon as possible.

Skin contact : If the material comes in contact with the skin, wash the contaminated skin with soap and water promptly. If the material penetrates through clothing, remove the clothing and wash the skin with soap and water promptly. If irritation persists after washing, get medical attention immediately.

Ingestion : If material has been swallowed, do not induce vomiting. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following: pain or irritation, watering, redness.

Inhalation : Adverse symptoms may include the following: respiratory tract irritation, coughing.

Skin contact : Adverse symptoms may include the following: irritation, redness.

Ingestion : No known significant effects or critical hazards.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet or water-based fire extinguishers.

Specific hazards arising from the chemical : Highly volatile material. Flowing gasoline can be ignited by self-generated static electricity; containers should be bonded and grounded. Vapors may travel along the ground to a source of ignition (pilot light, heater, electric motor) some distance away. Containers, drums (even empty) can explode when heat (welding, cutting, etc.) is applied.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Water may be ineffective on flames, but should be used to keep fire-exposed containers cool. Large fires, such as tank fires, should be fought with caution. If possible, pump the contents from the tank and keep adjoining structures cool and protect personnel. Avoid spreading burning liquid with water used for cooling purposes. Do not flush down public sewers. The use of a self-contained breathing apparatus and protective clothing is recommended for fire fighters. Avoid inhalation of vapors.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Keep unnecessary and unprotected personnel from entering. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Methods and materials for containment and cleaning up

Spill : Contain with dikes or absorbent to prevent migration to sewers/streams. Take up small spill with dry chemical absorbent; large spills may require pump or vacuum prior to absorbent. May require excavation of severely contaminated soil.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking.

Conditions for safe storage, including any incompatibilities : Do not store above the following temperature: 113°C (235.4°F). Odorous and toxic fumes may form from the decomposition of this product if stored at excessive temperatures for extended periods of time. Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Toluene	**NIOSH REL (United States, 6/2009).** STEL: 560 mg/m³ 15 minutes. STEL: 150 ppm 15 minutes. TWA: 375 mg/m³ 10 hours. TWA: 100 ppm 10 hours. **OSHA PEL Z2 (United States, 11/2006).** AMP: 500 ppm 10 minutes. CEIL: 300 ppm TWA: 200 ppm 8 hours. **ACGIH TLV (United States, 3/2012).** TWA: 20 ppm 8 hours.
Xylene	**ACGIH TLV (United States, 3/2012).** STEL: 651 mg/m³ 15 minutes. STEL: 150 ppm 15 minutes. TWA: 434 mg/m³ 8 hours. TWA: 100 ppm 8 hours. **OSHA PEL (United States, 6/2010).** TWA: 100 ppm 8 hours.

	TWA: 435 mg/m³ 8 hours.
Tert-butyl methyl ether	**ACGIH TLV (United States, 1/2005).** TWA: 50 ppm 8 hours. Form: All forms. **ACGIH TLV (United States, 2/2010).** TWA: 50 ppm 8 hours.
Benzene	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** STEL: 8 mg/m³ 15 minutes. STEL: 2.5 ppm 15 minutes. TWA: 1.6 mg/m³ 8 hours. TWA: 0.5 ppm 8 hours. **NIOSH REL (United States, 6/2009).** STEL: 1 ppm 15 minutes. TWA: 0.1 ppm 10 hours. **OSHA PEL (United States, 6/2010).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. **OSHA PEL Z2 (United States, 11/2006).** AMP: 50 ppm 10 minutes. CEIL: 25 ppm TWA: 10 ppm 8 hours.
1,2,4-Trimethylbenzene	**ACGIH TLV (United States, 3/2012).** TWA: 123 mg/m³ 8 hours. TWA: 25 ppm 8 hours. **NIOSH REL (United States, 1/2013).** TWA: 125 mg/m³ 10 hours. TWA: 25 ppm 10 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 25 ppm 8 hours. TWA: 125 mg/m³ 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2012).** TWA: 20 ppm 8 hours. **NIOSH REL (United States, 6/2009).** STEL: 545 mg/m³ 15 minutes. STEL: 125 ppm 15 minutes. TWA: 435 mg/m³ 10 hours. TWA: 100 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 435 mg/m³ 8 hours. TWA: 100 ppm 8 hours.
n-Hexane	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** TWA: 50 ppm 8 hours. **NIOSH REL (United States, 6/2009).** TWA: 180 mg/m³ 10 hours. TWA: 50 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 1800 mg/m³ 8 hours. TWA: 500 ppm 8 hours.
Naphthalene	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** STEL: 79 mg/m³ 15 minutes. STEL: 15 ppm 15 minutes. TWA: 52 mg/m³ 8 hours. TWA: 10 ppm 8 hours. **NIOSH REL (United States, 1/2013).** STEL: 75 mg/m³ 15 minutes. STEL: 15 ppm 15 minutes. TWA: 50 mg/m³ 10 hours. TWA: 10 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 50 mg/m³ 8 hours. TWA: 10 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Recommended: Splash goggles and a face shield, where splash hazard exists.

Skin protection

Hand protection : 4 - 8 hours (breakthrough time): Nitrile gloves.

Body protection : Recommended: Long sleeved coveralls.

Other skin protection : Recommended: Impervious boots.

Respiratory protection : If ventilation is inadequate, use a NIOSH-certified respirator with an organic vapor cartridge and P95 particulate filter.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Reddish golden brown.

Odor : Gasoline

Odor threshold : 10 ppm

pH : Not available.

Melting point : Not available.

Boiling point : 26.66°C (80°F)

Flash point : Closed cup: -40°C (-40°F) [Pensky-Martens.]

Flammability : Not available.

Lower and upper explosive (flammable) limits : Lower: 1.4%
Upper: 7.6%

Relative density : 0.72

Evaporation rate : Slower.

Solubility : Insoluble in the following materials: cold water and hot water.

Solubility in water : Negligible.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : 257.22 to 454.44°C (495 to 850°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not available.

Vapor pressure : 53.3 kPa (400 mm Hg) (68°F)

Vapor density : 4 [Air = 1]

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Toluene	LC50 Inhalation Vapor	Rat	49 g/m³	4 hours
	LD50 Oral	Rat	636 mg/kg	-
Xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
Tert-butyl methyl ether	LC50 Inhalation Gas.	Rat	23576 ppm	4 hours
	LC50 Inhalation Vapor	Rat	41000 mg/m³	4 hours
	LD50 Oral	Rat	>4 g/kg	-
Benzene	LD50 Oral	Rat	930 mg/kg	-
1,2,4-Trimethylbenzene	LC50 Inhalation Vapor	Rat	18000 mg/m³	4 hours
	LD50 Oral	Rat	5 g/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
n-Hexane	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
	LD50 Oral	Rat	15840 mg/kg	-
Butyl ethyl ether	LD50 Oral	Rat	1870 mg/kg	-
Naphthalene	LD50 Dermal	Rabbit	>20 g/kg	-
	LD50 Oral	Rat	490 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Toluene	Eyes - Mild irritant	Rabbit	-	0.5 minutes 100 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Eyes - Mild irritant	Rabbit	-	870 µg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 mg	-
	Skin - Mild irritant	Pig	-	24 hours 250 µL	-
	Skin - Mild irritant	Rabbit	-	435 mg	-
	Skin - Moderate irritant	Rabbit	-	500 mg	-
Xylene	Eyes - Mild irritant	Rabbit	-	87 mg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 mg	-
	Skin - Mild irritant	Rat	-	8 hours 60 µL	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 mg	-
	Skin - Moderate irritant	Rabbit	-	100%	-
Benzene	Eyes - Moderate irritant	Rabbit	-	88 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 mg	-
	Skin - Mild irritant	Rat	-	8 hours 60 µL	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 mg	-
Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 mg	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 mg	-
n-Hexane	Eyes - Mild irritant	Rabbit	-	10 mg	-
Naphthalene	Skin - Mild irritant	Rabbit	-	495 mg	-
	Skin - Severe irritant	Rabbit	-	24 hours 0.05 mL	-

Sensitization

Skin : There is no data available.

Respiratory : There is no data available.

Mutagenicity

There is no data available.

Carcinogenicity

There is no data available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Toluene	-	3	-
Xylene	-	3	-
Tert-butyl methyl ether	-	3	-
Benzene	+	1	Known to be a human carcinogen.
Ethylbenzene	-	2B	-
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

There is no data available.

Teratogenicity

There is no data available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Toluene	Category 3	Not applicable.	Narcotic effects
1,2,4-Trimethylbenzene	Category 3	Not applicable.	Respiratory tract irritation
n-Hexane	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Toluene	Category 2	Not determined	Not determined
Benzene	Category 1	Not determined	Not determined
n-Hexane	Category 2	Not determined	Not determined

Aspiration hazard

Name	Result
Toluene	ASPIRATION HAZARD - Category 1
Benzene	ASPIRATION HAZARD - Category 1
n-Hexane	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Dermal contact. Eye contact. Inhalation. Ingestion.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Toluene	Acute EC50 433 ppm Marine water	Algae - Skeletonema costatum	96 hours
	Acute EC50 12500 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 11600 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus - Adult	48 hours
	Acute EC50 6000 µg/l Fresh water	Daphnia - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	Acute LC50 5500 µg/l Fresh water	Fish - Oncorhynchus kisutch - Fry	96 hours
	Chronic NOEC 500000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Daphnia - Daphnia magna	21 days
Xylene	Acute IC50 10 mg/L	Algae	72 hours
	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Tert-butyl methyl ether	Acute LC50 672000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Benzene	Acute EC50 29000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1360000 µg/l Fresh water	Algae - Scenedesmus abundans	96 hours
	Acute EC50 9230 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 21000 µg/l Marine water	Crustaceans - Artemia salina - Nauplii	48 hours
	Acute LC50 5.28 ul/L Fresh water	Fish - Oncorhynchus gorbuscha - Fry	96 hours
	Chronic NOEC 1.5 to 5.4 ul/L Marine water	Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)	4 weeks
1,2,4-Trimethylbenzene	Acute LC50 4910 µg/l Marine water	Crustaceans - Elasmopus pectenicrus - Adult	48 hours
	Acute LC50 22.4 mg/L Fresh water	Fish - Tilapia zillii	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 2970 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 5200 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
n-Hexane	Acute LC50 113000 µg/l Fresh water	Fish - Oreochromis mossambicus	96 hours
Naphthalene	Acute EC50 1600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours

Persistence and degradability

There is no data available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Toluene	2.73	90	low
Xylene	3.12	8.1 to 25.9	low
Tert-butyl methyl ether	1.04	1.5	low
Benzene	2.13	11	low
1,2,4-Trimethylbenzene	3.63	243	low
Ethylbenzene	3.6	-	low
n-Hexane	4	501.187	high
Butyl ethyl ether	2.03	-	low
Naphthalene	3.4	36.5 to 168	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : There is no data available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Section 14. Transport information

DOT IDENTIFICATION NUMBER UN1203 **DOT proper shipping name** GASOLINE (Toluene, Xylene) RQ (Benzene, Xylene)

DOT Hazard Class(es) 3 **PG** I **DOT EMER. RESPONSE GUIDE NO.** 128

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) PAIR**: Naphthalene
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Water Act (CWA) 307: Toluene; Benzene; Ethylbenzene; Naphthalene
Clean Water Act (CWA) 311: Toluene; Xylene; Benzene; Ethylbenzene; Naphthalene

Clean Air Act Section 602 Class I Substances : Not listed
Clean Air Act Section 602 Class II Substances : Not listed
Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Listed

DEA List I Chemicals (Precursor Chemicals) : Not listed
DEA List II Chemicals (Essential Chemicals) : Listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Toluene	10 - 30	Yes.	No.	No.	Yes.	Yes.
Xylene	10 - 30	Yes.	No.	No.	Yes.	No.
Tert-butyl methyl ether	10 - 30	Yes.	No.	No.	Yes.	No.
Benzene	1 - 5	Yes.	No.	No.	Yes.	Yes.
1,2,4-Trimethylbenzene	1 - 5	Yes.	No.	No.	Yes.	No.
Ethylbenzene	1 - 5	Yes.	No.	No.	Yes.	Yes.
n-Hexane	1 - 5	Yes.	No.	No.	Yes.	Yes.
Butyl ethyl ether	0.1 - 1	Yes.	No.	No.	Yes.	No.
Naphthalene	0.1 - 1	No.	No.	No.	Yes.	Yes.

SARA 313 : This product (does/not) contain toxic chemicals subject to the reporting requirements of SARA Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372.

Product name	CAS number	%
Toluene	108-88-3	Up to 18.1
Xylene	1330-20-7	Up to 15.3
Benzene	71-43-2	Up to 5.3
1,2,4-Trimethylbenzene	95-63-6	Up to 4.8
Ethylbenzene	100-41-4	Up to 2.6
n-Hexane	110-54-3	Up to 4
Naphthalene	91-20-3	Up to 1

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether

New York : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; Ethylbenzene; n-Hexane; Naphthalene

New Jersey : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether; Naphthalene

Pennsylvania : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether; Naphthalene

California Prop. 65 : **WARNING:** This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Toluene	No.	Yes.	No.	7000 µg/day (ingestion) 13000 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Naphthalene	Yes.	No.	Yes.	No.

Section 16. Other information

Revision date : 11/15/2013 **Supersedes** : 01/23/2013

Revised Section(s) : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16. **Prepared by** : KMK Regulatory Services Inc.

Notice to reader
THE INFORMATION CONTAINED IN THIS SDS RELATES ONLY TO THE SPECIFIC MATERIAL IDENTIFIED. IT DOES NOT COVER USE OF THAT MATERIAL IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PARTICULAR PROCESS. IN COMPLIANCE WITH 29 C.F.R. 1910.1200(g), CHS HAS PREPARED THIS SDS IN SEGMENTS, WITH THE INTENT THAT THOSE SEGMENTS BE READ TOGETHER AS A WHOLE WITHOUT TEXTUAL OMISSIONS OR ALTERATIONS. CHS BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE, BUT MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESS OR IMPLIED, ABOUT THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THE INFORMATION OR ABOUT THE FITNESS OF CONTENTS HEREIN FOR EITHER GENERAL OR PARTICULAR PURPOSES. PERSONS REVIEWING THIS SDS SHOULD MAKE THEIR OWN DETERMINATION AS TO THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATIONS.

RegenOx® – Part A (Oxidizer Complex)

Material Safety Data Sheet (MSDS)

Last Revised: June 24, 2010

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H_2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.
Chemical Family:	Inorganic Chemicals
Trade Name:	RegenOx® – Part A (Oxidizer Complex)
Product Use:	Used to remediate contaminated soil and groundwater (environmental applications)

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical	Percentage
15630-89-4	Sodium Percarbonate	60 -100 %
5968-11-6	Sodium Carbonate Monohydrate	10 – 30 %
7699-11-6	Silicic Acid	< 1 %
63231-67-4	Silica Gel	< 1 %

Section 3 – Physical Data

Form:	Powder
Color:	White
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA

Section 3 – Physical Data (cont)	
Flammability/Flash Point:	NA
Vapor Pressure:	NA
Bulk Density:	0.9 – 1.2 g/cm^3
Solubility:	Min 14.5g/100g water @ 20 ºC
Viscosity:	NA
pH (3% solution):	≈ 10.5
Decomposition Temperature:	Self-accelerating decomposition with oxygen release starts at 50 ºC.

Section 4 – Reactivity Data	
Stability:	Stable under normal conditions
Conditions to Avoid/Incompatibility:	Acids, bases, salts of heavy metals, reducing agents, and flammable substances
Hazardous Decomposition Products:	Oxygen. Contamination with many substances will cause decomposition. The rate of decomposition increases with increasing temperature and may be very vigorous with rapid generation of oxygen and steam.

Section 5 – Regulations	
TSCA Inventory Listed:	Yes
CERCLA Hazardous Substance (40 CFR Part 302)	
Listed Substance:	*No*
Unlisted Substance:	*Yes*
SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know	
Extremely Hazardous Substance:	No
WHMIS Classification:	C, D2B
Canadian Domestic Substance List:	Appears

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Oxidizer. Store in a cool, well ventilated area away from all sources of ignition and out of the direct sunlight. Store in a dry location away from heat and in temperatures less than 40 °C. Keep away from incompatible materials and keep lids tightly closed. Do not store in improperly labeled containers. Protect from moisture. Do not store near combustible materials. Keep containers well sealed. Store separately from reducing materials. Avoid contamination which may lead to decomposition.
Handling:	Avoid contact with eyes, skin and clothing. Use with adequate ventilation. Do not swallow. Avoid breathing vapors, mists or dust. Do not eat, drink or smoke in the work area. Label containers and keep them tightly closed when not in use. Wash hands thoroughly after handling.

Personal Protective Equipment (PPE)

Engineering Controls:	General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Avoid creating dust or mists. Maintain adequate ventilation at all times. Do not use in confined areas. Keep levels below recommended exposure limits. To determine actual exposure limits, monitoring should be performed on a routine basis.
Respiratory Protection:	For many conditions, no respiratory protection is necessary; however, in dusty or unknown conditions or when exposures exceed limit values a NIOSH approved respirator should be used.
Hand Protection:	Wear chemical resistant gloves (neoprene, rubber, or PVC).

Section 6 – Protective Measures, Storage and Handling (cont)

Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Chemical resistant gloves (neoprene, PVC or rubber) and protective clothing should be worn during use.
Other:	Eye wash station.
Protection Against Fire & Explosion:	Product is non-explosive. In case of fire, evacuate all non-essential personnel, wear protective clothing and a self-contained breathing apparatus, stay upwind of fire, and use water to spray cool fire-exposed containers.

Section 7 – Hazards Identification

Potential Health Effects

Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes slight irritation.
Ingestion:	May be harmful if swallowed (vomiting and diarrhea).

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage:	Eliminate all ignition sources. Evacuate unprotected personnel and never exceed any occupational exposure limit. Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.
Extinguishing Media:	Water

First Aid

Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **Do Not** induce vomiting.

Section 8 – Measures in Case of Accidents and Fire (cont)

Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water.

Section 9 – Accidental Release Measures

Precautions:	
Cleanup Methods:	Shovel or sweep spilt material into plastic bags or vented containers for disposal. Do not return spilled or contaminated material to the inventory.

Section 10 – Information on Toxicology

Toxicity Data	
LD50 Oral (rat):	2,400 mg/kg
LD50 Dermal (rabbit):	Min 2,000 mg/kg
LD50 Inhalation (rat):	Min 4,580 mg/kg

Section 11 – Information on Ecology

Ecology Data	
Ecotoxicological Information:	NA

Section 12 – Disposal Considerations

Waste Disposal Method	
Waste Treatment:	Dispose of in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T. Shipping Name:	Oxidizing Solid, N.O.S. [A mixture of sodium percarbonate [$2Na_2CO_3 \cdot 3H2O_2$], sodium carbonate [Na_2CO_3], sodium silicate and silica gel.]
UN Number:	1479
Hazard Class:	5.1
Labels:	5.1 (Oxidizer)
Packaging Group:	III

Section 14 – Other Information

HMIS® Rating	Health – 1 (slight)	Reactivity – 1 (slight)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat

HMIS® is a registered trademark of the National Painting and Coating Association.

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

RegenOx® – Part B (Activator Complex)

Material Safety Data Sheet (MSDS)

Last Revised: June 4, 2010

Section 1 – Supplier Information and Material Identification

Supplier:

REGENESIS
1011 Calle Sombra
San Clemente, CA 92673
Telephone: 949.366.8000
Fax: 949.366.8090
E-mail: info@regenesis.com

Chemical Description:	A mixture of sodium silicate solution, silica gel and ferrous sulfate
Chemical Family:	Inorganic Chemicals
Trade Name:	RegenOx® – Part B (Activator Complex)
Product Use:	Used for environmental remediation of contaminated soils and groundwater

Section 2 – Chemical Information/Other Designations

CAS No.	Chemical
1344-09-8	Silicic Acid, Sodium Salt, Sodium Silicate
63231-67-4	Silica Gel
7720-78-7	Ferrous Sulfate
7732-18-5	Water

Section 3 – Physical Data

Form:	Liquid
Color:	Blue/Green
Odor:	Odorless
Melting Point:	NA
Boiling Point:	NA
Flammability/Flash Point:	NA
Vapor Pressure:	NA

Section 3 – Physical Data (cont)	
Specific Gravity	1.39 g/cm^3
Solubility:	Miscible
Viscosity:	NA
pH (3% solution):	11
Hazardous Decomposition Products:	Oxides of carbon and silicon may be formed when heated to decomposition.

Section 4 – Reactivity Data	
Stability:	Stable under normal conditions.
Conditions to Avoid:	None.
Incompatibility:	Avoid hydrogen fluoride, fluorine, oxygen difluoride, chlorine trifluoride, strong acids, strong bases, oxidizers, aluminum, fiberglass, copper, brass, zinc, and galvanized containers.

Section 5 – Regulations	
TSCA Inventory Listed:	Yes
CERCLA Hazardous Substance (40 CFR Part 302)	
Listed Substance:	*No*
Unlisted Substance:	*Yes*
SARA, Title III, Sections 302/303 (40 CFR Part 355) – Emergency Planning and Notification	
Extremely Hazardous Substance:	No
SARA, Title III, Sections 311/312 (40 CFR Part 370) – Hazardous Chemical Reporting: Community Right-To-Know	
Hazard Category:	Acute
SARA, Title III, Sections 313 (40 CFR Part 372) – Toxic Chemical Release Reporting: Community Right-To-Know	
Extremely Hazardous Substance:	No

Section 6 – Protective Measures, Storage and Handling

Technical Protective Measures

Storage:	Keep in a tightly closed container (steel or plastic) and store in a cool, well ventilated area away from all incompatible materials (acids, reactive metals, and ammonium salts). Store in a dry location away from heat above 60 degrees C and colder than 10 degrees C. Do not store in aluminum, fiberglass, copper, brass, zinc or galvanized containers.
Handling:	Avoid contact with eyes, skin and clothing. Avoid breathing spray mist. Use with adequate ventilation. Do not use product if it is brownish-yellow in color.

Personal Protective Equipment (PPE)

Engineering Controls:	General room ventilation is required if used indoors. Local exhaust ventilation, process enclosures or other engineering controls may be needed to maintain airborne levels below recommended exposure limits. Safety shower and eyewash station should be within direct access.
Respiratory Protection:	Use NIOSH-approved dust and mist respirator where spray mist exists. Respirators should be used in accordance with 29 CFR 1910.134.
Hand Protection:	Wear chemical resistant gloves.
Eye Protection:	Wear chemical safety goggles. A full face shield may be worn in lieu of safety goggles.
Skin Protection:	Try to avoid skin contact with this product. Gloves and protective clothing should be worn during use.
Other:	
Protection Against Fire & Explosion:	Product is non-explosive and non-combustible.

Section 7 – Hazards Identification

Potential Health Effects

Inhalation:	Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath, and irritations to mucous membranes, nose and throat.
Eye Contact:	Causes irritation, redness and pain.
Skin Contact:	Causes irritation. Symptoms include redness, itching and pain.
Ingestion:	May cause irritation to mouth, esophagus, and stomach.

Section 8 – Measures in Case of Accidents and Fire

After Spillage/Leakage (small):	Mop up and neutralize liquid, then discharge to sewer in accordance with local, state and federal regulations.
After Spillage/Leakage (large):	Keep unnecessary personnel away; isolate hazard area and do not allow entrance into the affected area. Do not touch or walk through spilled material. Stop leak if possible without risking injury. Prevent runoff from entering into storm sewers and ditches that lead to natural waterways. Isolate the material if at all possible. Sand or earth may be used to contain the spill. If containment is not possible, neutralize the contaminated area and flush with large quantities of water.
Extinguishing Media:	Material is compatible with all extinguishing media.
Further Information:	

First Aid

Eye Contact:	Flush eyes with running water for at least 15 minutes with eyelids held open. Seek a specialist.
Inhalation:	Remove affected person to fresh air. Give artificial respiration if individual is not breathing. If breathing is difficult, give oxygen. Seek medical attention if the effects persist.
Ingestion:	If the individual is conscious and not convulsing, give two-four cups of water to dilute the chemical and seek medical attention immediately. **DO NOT** induce vomiting.
Skin Contact:	Wash affected areas with soap and a mild detergent and large amounts of water. Remove contaminated clothing and shoes.

Section 9 – Accidental Release Measures

Precautions:

PPE:	Wear chemical goggles, body-covering protective clothing, chemical resistant gloves, and rubber boots (see Section 6).
Environmental Hazards:	Sinks and mixes with water. High pH of this material may be harmful to aquatic life. Only water will evaporate from a spill of this material.
Cleanup Methods:	Pick-up and place in an appropriate container for reclamation or disposal. US regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

Section 10 – Information on Toxicology

Toxicity Data

Sodium Silicate:	When tested for primary eye irritation potential according to OECD Guidelines, Section 405, a similar sodium silicate solution produced corneal, iridal and conjunctival irritation. Some eye irritation was still present 14 days after treatment, although the average primary irritation score has declined from 29.7 after 1 day to 4.0 after 14 days. When tested for primary skin irritation potential, a similar sodium silicate solution produced irritation with a primary irritation index of 3 to abraded skin and 0 to intact skin. Human experience confirms that irritation occurs when sodium silicates get on clothes at the collar, cuffs, or other areas where abrasion may exist. The acute oral toxicity of this product has not been tested.
Ferrous Sulfate:	LD50 Oral (rat): 319 mg/kg not a suspected carcinogen.

Section 11 – Information on Ecology

Ecology Data

Ecotoxicological Information:	Based on 100% solid sodium silicate, a 96 hour median tolerance for fish of 2,320 mg/l; a 96 hour median tolerance for water fleas of 247 mg/L; a 96 hour median tolerance for snail eggs of 632 mg/L; and a 96 hour median tolerance for Amphipoda of 160 mg/L.

Section 12 – Disposal Considerations

Waste Disposal Method

Waste Treatment:	Neutralize and landfill solids in an approved waste facility operated by an authorized contactor in compliance with local regulations.
Package (Pail) Treatment:	The empty and clean containers are to be recycled or disposed of in conformity with local regulations.

Section 13 – Shipping/Transport Information

D.O.T.	This product is not regulated as a hazardous material so there are no restrictions.

Section 14 – Other Information

HMIS® Rating	Health – 2 (moderate)	Reactivity – 0 (none)
	Flammability – 0 (none)	Lab PPE – goggles, gloves, and lab coat
	Contact – 1 (slight)	

HMIS® is a registered trademark of the National Painting and Coating Association.

Section 15 – Further Information

The information contained in this document is the best available to the supplier at the time of writing, but is provided without warranty of any kind. Some possible hazards have been determined by analogy to similar classes of material. The items in this document are subject to change and clarification as more information become available. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

SAFETY DATA SHEET

SILVER

Section 1. Identification

GHS product identifier	:	SILVER
Chemical name	:	Mixture
CAS number	:	Mixture
Other means of identification	:	CC01054908
Product type	:	liquid

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

Product use	:	Industrial applications. Plastics.
Supplier's details	:	**POLYONE CORPORATION** ColorMatrix Group Inc. 680 North Rocky River Drive, Berea, Ohio, 44017-1628, USA +1 216 622 0100
Emergency telephone number (with hours of operation)	:	**CHEMTREC 1-800-424-9300 (24hrs for spill, leak, fire, exposure or accident).**

Section 2. Hazards identification

This mixture has not been evaluated as a whole for health effects. Information provided on health effects of this product is based on the individual components. However, some vapors or contaminants may be released upon heating and the end-user (fabricator) must take the necessary precautions (mechanical ventilation, respiratory protection, etc.) to protect employees from exposure. See sections 8 and 11 for special precautions. After handling, always wash hands thoroughly with soap and water.

OSHA/HCS status	:	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	:	SKIN CORROSION/IRRITATION - Category 2

GHS label elements

Hazard pictograms :



Signal word : Warning
Hazard statements : Causes skin irritation.

Precautionary statements

General : Not applicable.
Prevention : Wear protective gloves. Wash hands thoroughly after handling.
Response : IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention.
Storage : Not applicable.
Disposal : Not applicable.
Supplemental label elements : None known.
Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Chemical name : Mixture
Other means of identification : CC01054908

CAS number/other identifiers

Ingredient name	%	CAS number
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	Not available.
Titanium dioxide	10 - 30	13463-67-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	:	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	:	Causes serious eye irritation.
Inhalation	:	No known significant effects or critical hazards.
Skin contact	:	Causes skin irritation.
Ingestion	:	Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact	:	Adverse symptoms may include the following: pain or irritation

watering
redness

Inhalation	:	No specific data.
Skin contact	:	Adverse symptoms may include the following: irritation redness
Ingestion	:	No specific data.

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

Notes to physician	:	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	:	No specific treatment.
Protection of first-aiders	:	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media	:	In case of fire, use water spray (fog), foam, dry chemical or CO_2.
Unsuitable extinguishing media	:	None known.
Specific hazards arising from the chemical	:	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	:	Decomposition products may include the following materials: carbon dioxide carbon monoxide metal oxide/oxides
Special protective actions for fire-fighters	:	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	:	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	:	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
For emergency responders	:	If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	:	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill	:	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	:	Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	:	Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene	:	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
Conditions for safe storage, including any incompatibilities	:	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Titanium dioxide	**OSHA PEL 1989 (1989-03-01)** PEL: Permissible Exposure Level 10 mg/m3 Form: Total dust **OSHA PEL (1993-06-30)** PEL: Permissible Exposure Level 15 mg/m3 Form: Total dust **ACGIH TLV (1996-05-18)** TLV-TWA: Threshold Limit Value - Time weighted average PEL: Permissible Exposure Level 10 mg/m3

Appropriate engineering controls	:	Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
Environmental exposure controls	:	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures	:	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated

clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : liquid [liquid]
Color : SILVER
Odor : Faint odor.
Odor threshold : Not available.
pH : Not available.
Melting point : Not available.
Boiling point : Not available.
Flash point : Not available.
Burning time : Not available.

Burning rate	:	Not available.
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	**Lower:** Not available. **Upper:** Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Relative density	:	Not available.
Solubility	:	Not available.
Solubility in water	:	insoluble in water.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	**Dynamic:** Not available. **Kinematic:** Not available.

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	Stable under recommended storage and handling conditions (see Section 7).
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Keep away from extreme heat and oxidizing agents.
Incompatible materials	:	Keep away from strong acids. Oxidizer.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

This mixture has not been evaluated as a whole for health effects. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Titanium dioxide				

	LC50 Inhalation	Rat - Male	6.82 Mg/l	4 h
	LD50 Dermal	Rabbit	> 5,000 mg/kg	-

Conclusion/Summary : Mixture.Not fully tested.

Irritation/Corrosion

Conclusion/Summary
Skin : Mixture.Not fully tested.
Eyes : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Sensitization

Conclusion/Summary
Skin : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Mutagenicity

Conclusion/Summary : Mixture.Not fully tested.

Carcinogenicity

Conclusion/Summary : Mixture.Not fully tested.

Classification

Product/ingredient name	OSHA	IARC	NTP
Titanium dioxide		2B	

Reproductive toxicity

Conclusion/Summary : Mixture.Not fully tested.

Teratogenicity

Conclusion/Summary : Mixture.Not fully tested.

Specific target organ toxicity (single exposure)
Not available.

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard

Product/ingredient name	Result

Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.
Inhalation : No known significant effects or critical hazards.
Skin contact : Causes skin irritation.
Ingestion : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness
Inhalation : No specific data.
Skin contact : Adverse symptoms may include the following:
irritation
redness
Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

Conclusion/Summary : Mixture.Not fully tested.

General : No known significant effects or critical hazards.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (dusts and mists)	8.073 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Titanium dioxide			
	Acute LC50 > 1,000,000 µg/l Marine water	Fish - Mummichog	96 h
	Acute LC50 > 1,000 mg/l Fresh water	Fish - Fathead minnow	96 h
	Acute LC50 13 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute LC50 6.5 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 19.3 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 27.8 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 35.306 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h

Conclusion/Summary : Not available.

Persistence and degradability

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
Titanium dioxide		352.00	low

Mobility in soil

Soil/water partition coefficient (KOC)	:	Not available.
Other adverse effects	:	No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Acute hazardous waste "P" List: Not listed

United States - RCRA Toxic hazardous waste "U" List: Not listed

Section 14. Transport information

U.S. DOT Classification	:	Not regulated for transportation.
ICAO/IATA	:	Not classified as dangerous good under transport regulations.
IMO/IMDG (maritime)	:	Not classified as dangerous good under transport regulations.

Section 15. Regulatory information

U.S. Federal regulations : **United States - TSCA 12(b) - Chemical export notification:** None of the components are listed.
United States - TSCA 4(a) - Final Test Rules: Not listed
United States - TSCA 4(a) - ITC Priority list: Not listed
United States - TSCA 4(a) - Proposed test rules: Not listed

United States - TSCA 4(f) - Priority risk review: Not listed
United States - TSCA 5(a)2 - Final significant new use rules: Not listed
United States - TSCA 5(a)2 - Proposed significant new use rules: Not listed
United States - TSCA 5(e) - Substances consent order: Not listed
United States - TSCA 6 - Final risk management: Not listed
United States - TSCA 6 - Proposed risk management: Not listed
United States - TSCA 8(a) - Chemical risk rules: Not listed
United States - TSCA 8(a) - Dioxin/Furane precusor: Not listed
United States - TSCA 8(a) - Chemical Data Reporting (CDR): Not determined
United States - TSCA 8(a) - Preliminary assessment report (PAIR): Not listed
United States - TSCA 8(c) - Significant adverse reaction (SAR): Not listed
United States - TSCA 8(d) - Health and safety studies: Not listed
United States - EPA Clean water act (CWA) section 307 - Priority pollutants: Listed **Chromium (III) oxide**

United States - EPA Clean water act (CWA) section 311 - Hazardous substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Flammable substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Toxic substances: Not listed
United States - Department of commerce - Precursor chemical: Not listed

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	:	Not listed
Clean Air Act Section 602 Class I Substances	:	Not listed
Clean Air Act Section 602 Class II Substances	:	Not listed
DEA List I Chemicals (Precursor Chemicals)	:	Not listed
DEA List II Chemicals (Essential Chemicals)	:	Not listed

US. EPA CERCLA Hazardous Substances (40 CFR 302)

not applicable

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Classification
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	AH
Titanium dioxide	10 - 30	CH

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Aluminum	7429-90-5	1 - 5
Supplier notification	Aluminum	7429-90-5	1 - 5

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed:
Mica
Titanium dioxide
Aluminum

New York : None of the components are listed.

New Jersey : The following components are listed:
Mica
Titanium dioxide
Aluminum

Pennsylvania : The following components are listed:
Titanium dioxide
Aluminum

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada inventory : All components are listed or exempted.

International regulations

International lists	:	**Australia inventory (AICS):** Not determined. **Taiwan inventory (CSNN):** Not determined. **Malaysia Inventory (EHS Register):** Not determined. **EINECS:** All components are listed or exempted. **Japan inventory:** Not determined. **China inventory (IECSC):** All components are listed or exempted. **Korea inventory:** All components are listed or exempted. **New Zealand Inventory of Chemicals (NZIoC):** Not determined. **Philippines inventory (PICCS):** All components are listed or exempted.
Chemical Weapons Convention List Schedule I Chemicals	:	Not listed
Chemical Weapons Convention List Schedule II Chemicals	:	Not listed
Chemical Weapons Convention List Schedule III Chemicals	:	Not listed

Section 16. Other information

History

Date of printing	:	06/04/2015
Date of issue/Date of revision	:	06/03/2015
Date of previous issue	:	11/20/2014
Version	:	1.1
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	:	Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution.

Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Particularly this information may not be valid for such material used in conjunction with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

1. Identification

Product identifier: Trichloroethylene

Other means of identification
Product No.: 9464, 8600, 9458, 9454

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	
	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard Classification

Health Hazards

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2A
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1B
Specific Target Organ Toxicity - Single Exposure	Category 3

Environmental Hazards

Chronic hazards to the aquatic environment	Category 3

Label Elements

Hazard Symbol:



Signal Word: Danger

Hazard Statement: May cause cancer.
Suspected of causing genetic defects.
Causes serious eye irritation.
Causes skin irritation.
Harmful to aquatic life with long lasting effects.

Precautionary Statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid release to the environment.

Response: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse. Call a POISON CENTER or doctor/physician if you feel unwell. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
TRICHLOROETHYLENE		79-01-6	99 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Rinse mouth. Get medical attention if symptoms occur. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention if symptoms persist. If breathing stops, provide artificial respiration.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation persists after washing. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if irritation persists after washing.

Most important symptoms/effects, acute and delayed

Symptoms: Irritating to eyes, respiratory system and skin.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical: Contact with metals may evolve flammable hydrogen gas. Fire may produce irritating, corrosive and/or toxic gases.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Keep unauthorized personnel away. Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental Precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling: Use personal protective equipment as required. Do not breathe mist or vapor. Do not taste or swallow. Do not eat, drink or smoke when using the product. Use only with adequate ventilation. Wash hands thoroughly after handling. See Section 8 of the MSDS for Personal Protective Equipment. Avoid contact with eyes. Avoid contact with skin. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing dust/fume/gas/mist/vapors/spray. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities: Store locked up. Keep in a cool, well-ventilated place. Store in a dry place.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	Type	Exposure Limit Values	Source
TRICHLOROETHYLENE	TWA	10 ppm	US. ACGIH Threshold Limit Values (2011)
	STEL	25 ppm	US. ACGIH Threshold Limit Values (2011)
	REL	25 ppm	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	TWA	50 ppm 270 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	200 ppm 1,080 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	100 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	Ceiling	200 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	MAX. CONC	300 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	AN ESL	54 µg/m3	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (12 2010)

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
TRICHLOROETHYLENE (Trichloroacetic acid: Sampling time: End of shift at end of work week.)	15 mg/l (Urine)	ACGIH BEL (03 2013)
TRICHLOROETHYLENE (Trichloroethanol, without hydrolysis: Sampling time: End of shift at end of work week.)	0.5 mg/l (Blood)	ACGIH BEL (03 2013)

Appropriate Engineering Controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin Protection

Hand Protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory Protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Observe good industrial hygiene practices. Wash hands before breaks and immediately after handling the product. Do not eat, drink or smoke when using the product. Wash contaminated clothing before reuse.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Ether-like odor
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	-84.7 °C
Initial boiling point and boiling range:	87.2 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	10.5 %(V) 90 %(V)
Flammability limit - lower (%):	8 %(V) 12.5 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	9.2 kPa (25 °C)
Vapor density:	4.53 AIR=1
Relative density:	1.47 (20 °C)
Solubility(ies)	
Solubility in water:	1 g/l (20 °C)
Solubility (other):	acetone: Soluble ethanol: Soluble
Partition coefficient (n-octanol/water):	2.61
Auto-ignition temperature:	420 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.

Other information

Molecular weight: 131.39 g/mol (C_2HCl_3)

10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.

Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur.
Conditions to Avoid:	Heat, sparks, flames. Light. Moisture. Contact with incompatible materials.
Incompatible Materials:	Strong oxidizing agents. Alkalies. Caustics. Chemically active metals.
Hazardous Decomposition Products:	By heating and fire, toxic vapors/gases may be formed. Oxides of Carbon. Phosgene.

11. Toxicological information

Information on likely routes of exposure

Ingestion: May be harmful if swallowed.

Inhalation: May be harmful if inhaled.

Skin Contact: Causes skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 4,920 mg/kg

Dermal
Product: No data available.

Inhalation
Product: LC 50 (Rat, 4 h): 12000 ppm

Repeated Dose Toxicity
Product: No data available.

Skin Corrosion/Irritation
Product: Causes skin irritation.

Serious Eye Damage/Eye Irritation
Product: Causes serious eye irritation.

Respiratory or Skin Sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: May cause cancer.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

TRICHLOROETHYLENE	Overall evaluation: 1. Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

TRICHLOROETHYLENE	Reasonably Anticipated to be a Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: Suspected of causing genetic defects.

In vivo
Product: Suspected of causing genetic defects.

Reproductive Toxicity
Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure
Product: May cause respiratory irritation. May cause drowsiness or dizziness.

Specific Target Organ Toxicity - Repeated Exposure
Product: No data available.

Aspiration Hazard
Product: Not classified

Other Effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE — LC 50 (Fathead minnow (Pimephales promelas), 96 h): 31.4 - 71.8 mg/l Mortality
LC 50 (Bluegill (Lepomis macrochirus), 96 h): 39 - 54 mg/l Mortality
EC 50 (Fathead minnow (Pimephales promelas), 96 h): 18.4 - 28.5 mg/l Intoxication

Aquatic Invertebrates
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE — LC 50 (Water flea (Daphnia magna), 48 h): 12 - 26 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation
Product: There are no data on the degradability of this product.

BOD/COD Ratio
Product: No data available.

Bioaccumulative Potential
Bioconcentration Factor (BCF)
Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)
Product: Log Kow: 2.61

Mobility in Soil: The product is water soluble and may spread in water systems.

Other Adverse Effects: Harmful to aquatic life with long lasting effects.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated Packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN Number:	UN 1710
UN Proper Shipping Name:	Trichloroethylene
Transport Hazard Class(es)	
Class(es):	6.1
Label(s):	6.1
Packing Group:	III
Marine Pollutant:	No

IMDG

UN Number:	UN 1710
UN Proper Shipping Name:	TRICHLOROETHYLENE
Transport Hazard Class(es)	
Class(es):	6.1
Label(s):	6.1
EmS No.:	F-A, S-A
Packing Group:	III
Marine Pollutant:	No

IATA

UN Number:	UN 1710
Proper Shipping Name:	Trichloroethylene
Transport Hazard Class(es):	
Class(es):	6.1
Label(s):	6.1
Marine Pollutant:	No
Packing Group:	III

15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

X	Acute (Immediate)	X	Chronic (Delayed)		Fire		Reactive		Pressure Generating

SARA 302 Extremely Hazardous Substance
None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

Chemical Identity	RQ
TRICHLOROETHYLENE	100 lbs.

SARA 311/312 Hazardous Chemical

Chemical Identity	Threshold Planning Quantity
TRICHLOROETHYLENE	500 lbs

SARA 313 (TRI Reporting)

Chemical Identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
TRICHLOROETHYLENE	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65
TRICHLOROETHYLENE Carcinogenic.
TRICHLOROETHYLENE Male reproductive toxin.
TRICHLOROETHYLENE Developmental toxin.

US. New Jersey Worker and Community Right-to-Know Act
TRICHLOROETHYLENE Listed

US. Massachusetts RTK - Substance List
TRICHLOROETHYLENE Listed

US. Pennsylvania RTK - Hazardous Substances
TRICHLOROETHYLENE Listed

US. Rhode Island RTK
TRICHLOROETHYLENE Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	Not in compliance with the inventory.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan ISHL Listing:	On or in compliance with the inventory
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue Date:	01-08-2015
Revision Date:	No data available.
Version #:	1.1
Further Information:	No data available.

Disclaimer:

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SAFETY DATA SHEET

Creation Date 10-Dec-2009 **Revision Date** 06-Nov-2015 **Revision Number** 2

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **AC167890000; AC167890010; AC167890025; AC167890100; AC167891000; AC167895000**

Synonyms Perchloroethylene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

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

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

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

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. . May cause allergic skin reaction. Inhalation of high vapor

concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products
Chlorine Hydrogen chloride gas Phosgene
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing.

Environmental Precautions Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Use only under a chemical fume hood. Wear personal protective equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m^3 Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Tetrachloroethylene	TWA: 25 ppm TWA: 170 mg/m³ STEL: 100 ppm STEL: 685 mg/m³	TWA: 100 ppm TWA: 670 mg/m³ TWA: 200 ppm TWA: 1250 mg/m³ STEL: 200 ppm STEL: 1340 mg/m³	TWA: 25 ppm STEL: 100 ppm

Legend

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

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C2 Cl4
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines

Hazardous Decomposition Products Chlorine, Hydrogen chloride gas, Phosgene

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes and skin

Sensitization May cause sensitization by skin contact

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)

STOT - repeated exposure Kidney Liver Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest

pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

Other Adverse Effects Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

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

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.88

13. Disposal considerations

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

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No	UN1897
Proper Shipping Name	TETRACHLOROETHYLENE
Hazard Class	6.1
Packing Group	III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		X	X	X	X	X

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

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Tetrachloroethylene	127-18-4	>95	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Tetrachloroethylene	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Tetrachloroethylene	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Tetrachloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant Y
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D1B Toxic materials
D2A Very toxic materials



16. Other information

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

Creation Date 10-Dec-2009
Revision Date 06-Nov-2015
Print Date 06-Nov-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

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

End of SDS

SAFETY DATA SHEET

1. Identification

Product identifier: TOLUENE

Other means of identification
Product No.: 9457, 4483, V560, 8604, 9476, 9466, 9460, 9456, 9364, 9351, 9336, 8608

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Physical hazards

Flammable liquids	Category 2

Health hazards

Acute toxicity (Oral)	Category 4
Acute toxicity (Inhalation - vapor)	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Toxic to reproduction	Category 2
Specific target organ toxicity - single exposure	Category 3
Specific target organ toxicity - repeated exposure	Category 2
Aspiration hazard	Category 1

Environmental hazards

Acute hazards to the aquatic environment	Category 2

Label elements

Hazard symbol:



Signal word: Danger

Hazard statement:
Highly flammable liquid and vapor.
Harmful if swallowed or if inhaled.
Causes skin irritation.
Causes serious eye irritation.
Suspected of damaging fertility or the unborn child.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
May cause damage to organs through prolonged or repeated exposure.
Toxic to aquatic life.

Precautionary statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment.

Response: In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction. IF exposed or concerned: Get medical advice/attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting.

Storage: Store locked up. Store in a well-ventilated place. Keep cool. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.

3. Composition/information on ingredients

Substances

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
TOLUENE		108-88-3	99 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Call a physician or poison control center immediately. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention immediately.

Skin contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Most important symptoms/effects, acute and delayed

Symptoms: Harmful if swallowed. May be fatal if swallowed. Harmful if inhaled. Irritating to eyes, respiratory system and skin.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Specific hazards arising from the chemical: Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Prevent buildup of vapors or gases to explosive concentrations.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out. Water may be ineffective in fighting the fire. Fight fire from a protected location. Move containers from fire area if you can do so without risk.

Special protective equipment for fire-fighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Keep upwind. Use personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. See Section 8 of the MSDS for Personal Protective Equipment.
Methods and material for containment and cleaning up:	Eliminate all ignition sources if safe to do so. Take precautionary measures against static discharges. Stop leak if possible without any risk. Use only non-sparking tools. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.
Notification Procedures:	Prevent entry into waterways, sewer, basements or confined areas. Inform authorities if large amounts are involved.
Environmental precautions:	Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling:	DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Wear protective gloves/protective clothing/eye protection/face protection. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Wash hands thoroughly after handling.
Conditions for safe storage, including any incompatibilities:	Keep away from food, drink and animal feeding stuffs. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values		Source
TOLUENE	TWA	20 ppm		US. ACGIH Threshold Limit Values (2011)
	STEL	150 ppm	560 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	REL	100 ppm	375 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	TWA	100 ppm	375 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	150 ppm	560 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	200 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	Ceiling	300 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	MAX. CONC	500 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)

Biological limit values

Chemical identity	Exposure Limit values	Source
TOLUENE (o-Cresol, with hydrolysis: Sampling time: End of shift.)	0.3 mg/g (Creatinine in urine)	ACGIH BEL (2011)
TOLUENE (toluene: Sampling time: Prior to last shift of work week.)	0.02 mg/l (Blood)	ACGIH BEL (2011)
TOLUENE (toluene: Sampling time: End of shift.)	0.03 mg/l (Urine)	ACGIH BEL (2011)

Appropriate engineering controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area. Use explosion-proof ventilation equipment.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Sweet aromatic odor
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	-94.9 °C
Initial boiling point and boiling range:	110 °C
Flash Point:	4 °C (Closed Cup)
Evaporation rate:	2.24 (butyl acetate=1)
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	7.1 %(V)
Flammability limit - lower (%):	1.1 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	3.8 kPa (25 °C)
Vapor density:	3.1 AIR=1
Relative density:	0.86 (20 °C)
Solubility(ies)	
Solubility in water:	0.7 g/l (23.3 °C)
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	2.73
Auto-ignition temperature:	480 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.

Other information

Molecular weight:	92.14 g/mol (C7H8)

10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of normal use.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Heat, sparks, flames.
Incompatible materials:	Strong oxidizing agents. Chlorine.
Hazardous decomposition products:	Thermal decomposition may release oxides of carbon.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Harmful if swallowed.
Inhalation:	Harmful if inhaled. May cause irritation to the mucous membranes and upper respiratory tract.

Skin contact: Causes skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 636 mg/kg

Dermal
Product: LD 50 (Rabbit): 12,124 mg/kg

Inhalation
Product: LC 50 (Mouse, 24 h): 400 mg/l
LC 50 (Rat, 4 h): 8,000 mg/l

Repeated dose toxicity
Product: No data available.

Skin corrosion/irritation
Product: Causes skin irritation.

Serious eye damage/eye irritation
Product: Causes serious eye irritation.

Respiratory or skin sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ cell mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: May damage fertility or the unborn child.

Specific target organ toxicity - single exposure
Product: Narcotic effect. Respiratory tract irritation.

Specific target organ toxicity - repeated exposure
Product: Peripheral nervous system Central nervous system. Kidneys. auditory organs

Aspiration hazard
Product: May be fatal if swallowed and enters airways.

Other effects: No data available.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: No data available.

Specified substance(s):

TOLUENE — LC 50 (Fathead minnow (Pimephales promelas), 96 h): 12.6 mg/l Mortality
LC 50 (Coho salmon,silver salmon (Oncorhynchus kisutch), 96 h): 5.5 mg/l Mortality

Aquatic invertebrates

Product: No data available.

Specified substance(s):

TOLUENE — EC 50 (Brine shrimp (Artemia sp.), 24 h): 22.1 - 54.1 mg/l Intoxication
EC 50 (Water flea (Daphnia magna), 48 h): 5.46 - 9.83 mg/l Intoxication

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and degradability

Biodegradation

Product: Expected to be readily biodegradable.

BOD/COD ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration factor (BCF)

Product: Bioaccumulation is unlikely to be significant because of the low water solubility of this product.

Partition coefficient n-octanol / water (log Kow)

Product: Log Kow: 2.73

Mobility in soil: The product is insoluble in water and will spread on the water surface.

Other adverse effects: Toxic to aquatic organisms.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number:	UN 1294
UN proper shipping name:	Toluene
Transport hazard class(es)	
Class(es):	3
Label(s):	3
Packing group:	II
Marine Pollutant:	No

IMDG

UN number:	UN 1294
UN proper shipping name:	TOLUENE
Transport hazard class(es)	
Class(es):	3
Label(s):	3
EmS No.:	F-E, S-D
Packing group:	II
Marine Pollutant:	No

IATA

UN number:	UN 1294
Proper Shipping Name:	Toluene
Transport hazard class(es):	
Class(es):	3
Label(s):	3
Marine Pollutant:	No
Packing group:	II

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

TOLUENE Reportable quantity: 1000 lbs.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

[X] Acute (Immediate) [X] Chronic (Delayed) [X] Fire [ ] Reactive [ ] Pressure Generating

SARA 302 Extremely hazardous substance

None present or none present in regulated quantities.

SARA 304 Emergency release notification

Chemical identity	RQ
TOLUENE	1000 lbs.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
TOLUENE	500 lbs

SARA 313 (TRI reporting)

Chemical identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
TOLUENE	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

TOLUENE — Reportable quantity: 1000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

US state regulations

US. California Proposition 65

TOLUENE	Developmental toxin.
TOLUENE	Female reproductive toxin.

US. New Jersey Worker and Community Right-to-Know Act

TOLUENE — Listed

US. Massachusetts RTK - Substance List

TOLUENE — Listed

US. Pennsylvania RTK - Hazardous Substances

TOLUENE — Listed

US. Rhode Island RTK

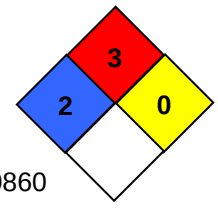
TOLUENE — Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EU EINECS List:	On or in compliance with the inventory
EU ELINCS List:	Not in compliance with the inventory.
Japan (ENCS) List:	On or in compliance with the inventory
EU No Longer Polymers List:	Not in compliance with the inventory.
China Inv. Existing Chemical Substances:	On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Switzerland Consolidated Inventory:	Not in compliance with the inventory.
Japan ISHL Listing:	On or in compliance with the inventory
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Flammability
Health

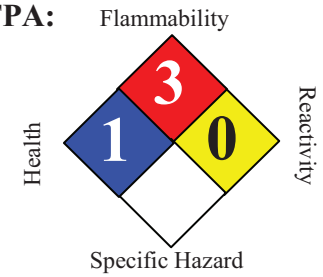


Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date:	06-12-2014
Revision date:	No data available.
Version #:	1.0
Further information:	No data available.
Disclaimer:	THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED “AS IS,” AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION<(>,<)> WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.

Safety Data Sheet
Gasoline, Unleaded

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Gasoline, Unleaded			
Synonyms	:	Blend of Highly Flammable Petroleum Distillates, Regular, Mid-Grade, Premium, 888100008809			
SDS Number	:	888100008809	**Version**	:	1.1
Product Use Description	:	Fuel			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications :
Flammable Liquid – Category 1 or 2 depending on formulation.
Aspiration Hazard – Category 1
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Skin Irritation – Category 2
Eye Irritation – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms :



Signal Word : **Danger**

Hazard Statements

Extremely flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing blood cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by repeated and prolonged inhalation or skin contact. Causes eye irritation. Can be absorbed through skin.
May cause drowsiness or dizziness. Extreme exposure such as intentional inhalation may cause unconsciousness, asphyxiation and death.
Repeated or prolonged skin contact can cause irritation and dermatitis.

Harmful to aquatic life.

Precautionary statements

Prevention : Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response : In case of fire: Use dry chemical, CO2, water spray or fire fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage : Store in a well ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers. Some containers not approved for gasoline may dissolve and release flammable gasoline liquid and vapors.

Disposal : Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Gasoline, natural; Low boiling point naphtha	8006-61-9	10 - 30%
Toluene	108-88-3	10 - 30%
Xylene	1330-20-7	10 - 30%
Ethanol; ethyl alcohol	64-17-5	0-8.2%
Trimethylbenzene	25551-13-7	1 - 5%
Isopentane; 2-methylbutane	78-78-4	1 - 5%

Naphthalene	91-20-3	1 - 5%
Benzene	71-43-2	Less than 1.3%
Pentane	109-66-0	1 - 5%
Cyclohexane	110-82-7	1 - 5%
Ethylbenzene	100-41-4	1 - 5%
Butane	106-97-8	1 - 20%
Heptane [and isomers]	142-82-5	0.5 - 0.75%
N-hexane	110-54-3	0.5 - 0.75%

SECTION 4. FIRST AID MEASURES

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Contaminated leather, particularly footwear, must be discarded. Note that contaminated clothing may be a fire hazard. Seek medical advice if symptoms persist or develop.

Eye contact : Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Obtain medical attention.

Notes to physician : Symptoms: Dizziness, Discomfort, Headache, Nausea, Kidney disorders, Liver disorders. Aspiration may cause pulmonary edema and pneumonitis. Swallowing gasoline is more likely to be fatal for small children than adults, even if aspiration does not occur.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray or fire fighting foam. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers. Keep containers and surroundings cool with water spray.

Specific hazards during fire fighting : Extremely flammable liquid and vapor. This material is combustible/flammable and is sensitive to fire, heat, and static discharge.

Special protective equipment for fire-fighters : Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Further information	:	Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam. Exposure to decomposition products may be a hazard to health. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Evacuate personnel to safe areas. Ventilate the area. Remove all sources of ignition. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).
Environmental precautions	:	Discharge into the environment must be avoided. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	:	Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling :

Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:

(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators.

(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).

(3) Storage tank level floats must be effectively bonded.

For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Reports suggest that government-mandated ethanol, if present, may not be compatible with fiberglass gasoline tanks. Ethanol may dissolve fiberglass resin, causing engine damage and possibly allow leakage of explosive gasoline.

Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

No decomposition if stored and applied as directed. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Store only in containers approved and labeled for gasoline.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Ethanol; Ethyl alcohol	64-17-5	PEL	1,000 ppm 1,900 mg/m3
	Naphthalene	91-20-3	PEL	10 ppm 50 mg/m3
	Cyclohexane	110-82-7	PEL	300 ppm 1,050 mg/m3
	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Heptane [and isomers]	142-82-5	PEL	500 ppm 2,000 mg/m3
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
ACGIH	Toluene	108-88-3	TWA	50 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Ethanol; Ethyl alcohol	64-17-5	TWA	1,000 ppm
	Trimethylbenzene	25551-13-7	TWA	25 ppm
	Isopentane; 2-Methylbutane	78-78-4	TWA	600 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Pentane	109-66-0	TWA	600 ppm
	Cyclohexane	110-82-7	TWA	100 ppm
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Heptane [and isomers]	142-82-5	TWA	400 ppm
		142-82-5	STEL	500 ppm

	N-hexane	110-54-3	TWA	50 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Ensure that eyewash stations and safety showers are close to the workstation location.

Hand protection : Gloves constructed of nitrile or neoprene are recommended. Consult manufacturer specifications for further information.

Skin and body protection : If needed to prevent skin contact, chemical protective clothing such as of DuPont TyChem®, Saranex or equivalent recommended based on degree of exposure. Flame resistant clothing such as Nomex ® is recommended in areas where material is stored or handled.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Work / Hygiene practices : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Clear to straw colored liquid

Odor : Characteristic hydrocarbon-like

Odor threshold 0.5 - 1.1 ppm

pH : Not applicable

Melting point/freezing point About -101°C (-150°F)

Initial boiling point & range Boiling point varies: 30 – 200°C (85 – 392°F)

Flash point < -21°C (-5.8°F)

Evaporation rate : Higher initially and declining as lighter components evaporate

Flammability (solid, gas) : Flammable vapor released by liquid

Upper explosive limit	7.6 %(V)
Lower explosive limit	1.3 %(V)
Vapor pressure	345 - 1,034 hPa at 37.8 °C (100.0 °F)
Vapor density (air = 1)	Approximately 3 to 4
Relative density (water = 1)	0.8 g/mL
Solubility (in water)	Negligible
Partition coefficient (n-octanol/water)	2 – 7 as log Pow
Auto-ignition temperature	Approximately 250°C (480°F)
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	0.64 to 0.88 mm²/s range reported for gasoline
Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature)	: Hydrocarbon liquids without static dissipater additive may have conductivity below 1 picoSiemens per meter (pS/m). The highest electro-static ignition risks are associated with "ultra-low conductivities" below 5 pS/m. See Section 7 for sources of information on defining safe loading and handling procedures for low conductivity products.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, alkaline products and strong acids. Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.
Conditions to avoid	: Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	: Ignition and burning can release carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

SECTION 11. TOXICOLOGICAL INFORMATION

Skin contact	: Irritating to skin. Can be partially absorbed through skin.
Eye contact	: Irritating to eyes.
Ingestion	: Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Inhalation and further information

Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, over excitation. Exposure to very high levels can result in unconsciousness and death.

Repeated over-exposure may cause liver and kidney injuries.
Components of the product may affect the nervous system.

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.
This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

Component:

Gasoline, natural; Low boiling point naphtha	8006-61-9	Acute oral toxicity: LD50 rat Dose: 18.8 mg/kg Acute inhalation toxicity: LC50 rat Dose: 20.7 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Moderate eye irritation
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation

		Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethanol; Ethyl alcohol	64-17-5	Acute oral toxicity: LD50 rat Dose: 6,200 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 19,999 mg/kg Acute inhalation toxicity: LC50 rat Dose: 8,001 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may cause skin irritation and/or dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h

		Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	:	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	:	Benzene (CAS-No.: 71-43-2)
CA Prop 65	:	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3)

Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h
Ethanol; Ethyl alcohol	64-17-5	Toxicity to fish: LC50 Species: Leuciscus idus (Golden orfe) Dose: 8,140 mg/l Exposure time: 48 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9,268 - 14,221 mg/l Exposure time: 48 h
Isopentane; 2-Methylbutane	78-78-4	Toxicity to fish: LC50 Species: Oncorhynchus mykiss (rainbow trout) Dose: 3.1 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.3 mg/l Exposure time: 96 h
Naphthalene	91-20-3	Toxicity to algae: EC50 Species: Dose: 33 mg/l Exposure time: 24 h
Pentane	109-66-0	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9.74 mg/l Exposure time: 48 h
Cyclohexane	110-82-7	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 3.78 mg/l Exposure time: 48 h

Heptane [and isomers]	142-82-5	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 4 mg/l Exposure time: 24 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 1.5 mg/l Exposure time: 48 h
N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: Petrol
UN-No.	: 1203
Class	: 3
Packing group	: II

TDG

Proper shipping name	: Gasoline
UN-No.	: UN1203
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3

Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	353
Packing instruction (passenger aircraft)	:	Y341

IMDG-Code

UN-No.	:	UN 1203
Description of the goods	:	Gasoline
Class	:	3
Packaging group	:	II
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : Flammable liquid
Highly toxic by ingestion
Moderate skin irritant
Severe eye irritant
Carcinogen

TSCA Status : On TSCA Inventory

DSL Status : . All components are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

Further information

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

Revision Date : 08/09/2012

6, 8, 10, 12, 14, 16, 64, 68, 91, 112, 306, 1092, 1106, 1500, 1570, 1571, 1651, 1652, 1654, 1700, 1701, 1702, 1710, 1711, 1714, 1726, 1729, 1730, 1732, 1733, 1826, 1848, 1880, 1950

SAFETY DATA SHEET

Creation Date 13-Feb-2015 **Revision Date** 21-Feb-2014 **Revision Number** 3

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identification

Product Description: Xylene
Cat No. : **6601, 6615, 6655, 9900-5, 9900-55, 6601E**
Synonyms Dimethylbenzene; Methyltoluene
Molecular Formula C8H10

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

Recommended Use Laboratory chemicals.
Uses advised against No Information available

1.3. Details of the supplier of the safety data sheet

Company
Richard Allan Scientific
A Subsidiary of Thermo Fisher Scientific
4481 Campus Drive
Kalamazoo, MI 49008
Tel: (800) 522-7270
E-mail address begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Flammable liquids	Category 3

Health hazards

Aspiration Toxicity	Category 1
Acute dermal toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/irritation	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2

Environmental hazards
Based on available data, the classification criteria are not met

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Symbol(s) Xn - Harmful
R-phrase(s) R10 - Flammable
R38 - Irritating to skin
R20/21 - Harmful by inhalation and in contact with skin

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

2.2. Label elements



Signal Word **Danger**

Hazard Statements

H226 - Flammable liquid and vapor
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H304 - May be fatal if swallowed and enters airways
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary Statements

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P280 - Wear protective gloves/ protective clothing
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P312 - Call a POISON CENTER or doctor/ physician if you feel unwell
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician
P331 - Do NOT induce vomiting
P362 - Take off contaminated clothing and wash before reuse
P260 - Do not breathe dust/fume/gas/mist/vapors/spray

2.3. Other hazards

No information available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008	DSD Classification - 67/548/EEC
Ethylbenzene	100-41-4	EEC No. 202-849-4	10 - 15	Flam. Liq. 2 (H225) Acute Tox. 4 (H332) Asp. Tox. 1 (H304) STOT RE 2 (H373) Aquatic Chronic 3 (H412)	F; R11 Xn; R20-48/20 R65
Xylenes (o-, m-, p- isomers)	1330-20-7	EEC No. 215-535-7	85	Acute Tox. 4 (H312) Acute Tox. 4 (H332) Skin Irrit. 2 (H315) Flam. Liq. 3 (H226)	R10 Xn; R20/21 Xi; R38
Toluene	108-88-3	EEC No. 203-625-9	0 - 0.5	Skin Irrit. 2 (H315) Repr. 2 (H361d) STOT SE 3 (H336) STOT RE 2 (H373) Asp. Tox. 1 (H304) Flam. Liq. 2 (H225)	F; R11 Xi; R38 Xn; R48/20-65 Repr.Cat.3; R63 R67
Benzene	71-43-2	EEC No. 200-753-7	0 - 0.01	Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Muta. 1B (H340) Carc. 1A (H350) STOT RE 1 (H372)	F; R11 Xi; R36/38 Carc.Cat.1; R45 Muta.Cat.2; R46 T; R48/23/24/25

				Asp. Tox. 1 (H304) Flam. Liq. 2 (H225)	Xn; R65

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

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice If symptoms persist, call a physician. Show this safety data sheet to the doctor in attendance.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required. Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required. Call a physician immediately. SPEEDY ACTION IS CRITICAL, GET MEDICAL AID IMMEDIATELY. If symptoms persist, call a physician. If skin irritation persists, call a physician. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately. Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Consult a physician.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required. Immediate medical attention is not required. Move to fresh air in case of accidental inhalation of vapors. If symptoms persist, call a physician.

Protection of First-aiders Use personal protective equipment.

4.2. Most important symptoms and effects, both acute and delayed

Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Extinguishing media which must not be used for safety reasons
No information available.

5.2. Special hazards arising from the substance or mixture

Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrocarbons, Aldehydes.

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Do not get in eyes, on skin, or on clothing. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

6.2. Environmental precautions

Should not be released into the environment. See Section 12 for additional ecological information. Do not flush into surface water or sanitary sewer system. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.

6.3. Methods and material for containment and cleaning up

Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Use only under a chemical fume hood. Wear personal protective equipment. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Do not ingest. Pay attention to flashback. No information available. Do not take internally.

7.2. Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area. Keep containers tightly closed in a cool, well-ventilated place. Keep in properly labeled containers.

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits

Component	European Union	The United Kingdom	France	Belgium	Spain
Ethylbenzene	TWA: 100 ppm 8 hr TWA: 442 mg/m³ 8 hr STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min Possibility of significant uptake through the skin	STEL: 125 ppm 15 min STEL: 552 mg/m³ 15 min TWA: 100 ppm 8 hr TWA: 441 mg/m³ 8 hr Skin	TWA / VME: 20 ppm (8 heures). restrictive limit TWA / VME: 88.4 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 442	TWA: 100 ppm 8 uren TWA: 442 mg/m³ 8 uren STEL: 125 ppm 15 minuten STEL: 551 mg/m³ 15 minuten Huid	STEL / VLA-EC: 200 ppm (15 minutos). STEL / VLA-EC: 884 mg/m³ (15 minutos). TWA / VLA-ED: 100 ppm (8 horas) TWA / VLA-ED: 441 mg/m³ (8 horas) Piel

			mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau		
Xylenes (o-, m-, p-isomers)	TWA: 50 ppm 8 hr TWA: 221 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Possibility of significant uptake through the skin	STEL: 100 ppm 15 min STEL: 441 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 220 mg/m³ 8 hr Skin	TWA / VME: 50 ppm (8 heures). restrictive limit TWA / VME: 221 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 442 mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau	TWA: 50 ppm 8 uren TWA: 221 mg/m³ 8 uren STEL: 100 ppm 15 minuten STEL: 442 mg/m³ 15 minuten Huid	STEL / VLA-EC: 100 ppm (15 minutos). STEL / VLA-EC: 442 mg/m³ (15 minutos). TWA / VLA-ED: 50 ppm (8 horas) TWA / VLA-ED: 221 mg/m³ (8 horas) Piel
Toluene	TWA: 50 ppm 8 hr TWA: 192 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min Skin	STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 191 mg/m³ 8 hr Skin	TWA / VME: 20 ppm (8 heures). restrictive limit TWA / VME: 76.8 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 384 mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau	TWA: 20 ppm 8 uren TWA: 77 mg/m³ 8 uren STEL: 100 ppm 15 minuten STEL: 384 mg/m³ 15 minuten Huid	STEL / VLA-EC: 100 ppm (15 minutos). STEL / VLA-EC: 384 mg/m³ (15 minutos). TWA / VLA-ED: 50 ppm (8 horas) TWA / VLA-ED: 192 mg/m³ (8 horas) Piel
Benzene	TWA: 1 ppm 8 hr measured or calculated in relation to a reference period of eight hours TWA: 3.25 mg/m³ 8 hr measured or calculated in relation to a reference period of eight hours Substantial contribution to the total body burden via dermal exposure possible	STEL: 3 ppm 15 min STEL: 9.75 mg/m³ 15 min TWA: 1 ppm 8 hr TWA: 3.25 mg/m³ 8 hr Carc. Skin	TWA / VME: 1 ppm (8 heures). restrictive limit TWA / VME: 3.25 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 1500 mg/m³. Peau	TWA: 1 ppm 8 uren TWA: 3.25 mg/m³ 8 uren Huid	TWA / VLA-ED: 1 ppm (8 horas) TWA / VLA-ED: 3.25 mg/m³ (8 horas) Piel

Component	Italy	Germany	Portugal	The Netherlands	Finland
Ethylbenzene	TWA: 100 ppm 8 ore. TWA: 442 mg/m³ 8 ore. STEL: 200 ppm 15 minuti. Breve termine STEL: 884 mg/m³ 15 minuti. Breve termine Pelle	TWA: 20 ppm (8 Stunden). AGW - exposure factor 2 TWA: 88 mg/m³ (8 Stunden). AGW - exposure factor 2 TWA: 20 ppm (8 Stunden). MAK TWA: 88 mg/m³ (8 Stunden). MAK Höhepunkt: 40 ppm Höhepunkt: 176 mg/m³ Haut	STEL: 200 ppm 15 minutos STEL: 884 mg/m³ 15 minutos TWA: 100 ppm 8 horas TWA: 442 mg/m³ 8 horas Pele	huid STEL: 430 mg/m³ 15 minuten TWA: 215 mg/m³ 8 uren	TWA: 50 ppm 8 tunteina TWA: 220 mg/m³ 8 tunteina STEL: 200 ppm 15 minuutteina STEL: 880 mg/m³ 15 minuutteina Iho
Xylenes (o-, m-, p-isomers)	TWA: 50 ppm 8 ore. pure TWA: 221 mg/m³ 8 ore. pure STEL: 100 ppm 15 minuti. Breve termine pure STEL: 442 mg/m³ 15 minuti. Breve termine pure Pelle	TWA: 100 ppm (8 Stunden). AGW - exposure factor 2 TWA: 440 mg/m³ (8 Stunden). AGW - exposure factor 2 TWA: 100 ppm (8 Stunden). MAK all isomers TWA: 440 mg/m³ (8 Stunden). MAK all isomers	STEL: 100 ppm 15 minutos STEL: 442 mg/m³ 15 minutos TWA: 50 ppm 8 horas TWA: 221 mg/m³ 8 horas Pele	huid STEL: 442 mg/m³ 15 minuten TWA: 210 mg/m³ 8 uren	TWA: 50 ppm 8 tunteina TWA: 220 mg/m³ 8 tunteina STEL: 100 ppm 15 minuutteina STEL: 440 mg/m³ 15 minuutteina Iho

		Höhepunkt: 200 ppm Höhepunkt: 880 mg/m³ Haut Haut all isomers			
Toluene	TWA: 50 ppm 8 ore. TWA: 192 mg/m³ 8 ore. Pelle	TWA: 50 ppm (8 Stunden). AGW - exposure factor 4 TWA: 190 mg/m³ (8 Stunden). AGW - exposure factor 4 TWA: 50 ppm (8 Stunden). MAK TWA: 190 mg/m³ (8 Stunden). MAK Höhepunkt: 200 ppm Höhepunkt: 760 mg/m³ Haut	STEL: 100 ppm 15 minutos STEL: 384 mg/m³ 15 minutos TWA: 50 ppm 8 horas TWA: 192 mg/m³ 8 horas Pele	STEL: 384 mg/m³ 15 minuten TWA: 150 mg/m³ 8 uren	TWA: 25 ppm 8 tunteina TWA: 81 mg/m³ 8 tunteina STEL: 100 ppm 15 minuutteina STEL: 380 mg/m³ 15 minuutteina Iho
Benzene	TWA: 1 ppm 8 ore. TWA: 3.25 mg/m³ 8 ore. Pelle	Haut	STEL: 2.5 ppm 15 minutos TWA: 0.5 ppm 8 horas Pele	huid TWA: 3.25 mg/m³ 8 uren	TWA: 1 ppm 8 tunteina TWA: 3.25 mg/m³ 8 tunteina Iho

Component	Austria	Denmark	Switzerland	Poland	Norway
Ethylbenzene	Haut MAK-KZW: 200 ppm 15 Minuten MAK-KZW: 880 mg/m³ 15 Minuten MAK-TMW: 100 ppm 8 Stunden MAK-TMW: 440 mg/m³ 8 Stunden	TWA: 50 ppm 8 timer TWA: 217 mg/m³ 8 timer Hud	Haut/Peau STEL: 50 ppm 15 Minuten STEL: 220 mg/m³ 15 Minuten TWA: 50 ppm 8 Stunden TWA: 220 mg/m³ 8 Stunden	STEL: 400 mg/m³ 15 minutach TWA: 200 mg/m³ 8 godzinach	TWA: 5 ppm 8 timer TWA: 20 mg/m³ 8 timer STEL: 10 ppm 15 minutter. STEL: 30 mg/m³ 15 minutter. Hud
Xylenes (o-, m-, p-isomers)	Haut MAK-KZW: 100 ppm 15 Minuten MAK-KZW: 442 mg/m³ 15 Minuten MAK-TMW: 50 ppm 8 Stunden MAK-TMW: 221 mg/m³ 8 Stunden	TWA: 25 ppm 8 timer TWA: 109 mg/m³ 8 timer Hud	Haut/Peau STEL: 200 ppm 15 Minuten STEL: 870 mg/m³ 15 Minuten TWA: 100 ppm 8 Stunden TWA: 435 mg/m³ 8 Stunden	TWA: 100 mg/m³ 8 godzinach	TWA: 25 ppm 8 timer TWA: 108 mg/m³ 8 timer STEL: 37.5 ppm 15 minutter. STEL: 135 mg/m³ 15 minutter. Hud
Toluene	Haut MAK-KZW: 100 ppm 15 Minuten MAK-KZW: 380 mg/m³ 15 Minuten MAK-TMW: 50 ppm 8 Stunden MAK-TMW: 190 mg/m³ 8 Stunden	TWA: 25 ppm 8 timer TWA: 94 mg/m³ 8 timer Hud	Haut/Peau STEL: 200 ppm 15 Minuten STEL: 760 mg/m³ 15 Minuten TWA: 50 ppm 8 Stunden TWA: 190 mg/m³ 8 Stunden	STEL: 200 mg/m³ 15 minutach TWA: 100 mg/m³ 8 godzinach	TWA: 25 ppm 8 timer TWA: 94 mg/m³ 8 timer STEL: 37.5 ppm 15 minutter. STEL: 141 mg/m³ 15 minutter. Hud
Benzene	TRK-KZW: 4 ppm 15 Minuten TRK-KZW: 12.8 mg/m³ 15 Minuten Haut TRK-TMW: 1 ppm TRK-TMW: 3.2 mg/m³	TWA: 0.5 ppm 8 timer TWA: 1.6 mg/m³ 8 timer Hud	Haut/Peau TWA: 0.5 ppm 8 Stunden TWA: 1.6 mg/m³ 8 Stunden	TWA: 1.6 mg/m³ 8 godzinach	TWA: 1 ppm 8 timer TWA: 3 mg/m³ 8 timer STEL: 3 ppm 15 minutter. STEL: 6 mg/m³ 15 minutter.

Component	Bulgaria	Croatia	Ireland	Cyprus	Czech Republic
Ethylbenzene	TWA: 435 mg/m³ STEL : 545 mg/m³ Skin notation	kože TWA-GVI: 100 ppm 8 satima. TWA-GVI: 442 mg/m³ 8 satima. STEL-KGVI: 200 ppm 15 minutama. STEL-KGVI: 884 mg/m³ 15 minutama.	TWA: 100 ppm 8 hr. TWA: 442 mg/m³ 8 hr. STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min Skin	Skin-potential for cutaneous absorption STEL: 200 ppm STEL: 884 mg/m³ TWA: 100 ppm TWA: 442 mg/m³	TWA: 200 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 500 mg/m³
Xylenes (o-, m-, p-	TWA: 50 ppm	kože	TWA: 50 ppm 8 hr.	Skin-potential for	TWA: 200 mg/m³ 8

isomers)	TWA: 221.0 mg/m³ STEL : 100 ppm STEL : 442 mg/m³ Skin notation	TWA-GVI: 50 ppm 8 satima. TWA-GVI: 221 mg/m³ 8 satima. STEL-KGVI: 100 ppm 15 minutama. STEL-KGVI: 442 mg/m³ 15 minutama.	TWA: 221 mg/m³ 8 hr. STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Skin	cutaneous absorption STEL: 100 ppm STEL: 442 mg/m³ TWA: 50 ppm TWA: 221 mg/m³	hodinách. Potential for cutaneous absorption Ceiling: 400 mg/m³
Toluene	TWA: 50 ppm TWA: 192.0 mg/m³ STEL : 100 ppm STEL : 384.0 mg/m³ Skin notation	kože TWA-GVI: 50 ppm 8 satima. TWA-GVI: 192 mg/m³ 8 satima. STEL-KGVI: 100 ppm 15 minutama. STEL-KGVI: 384 mg/m³ 15 minutama.	TWA: 50 ppm 8 hr. TWA: 192 mg/m³ 8 hr. STEL: 384 mg/m³ 15 min STEL: 100 ppm 15 min Skin	Skin-potential for cutaneous absorption STEL: 100 ppm STEL: 384 mg/m³ TWA: 50 ppm TWA: 192 mg/m³	TWA: 200 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 500 mg/m³
Benzene	TWA: 3.25 mg/m³ Skin notation	kože TWA-GVI: 1 ppm 8 satima. TWA-GVI: 3.25 mg/m³ 8 satima.	TWA: 1 ppm 8 hr. TWA: 3 mg/m³ 8 hr. STEL: 3 ppm 15 min STEL: 9 mg/m³ 15 min Skin	Skin-potential for cutaneous absorption TWA: 1 ppm TWA: 3.25 mg/m³	TWA: 3 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 10 mg/m³

Component	Estonia	Gibraltar	Greece	Hungary	Iceland
Ethylbenzene	Nahk TWA: 100 ppm 8 tundides. TWA: 442 mg/m³ 8 tundides. STEL: 200 ppm 15 minutites. STEL: 884 mg/m³ 15 minutites. Ceiling: 0.01 ppm 5 min	Skin notation TWA: 100 ppm 8 hr TWA: 442 mg/m³ 8 hr STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min	STEL: 125 ppm STEL: 545 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	STEL: 884 mg/m³ 15 percekben. CK TWA: 442 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 200 ppm STEL: 884 mg/m³ TWA: 50 ppm 8 klukkustundum. TWA: 200 mg/m³ 8 klukkustundum. Skin notation Ceiling: 100 ppm Ceiling: 400 mg/m³
Xylenes (o-, m-, p-isomers)	Nahk TWA: 50 ppm 8 tundides. TWA: 221 mg/m³ 8 tundides. STEL: 100 ppm 15 minutites. STEL: 442 mg/m³ 15 minutites.	Skin notation TWA: 50 ppm 8 hr pure TWA: 221 mg/m³ 8 hr pure STEL: 100 ppm 15 min pure STEL: 442 mg/m³ 15 min pure	skin - potential for cutaneous absorption STEL: 150 ppm STEL: 650 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	STEL: 442 mg/m³ 15 percekben. CK TWA: 221 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 100 ppm STEL: 442 mg/m³ TWA: 25 ppm 8 klukkustundum. TWA: 109 mg/m³ 8 klukkustundum. Skin notation Ceiling: 50 ppm Ceiling: 218 mg/m³
Toluene	Nahk TWA: 50 ppm 8 tundides. TWA: 192 mg/m³ 8 tundides. STEL: 100 ppm 15 minutites. STEL: 384 mg/m³ 15 minutites.	Skin notation TWA: 50 ppm 8 hr TWA: 192 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min	skin - potential for cutaneous absorption STEL: 100 ppm STEL: 384 mg/m³ TWA: 50 ppm TWA: 192 mg/m³	STEL: 380 mg/m³ 15 percekben. CK TWA: 190 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 50 ppm STEL: 188 mg/m³ TWA: 25 ppm 8 klukkustundum. TWA: 94 mg/m³ 8 klukkustundum. Skin notation Ceiling: 50 ppm Ceiling: 188 mg/m³
Benzene	Nahk TWA: 0.5 ppm 8 tundides. TWA: 1.5 mg/m³ 8 tundides. STEL: 3 ppm 15 minutites. STEL: 9 mg/m³ 15 minutites.		skin - potential for cutaneous absorption TWA: 1.0 ppm TWA: 3.19 mg/m³	lehetséges borön keresztüli felszívódás Ceiling: 3 mg/m³ MK	TWA: 0.5 ppm 8 klukkustundum. TWA: 1.6 mg/m³ 8 klukkustundum. Skin notation Ceiling: 1 ppm Ceiling: 3.2 mg/m³

Component	Latvia	Lithuania	Luxembourg	Malta	Romania
Ethylbenzene	skin - potential for cutaneous exposure STEL: 200 ppm STEL: 884 mg/m³ TWA: 100 ppm	TWA: 100 ppm IPRD TWA: 442 mg/m³ IPRD Oda STEL: 200 ppm STEL: 884 mg/m³	Possibility of significant uptake through the skin TWA: 100 ppm 8 Stunden TWA: 442 mg/m³ 8	possibility of significant uptake through the skin TWA: 100 ppm TWA: 442 mg/m³ STEL: 200 ppm 15	Skin notation TWA: 100 ppm 8 ore TWA: 442 mg/m³ 8 ore STEL: 200 ppm 15 minute

	TWA: 442 mg/m³		Stunden STEL: 200 ppm 15 Minuten STEL: 884 mg/m³ 15 Minuten	minuti STEL: 884 mg/m³ 15 minuti	STEL: 884 mg/m³ 15 minute
Xylenes (o-, m-, p-isomers)	skin - potential for cutaneous exposure STEL: 100 ppm STEL: 442 mg/m³ TWA: 50 ppm TWA: 221 mg/m³	TWA: 50 ppm IPRD TWA: 200 mg/m³ IPRD Oda STEL: 100 ppm STEL: 450 mg/m³	TWA: 50 ppm 8 Stunden TWA: 221 mg/m³ 8 Stunden STEL: 100 ppm 15 Minuten STEL: 442 mg/m³ 15 Minuten	possibility of significant uptake through the skin TWA: 50 ppm TWA: 221 mg/m³ STEL: 100 ppm 15 minuti STEL: 442 mg/m³ 15 minuti	Skin notation TWA: 50 ppm 8 ore TWA: 221 mg/m³ 8 ore STEL: 100 ppm 15 minute STEL: 442 mg/m³ 15 minute
Toluene	skin - potential for cutaneous exposure STEL: 40 ppm STEL: 150 mg/m³ TWA: 14 ppm TWA: 50 mg/m³	TWA: 50 ppm IPRD TWA: 192 mg/m³ IPRD Oda STEL: 100 ppm STEL: 384 mg/m³	Possibility of significant uptake through the skin TWA: 50 ppm 8 Stunden TWA: 192 mg/m³ 8 Stunden STEL: 100 ppm 15 Minuten STEL: 384 mg/m³ 15 Minuten	possibility of significant uptake through the skin TWA: 50 ppm TWA: 192 mg/m³ STEL: 100 ppm 15 minuti STEL: 384 mg/m³ 15 minuti	Skin notation TWA: 50 ppm 8 ore TWA: 192 mg/m³ 8 ore STEL: 100 ppm 15 minute STEL: 384 mg/m³ 15 minute
Benzene	skin - potential for cutaneous exposure TWA: 1 ppm TWA: 3.25 mg/m³	TWA: 1 ppm IPRD TWA: 3.25 mg/m³ IPRD Oda STEL: 6 ppm STEL: 19 mg/m³	TWA: 1 ppm 8 Stunden TWA: 3.25 mg/m³ 8 Stunden		Skin notation TWA: 1 ppm 8 ore TWA: 3.25 mg/m³ 8 ore

Component	Russia	Slovak Republic	Slovenia	Sweden	Turkey
Ethylbenzene	TWA: 50 mg/m³ STEL: 150 mg/m³ vapor	Ceiling: 884 mg/m³ Potential for cutaneous absorption TWA: 100 ppm TWA: 442 mg/m³	TWA: 100 ppm 8 urah TWA: 442 mg/m³ 8 urah Koža STEL: 200 ppm 15 minutah STEL: 884 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 450 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 200 mg/m³ 8 timmar.	Deri TWA: 100 ppm 8 saat TWA: 442 mg/m³ 8 saat STEL: 200 ppm 15 dakika STEL: 884 mg/m³ 15 dakika
Xylenes (o-, m-, p-isomers)	TWA: 50 mg/m³ 2-,3- and 4- isomers STEL: 150 mg/m³ vapor	Ceiling: 442 mg/m³ Potential for cutaneous absorption TWA: 50 ppm TWA: 221 mg/m³	TWA: 50 ppm 8 urah TWA: 221 mg/m³ 8 urah Koža STEL: 100 ppm 15 minutah STEL: 442 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 442 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 221 mg/m³ 8 timmar. Hud	Deri TWA: 50 ppm 8 saat TWA: 221 mg/m³ 8 saat STEL: 100 ppm 15 dakika STEL: 442 mg/m³ 15 dakika
Toluene	TWA: 50 mg/m³ STEL: 150 mg/m³ vapor	Ceiling: 384 mg/m³ Potential for cutaneous absorption TWA: 50 ppm TWA: 192 mg/m³	TWA: 50 ppm 8 urah TWA: 192 mg/m³ 8 urah Koža STEL: 200 ppm 15 minutah STEL: 384 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 384 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 192 mg/m³ 8 timmar. Hud	Deri TWA: 50 ppm 8 saat TWA: 192 mg/m³ 8 saat STEL: 100 ppm 15 dakika STEL: 384 mg/m³ 15 dakika
Benzene	TWA: 5 mg/m³ Skin notation STEL: 15 mg/m³ vapor	TWA: 1.0 ppm 8 hodinách TWA: 3.25 mg/m³ 8 hodinách Potential for cutaneous absorption STEL: 5.0 ppm 15 minútach STEL: 16.25 mg/m³ 15 minútach	TWA: 1 ppm 8 urah TWA: 3.25 mg/m³ 8 urah Koža STEL: 4 ppm 15 minutah STEL: 13 mg/m³ 15 minutah	STV: 3 ppm 15 minuter STV: 9 mg/m³ 15 minuter LLV: 0.5 ppm 8 timmar. LLV: 1.5 mg/m³ 8 timmar. Hud	

Biological limit values

Component	European Union	United Kingdom	France	Spain	Germany
Ethylbenzene			Mandelic acid: 1500	Mandelic acid plus	Mandelic acid plus

			mg/g creatinine urine end of shift at end of workweek	Phenylglyoxylic acid: 700 mg/g Creatinine urine end of workweek	Phenylglyoxylic acid: 300 mg/g urine (end of shift)
Xylenes (o-, m-, p-isomers)		Methyl hippuric acid: 650 mmol/mol creatinine urine Post shift	Methylhippuric acid: 1500 mg/g creatinine urine end of shift	Methylhippuric acids: 1 g/g Creatinine urine end of shift	Xylene: 1.5 mg/L whole blood (end of shift all isomers) Methylhippuric(tolur-)acid: 2000 mg/L urine (end of shift all isomers)
Toluene			Toluene: 1 mg/L blood end of shift Hippuric acid: 2500 mg/g creatinine urine end of shift	o-Cresol: 0.5 mg/L urine end of shift Hippuric acid: 1.6 g/g Creatinine urine end of shift Toluene: 0.05 mg/L blood start of last shift of workweek	Toluene: 600 µg/L whole blood (end of shift) o-Cresol: 1.5 mg/L urine (end of several shifts after hydrolysis; for long-term exposures)
Benzene			Muconic acid: 5 mg/L urine end of shift	S-Phenylmercapturic acid: 0.045 mg/g urine end of exposure or end of shift trans,trans-Muconic acid: 2 mg/L urine end of exposure or end of shift Total benzene: 5 µg/L blood end of exposure or end of shift	

Component	Italy	Finland	Denmark	Bulgaria	Romania
Ethylbenzene		Mandelic acid: 5.2 mmol/L urine end of shift at end of workweek.		Mandelic acid and Phenylglyoxylic acid - together: 2000 mg/g Creatinine urine at the end of exposure or end of shift Possible significant absorption through the skin	Mandelic acid: 1.5 g/g Creatinine urine end of work week
Xylenes (o-, m-, p-isomers)		Methylhippuric acid: 5.0 mmol/L urine end of shift.			Methylhippuric acid: 3 g/L urine end of shift
Toluene		Toluene concentrated: 500 nmol/L blood prior to shift.		Hippuric acid: 1.6 mmol/mmol Creatinine urine at the end of exposure or end of shift	Hippuric acid: 2 g/L urine end of shift o-Cresol: 3 mg/L urine end of shift
Benzene				Trans, trans-Muconic acid: 2.0 mg/L urine at the end of exposure or end of shift Possible significant absorption through the skin S-Phenyl Mercapturic acid: 0.045 mg/g Creatinine urine at the end of exposure or end of shift Possible significant absorption through the skin	S-Phenylmercapturic acid: 25 µg/g Creatinine urine end of shift total Phenols: 50 mg/L urine end of shift

Component	Gibraltar	Latvia	Slovak Republic	Luxembourg	Turkey
Ethylbenzene			2 and 4-Ethylphenol: 12 mg/L urine end of exposure or work shift also after all work shifts for long-term exposure Mandelic acid and phenylglycolic acid: 1600 mg/L urine end of exposure or work shift		

			also after all work shifts for long-term exposure		
Xylenes (o-, m-, p-isomers)			Xylene: 1.5 mg/L blood end of exposure or work shift all isomers Methylhippuric acid: 2000 mg/L urine end of exposure or work shift		
Toluene		Hippuric acid: 1.6 g/g Creatinine urine end of shift Toluene: 0.05 mg/l blood end of shift	Toluene: 600 µg/L blood end of exposure or work shift o-Cresol: 1.5 mg/L urine after all work shifts for long-term exposure o-Cresol: 1.5 mg/L urine end of exposure or work shift Hippuric acid: 1600 mg/g creatinine end of exposure or work shift		
Benzene		Phenol: 25 µg/g Creatinine urine end of shift			

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.

Derived No Effect Level (DNEL) No information available

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				
Inhalation				

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Engineering Measures
Use only under a chemical fume hood. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment

Eye Protection Safety glasses with side-shields (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Disposable gloves	See manufacturers recommendations	-	EN 374	(minimum requirement)

Skin and body protection Long sleeved clothing Apron Impervious gloves

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)
Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use

	appropriate certified respirators. To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly
Large scale/emergency use	In case of insufficient ventilation wear suitable respiratory equipment
Small scale/Laboratory use	Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. When RPE is used a face piece Fit Test should be conducted
Hygiene Measures	When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing.
Environmental exposure controls	No information available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Clear, Colorless	
Physical State	Liquid	
Odor	aromatic	
Odor Threshold	No data available	
pH	No data available	
Melting Point/Range	-47.2 °C / -53 °F	
Softening Point	No data available	
Boiling Point/Range	136.7 - 143.3 °C / 278 - 290 °F	
Flash Point	27.7 °C / 82 °F	**Method -** No information available
Evaporation Rate	No information available	
Flammability (solid,gas)	No information available	
Explosion Limits	**Lower** 1.1 vol % **Upper** 7.0 vol %	
Vapor Pressure	9 mmHg @ 25 °C	
Vapor Density	3.66 (Air = 1.0)	(Air = 1.0)
Specific Gravity / Density	No data available 0.87	
Bulk Density	No data available	
Water Solubility	No information available	
Solubility in other solvents	No information available	

Partition Coefficient (n-octanol/water)

Component	**log Pow**
Ethylbenzene	3.118
Xylenes (o-, m-, p- isomers)	3.15
Toluene	2.65
Benzene	1.83

Autoignition Temperature	527 °C / 980.6 °F
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Formula	C8H10
Molecular Weight	106.17

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

None known, based on information available

10.2. Chemical stability

Stable under normal conditions

10.3. Possibility of hazardous reactions

Hazardous Polymerization Hazardous polymerization does not occur.
Hazardous Reactions No information available.

10.4. Conditions to avoid

Incompatible products. Heat, flames and sparks.

10.5. Incompatible materials

Strong oxidizing agents. Strong acids.

10.6. Hazardous decomposition products

Carbon monoxide (CO). Carbon dioxide (CO_2). Hydrocarbons. Aldehydes.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information No acute toxicity information is available for this product

(a) acute toxicity;
Oral No data available
Dermal No data available
Inhalation No data available

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylbenzene	3500 mg/kg (Rat)	15400 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h
Xylenes (o-, m-, p- isomers)	3500 mg/kg (Rat)	4350 mg/kg (Rabbit) 1700 mg/kg (Rabbit)	29.08 mg/L [MOE Risk Assessment Vol.1, 2002]
Toluene	> 5000 mg/kg (Rat)	12000 mg/kg (Rabbit)	26700 ppm (Rat) 1 h
Benzene	810 mg/kg (Rat) 1800 mg/kg (Rat)	8200 mg/kg (Rabbit)	44.66 mg/L (Rat) 4 h

(b) skin corrosion/irritation; No data available

(c) serious eye damage/irritation; No data available

(d) respiratory or skin sensitization;
Respiratory No data available
Skin No data available

(e) germ cell mutagenicity; No data available

(f) carcinogenicity; No data available

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

Component	EU	UK	Germany	IARC
Ethylbenzene				Group 2B
Benzene	Carc Cat. 1A		Cat. 1	Group 1

(g) reproductive toxicity; No data available
Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.
Developmental Effects Developmental effects have occurred in experimental animals.
Teratogenicity Teratogenic effects have occurred in experimental animals.

(h) STOT-single exposure; No data available

(i) STOT-repeated exposure; No data available

Target Organs Eyes, Skin, Central nervous system (CNS), Liver, Kidney, Respiratory system.

(j) aspiration hazard; No data available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information

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

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects Do not empty into drains.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Ethylbenzene	9.6 mg/L LC50 96 h 9.1 - 15.6 mg/L LC50 96 h 32 mg/L LC50 96 h 7.55 - 11 mg/L LC50 96 h 4.2 mg/L LC50 96 h 11.0 - 18.0 mg/L LC50 96 h	1.8 - 2.4 mg/L EC50 48 h	2.6 - 11.3 mg/L EC50 72 h 438 mg/L EC50 > 96 h 4.6 mg/L EC50 = 72 h 1.7 - 7.6 mg/L EC50 96 h	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h
Xylenes (o-, m-, p- isomers)	30.26 - 40.75 mg/L LC50 96 h 780 mg/L LC50 96 h 23.53 - 29.97 mg/L LC50 96 h 7.711 - 9.591 mg/L LC50 96 h 19 mg/L LC50 96 h 13.1 - 16.5 mg/L LC50 96 h 13.5 - 17.3 mg/L LC50 96 h 2.661 - 4.093 mg/L LC50 96 h 13.4 mg/L LC50 96 h	0.6 mg/L LC50 = 48 h 3.82 mg/L EC50 = 48 h		EC50 = 0.0084 mg/L 24 h
Toluene	50-70 mg/L LC50 96 h 5-7 mg/L LC50 96 h 15-19 mg/L LC50 96 h 28 mg/L LC50 96 h 12 mg/L LC50 96 h	11.5 mg/L EC50 = 48 h 5.46 - 9.83 mg/L EC50 48 h	12.5 mg/L EC50 = 72 h 433 mg/L EC50 > 96 h	EC50 = 19.7 mg/L 30 min
Benzene	70000 - 142000 µg/L LC50 96 h 22330 - 41160 µg/L LC50 96 h 28.6 mg/L LC50 96 h 22.49 mg/L LC50 96 h 5.3 mg/L LC50 96 h 10.7 - 14.7 mg/L LC50 96 h	10 mg/L EC50 = 48 h 8.76 - 15.6 mg/L EC50 48 h	29 mg/L EC50 = 72 h	

12.2. Persistence and degradability No information available

Component	Degradability
Toluene 108-88-3 (0 - 0.5)	86% (20d)

12.3. Bioaccumulative potential No information available

Component	log Pow	Bioconcentration factor (BCF)
Ethylbenzene	3.118	15
Xylenes (o-, m-, p- isomers)	3.15	0.6 - 15
Toluene	2.65	90
Benzene	1.83	3.5 - 4.4

12.4. Mobility in soil .

12.5. Results of PBT and vPvB assessment No data available for assessment.

12.6. Other adverse effects

Endocrine Disruptor Information	This product does not contain any known or suspected endocrine disruptors
Persistent Organic Pollutant	This product does not contain any known or suspected substance
Ozone Depletion Potential	This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products	Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.
Contaminated Packaging	Empty remaining contents. Dispose of in accordance with local regulations. Do not re-use empty containers.
European Waste Catalogue (EWC)	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Other Information	Waste codes should be assigned by the user based on the application for which the product was used.

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

ADR

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

IATA

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

14.5. Environmental hazards	No hazards identified
14.6. Special precautions for user	No special precautions required
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

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

International Inventories Australia X = listed China Canada The product is classified and labeled according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC Europe TSCA Korea Philippines Japan

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	AICS	KECL
Ethylbenzene	202-849-4	-		X	X	-	X	X	X	X	X
Xylenes (o-, m-, p- isomers)	215-535-7	-		X	X	-	X	X	X	X	X

Toluene	203-625-9	-		X	X	-	X	X	X	X	X
Benzene	200-753-7	-		X	X	-	X	X	X	X	X

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Toluene		Use restricted. See item 48. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details)	
Benzene		Use restricted. See item 5. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details) Use restricted. See item 28. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details) Use restricted. See item 29. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details)	

National Regulations

Component	Germany - Water Classification (VwVwS)	Germany - TA-Luft Class
Ethylbenzene	WGK 1	
Xylenes (o-, m-, p- isomers)	WGK 2	
Toluene	WGK 2	
Benzene	WGK 3	Krebserzeugende Stoffe - Class III : 1 mg/m³ (Massenkonzentration)

Component	France - INRS (Tables of occupational diseases)
Ethylbenzene	Tableaux des maladies professionnelles (TMP) - RG 84
Xylenes (o-, m-, p- isomers)	Tableaux des maladies professionnelles (TMP) - RG 4bis,RG 84
Toluene	Tableaux des maladies professionnelles (TMP) - RG 4bis,RG 84
Benzene	Tableaux des maladies professionnelles (TMP) - RG 4,RG 4bis,RG 84

Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment.
Take note of Dir 94/33/EC on the protection of young people at work
Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has not been conducted

SECTION 16: OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3
R10 - Flammable
R11 - Highly flammable
R20 - Harmful by inhalation
R38 - Irritating to skin
R45 - May cause cancer
R46 - May cause heritable genetic damage
R63 - Possible risk of harm to the unborn child
R65 - Harmful: may cause lung damage if swallowed
R67 - Vapors may cause drowsiness and dizziness

R20/21 - Harmful by inhalation and in contact with skin
R36/38 - Irritating to eyes and skin
R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation
R48/23/24/25 - Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed

Full text of H-Statements referred to under sections 2 and 3
H226 - Flammable liquid and vapor
H225 - Highly flammable liquid and vapor
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H304 - May be fatal if swallowed and enters airways
H373 - May cause damage to organs through prolonged or repeated exposure

Legend

CAS - Chemical Abstracts Service
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japanese Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit
ACGIH - American Conference of Governmental Industrial Hygienists
DNEL - Derived No Effect Level
RPE - Respiratory Protective Equipment
LC50 - Lethal Concentration 50%
NOEC - No Observed Effect Concentration
PBT - Persistent, Bioaccumulative, Toxic
TWA - Time Weighted Average
IARC - International Agency for Research on Cancer
PNEC - Predicted No Effect Concentration
LD50 - Lethal Dose 50%
EC50 - Effective Concentration 50%
POW - Partition coefficient Octanol:Water
vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor
ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC - Volatile Organic Compounds

Key literature references and sources for data
Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice
Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.

Creation Date	13-Feb-2015
Revision Date	21-Feb-2014
Revision Summary	Not applicable.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Disclaimer

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

End of Safety Data Sheet

SAFETY DATA SHEET

Version 5.8
Revision Date 10/12/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Zinc

Product Number : 96454
Brand : Sigma-Aldrich

CAS-No. : 7440-66-6

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Combustible dust,
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

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

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

May form combustible dust concentrations in air
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
P391 Collect spillage.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Zn
Molecular weight : 65.39 g/mol

Hazardous components

Component		Classification	Concentration
Zinc powder (stabilized)			
CAS-No. EC-No. Index-No.	7440-66-6 231-175-3 030-001-01-9	Aquatic Acute 1; Aquatic Chronic 1; H410	<= 100 %
Zinc oxide			
CAS-No. EC-No. Index-No.	1314-13-2 215-222-5 030-013-00-7	Aquatic Acute 1; Aquatic Chronic 1; H410	>= 5 - < 10 %

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

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

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

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

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

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

4.2 Most important symptoms and effects, both acute and delayed

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

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Special powder against metal fire Dry sandUse water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media
Water

5.2 Special hazards arising from the substance or mixture

Zinc/zinc oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

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

6.3 Methods and materials for containment and cleaning up

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

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

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

7.2 Conditions for safe storage, including any incompatibilities

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

Keep in a dry place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Zinc oxide	1314-13-2	TWA	2.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	metal fume fever		
		STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		metal fume fever		

		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	15.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	15.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

8.2 Exposure controls

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

Personal protective equipment

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

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

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

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

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

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	Not applicable
e)	Melting point/freezing point	Melting point/range: 420 °C (788 °F) - lit.
f)	Initial boiling point and boiling range	907 °C (1,665 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	Not applicable
l)	Vapour density	No data available
m)	Relative density	7.133 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable
p)	Auto-ignition temperature	does not ignite
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	During processing, dust may form explosive mixture in air.
t)	Oxidizing properties	No data available

9.2 Other safety information

Bulk density	1.8 - 3.2 kg/m3

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Dust may form explosive mixture in air.

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Acids and bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available (Zinc powder (stabilized))

Inhalation: No data available (Zinc powder (stabilized))

Dermal: No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Skin corrosion/irritation
No data available (Zinc powder (stabilized))

Serious eye damage/eye irritation
No data available (Zinc powder (stabilized))

Respiratory or skin sensitisation
Did not cause sensitisation on laboratory animals. (Zinc powder (stabilized))

Germ cell mutagenicity
No data available (Zinc powder (stabilized))

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Specific target organ toxicity - single exposure
No data available (Zinc powder (stabilized))

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available (Zinc powder (stabilized))

Additional Information
RTECS: ZG8600000

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

Effects due to ingestion may include:, chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness, Contact with eyes or skin may cause:, Irritation (Zinc powder (stabilized))

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 450 µg/l - 96 h (Zinc powder (stabilized))
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h (Zinc powder (stabilized))
	mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d (Zinc powder (stabilized))

12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Algae - 7 d at 16 °C - 5 µg/l (Zinc powder (stabilized))
	Bioconcentration factor (BCF): 466

12.4 Mobility in soil

No data available (Zinc powder (stabilized))

12.5 Results of PBT and vPvB assessment

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

12.6 Other adverse effects

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

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Zinc powder (stabilized))
Reportable Quantity (RQ): 1020 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc powder (stabilized))
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Zinc powder (stabilized))

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

15. REGULATORY INFORMATION

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

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

	CAS-No.	Revision Date
Zinc oxide	1314-13-2	2007-03-01
Zinc powder (stabilized)	7440-66-6	1993-04-24

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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

	May form combustible dust concentrations in air
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

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

NFPA Rating

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

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

Version: 5.8 Revision Date: 10/12/2015 Print Date: 05/01/2016

ATTACHMENT I

Langan Guidelines

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ATTACHMENT I

LANGAN GUIDELINES

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carrying passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to insure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signalman to direct backing as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done, and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

ATTACHMENT J

NYSDOH Generic CAMP and Fugitive Dust and Particulate Monitoring

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ATTACHMENT J

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

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

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

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

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

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

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

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

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

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

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

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

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

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

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

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

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

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

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

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

ATTACHMENT K

CAMP Special Requirements

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ATTACHMENT K

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/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.

Special Requirements for Indoor Work With Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

APPENDIX B

Quality Assurance Project Plan

LANGAN

QUALITY ASSURANCE PROJECT PLAN

for

Louisiana Ave Landfill Auto Wrecking
Project 7 Site
Flatlands Avenue
Brooklyn, New York

Prepared For:

IUV Phase 2B Owner, LLC
111 Fifth Avenue, 9th Floor
New York, New York 10003

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, New Jersey 07054

January 2026
100688807

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1.0 PROJECT DESCRIPTION

1.1 Introduction

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) has prepared this Quality Assurance Project Plan (QAPP) on behalf of IUV Phase 2B Owner, LLC for the property located to the northwest and west of the Christian Cultural Center building on Flatlands Avenue in Brooklyn, New York, and is designated as New York City Tax Block 4430, portion of Lot 1 (the Site). A RP602 form has been filed with the New York City Department of Finance (NYCDOF) to reapportion this portion of Lot 1 into future Lot 101. The Site has not yet been assigned a new address since it was recently subdivided into its own lot; however, it is anticipated that the Site will have a Louisiana Avenue and/or Flatlands Avenue address. A Site Location Map is included as Figure 1.

This QAPP specifies analytical methods to be used to ensure that data collected during the Remedial Investigation (RI) are precise, accurate, representative, comparable, complete, and meet the sensitivity requirements of the project.

1.2 Project Objectives

The RI involves the following, as outlined in the January 2026 RI Work Plan (RIWP):

- Soil boring installation and soil sample collection;
- Groundwater monitoring well installation and groundwater sample collection;
- Synoptic gauging and sampling of the previously installed monitoring wells and the new monitoring wells installed as part of the RI;
- Soil vapor point installation and soil vapor sample collection.

This QAPP addresses sampling and analytical methods that will be necessary in support of RI activities. These objectives have been established in order to meet standards that will protect public health and the environment for the site.

1.3 Scope of Work

The specific scope of work covered in this QAPP includes any documentation sampling that will occur during implementation of the RIWP. The RIWP requires collection of soil, groundwater, and soil vapor samples to supplement the data and findings of a previous investigation.

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQOs) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall objectives are:

- To evaluate the quality of soil through the collection of soil samples;
- To evaluate the quality of groundwater through the collection of groundwater samples; and,
- To evaluate the quality of soil vapor through the collection of soil vapor samples.

DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and quality assurance/quality control (QA/QC) documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- Precision – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will

be determined by analyzing internal QC duplicates and/or matrix spike duplicates.

- Accuracy – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. For soil samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.
- Representativeness – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOPs), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.
- Completeness – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- Comparability – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in the QAPP, using standard reporting units and reporting formats, and data validation.
- Sensitivity – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Implementation of the RIWP will be overseen by Langan for IUV Phase 2B Owner, LLC. The environmental consultant will also arrange data analysis and reporting tasks. The analytical services will be performed by an Environmental Laboratory Approval Program (ELAP)-certified laboratory. Data validation services will be performed by approved data validation contractor(s).

For the required sampling as stated in the RIWP, sampling will be conducted by Langan, the analytical services will be performed by York Analytical Laboratories, Inc. of Stratford, Conn. (New York State Department of Health [NYSDOH] ELAP certification number 10854). Data validation services will be performed by Joseph Conboy; résumé attached (Attachment A).

Key contacts for this project are as follows:

IUV Phase 2B Owner, LLC c/o Gotham Organization, LLC:	Bryan Kelly Telephone: (212) 716-2502
Qualified Environmental Professional:	Amanda Forsburg Telephone: (973) 560-4900
Langan Project Manager:	Ashley Sandve Telephone: (973) 560-4900
Langan Quality Assurance Officer (QAO):	Marlena Jewett Telephone: (212) 479-5735
Langan Remedial Engineer:	Ron Boyer Telephone: (973) 560-4900
Data Validator / Program Quality Assurance Monitor:	Joe Conboy Telephone: (215) 845-8985
Laboratory Representative:	York Analytical Laboratories, Inc. Allison Bennet Telephone: (203) 325-1371 x844

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA

The overall quality assurance objective is to develop and implement procedures for sampling, laboratory analysis, field measurements, and reporting that will provide data of sufficient quality to evaluate soil impacts at the site. The sample set, chemical analysis results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the site. Quality assurance objectives are usually expressed in terms of accuracy or bias, sensitivity, completeness, representativeness, comparability, and sensitivity of analysis. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

Precision

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 2x the reporting limit (RL) meet the precision criteria if the absolute difference is less than ±2X the RL. For results greater than 2X the RL, the acceptance criteria is a relative percent difference (RPD) of ≤50% (soil), and <30% (groundwater). RLs and method detection limits (MDL) are provided in Attachment B.

Accuracy

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix interferences, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of field blanks and through compliance to all sample handling, preservation, and holding time requirements. All field blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an associated field blank was evaluated against laboratory blanks (preparation or method) and evaluated against field samples collected on the same day to determine potential for bias.

Laboratory accuracy is assessed by evaluating the percent recoveries of MS/MSD samples, LCS/LCSDs, surrogate compound recoveries, internal standard responses and the results of method preparation blanks. MS/MSD, LCS/LCSD, internal standard responses and surrogate percent recoveries were compared to either method-specific control limits or laboratory-derived control limits. Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

Completeness

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Soil and groundwater data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the sampling program and was satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. This is performed by following applicable standard operating procedures (SOPs) and this QAPP. All field technicians will be given copies of appropriate documents prior to sampling events and will be required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is performed by following all

applicable EPA and standard methods, laboratory-issued SOPs, the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

Comparability

Comparability is an expression of the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and was satisfied by ensuring that the sampling plan is followed and that sampling is performed according to the SOPs or other project-specific procedures. Analytical data were comparable when similar sampling and analytical methods are used as documented in the QAPP. Comparability was controlled by requiring the use of specific nationally-recognized analytical methods and requiring consistent method performance criteria. Comparability is also dependent on similar quality assurance objectives. Previously collected data were evaluated to determine whether they may be combined with contemporary data sets.

Sensitivity

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest (e.g., at the NYSDEC Subpart 375-6 Soil Cleanup Objectives). The Project Manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the Project Manager will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the reporting limit.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in DER-10 and as described in Section 5.3.2.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

Soil sampling will be conducted in accordance with the established NYSDEC protocols contained in DER-10/Technical Guidance for Site Investigation and Remediation (May 2010). The following sections describe procedures to be followed for specific tasks.

5.1 Field Documentation Procedures

Field documentation procedures will include summarizing field data in field books and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability and secure page binding. The pages of the notebook will not be removed.

Entries were made in waterproof, permanent blue or black ink. No erasures will be allowed. Incorrect entries will be crossed out with a single strike mark and the change initialed and dated by the team member making the change.

Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number;
- Reasons for being on-site or taking the sample;
- Date and time of activity;
- Sample identification numbers;
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches were made in the field logbook when appropriate;

- Physical location of sampling locations such as depth below ground surface;
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures;
- Description of the sample including physical characteristics, odor, etc.;
- Readings obtained from health and safety equipment;
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample;
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera;
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.; and,
- Names of sampling personnel and signature of persons making entries.

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

5.1.2 Sample Labeling

Each sample collected will be assigned a unique identification number and placed in an appropriate sample container. Each sample container will have a sample label affixed to the outside with the date and time of sample collection and project name. In addition, the label will contain the sample identification number, analysis required and chemical preservatives added, if any. All documentation will be completed in waterproof ink. Sample nomenclature procedures are included in Attachment D.

5.2 Equipment Calibration and Preventative Maintenance

A photoionization detector (PID) will be used during the sampling activities to evaluate work zone action levels and screen soil samples. Field calibration and/or field checking of the PID will be the responsibility of the field team leader and the site HSO, and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)
- Reference standard used for calibration
- Calibration and/or maintenance procedure used
- Other pertinent information

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by qualified personnel. A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

5.3 Sample Collection

5.3.1 Soil Samples

Soil samples will be visually classified and field screened using a PID to assess potential impacts from VOCs and for health and safety monitoring.

Soil samples collected for analysis of VOCs will be collected using Terra Core® sampling equipment. For analysis of non-volatile parameters, samples will be homogenized and placed into glass jars. After collection, all sample jars will be capped and securely tightened, and placed in iced coolers and maintained at 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected soil samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected soil sample will meet all quality assurance criteria set forth by this QAPP and DER-10.

Soil samples analyzed for per- and poly-fluoro alkyl substances (PFAS) will be collected in an 8 ounce high-density polyethylene (HDPE) container provided by the laboratory and analyzed by using USEPA Method 1633. The reporting limits for PFAS in soil are included in Attachment B. The laboratory standard operating procedures (SOP) for the analysis of PFAS is included in Attachment E. Soil samples analyzed for 1,4-dioxane will be collected in an 8-ounce jar provided by the laboratory and analyzed using USEPA Method 8270. The reporting limit for 1,4-dioxane in soil is 0.1 milligram per kilogram (mg/kg).

5.3.1.1 Sample Field Blanks and Duplicates

Use of dedicated sampling equipment is planned; therefore, collection of field blanks is not anticipated. If the use of reusable sampling equipment is required, proper decontamination procedures will be employed (as further described in Section 5.7) and field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative soil samples. If required, field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blanks will be collected at a rate of one per 20 samples and will be analyzed for the complete list of analytes on the day of sampling. If less than 20 samples are collected during a particular sampling event, one field blank sample will be collected. Equipment

blanks will be collected at a rate of one per day when soil samples are analyzed for PFAS. Trip blanks will be collected at a rate of one per day if soil samples are analyzed for VOCs during that day.

Duplicate soil samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. If less than 20 samples are collected during a particular sampling event, one MS/MSD sample will be collected. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes.

5.3.2 Groundwater Samples

Groundwater samples will be collected into laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to a NYSDOH ELAP-certified analytical laboratory. Analysis and/or extraction and digestion of collected groundwater samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected groundwater samples will meet all quality assurance criteria set forth by this QAPP and DER-10.

Groundwater samples analyzed for PFAS will be collected in three 500-mL HDPE containers provided by the laboratory and analyzed using USEPA Method 1633. The reporting limits for PFAS in groundwater are provided in Attachment B. The laboratory SOP for the analysis of PFAS is included in Attachment E. Groundwater samples also be analyzed for 1,4-dioxane will be collected in a one-liter amber glass jar and analyzed using USEPA

Method 8270 SIM. The reporting limit for 1,4-dioxane in groundwater is 0.35 micrograms per liter (ug/L).

5.3.2.1 Sample Field Blanks and Duplicates

Use of dedicated sampling equipment is planned; therefore, collection of field blanks is not anticipated. If the use of reusable sampling equipment is required, proper decontamination procedures will be employed (as further described in Section 5.7) and field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative groundwater samples. If required, field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blanks will be collected at a rate of one per 20 samples and will be analyzed for the complete list of analytes on the day of sampling. If less than 20 samples are collected during a particular sampling event, one field blank sample will be collected. Equipment blanks will be collected at a rate of one per day when groundwater samples are analyzed for PFAS. Trip blanks will be collected at a rate of one per day if groundwater samples are analyzed for VOCs during that day.

Duplicate groundwater samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. If less than 20 samples are collected during a particular sampling event, one MS/MSD sample will be collected. These samples are used to assess the effect of the

sample matrix on the recovery of target compounds or target analytes.

5.3.3 Soil Vapor Samples

Soil vapor samples will be collected in accordance with the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH October 2006). Soil vapor implants will be set at a depth of approximately 14-feet below current site grades which corresponds to the depth interval directly below the proposed development excavation depth. Each vapor probe will consist of a new, dedicated stainless steel screen implant connected to polyethylene or Teflon™ tubing extending to the target depth. About 1 foot of clean sand filter pack will be placed around the screen implant, and the remaining annular space will be backfilled to grade with hydrated bentonite. Sampling will occur for the duration of 2 hours.

Samples will be collected in appropriate sized Summa canisters that have been certified clean by the laboratory and samples will be analyzed by using USEPA Method TO-15. Flow rate for both purging and sampling will not exceed 0.2 L/min. Soil vapor samples will be collected shortly after installation of the temporary probes. One to three volumes (i.e., the volume of the sample probe and tube) will be purged prior to collecting the sample to ensure a representative sample is obtained. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

As part of the vapor intrusion evaluation, a tracer gas will be used in accordance with NYSDOH protocols to serve as a quality assurance/quality control (QA/QC) device to verify the integrity of the soil vapor probe seal. A container (box, plastic pail, etc.) will serve to keep the tracer gas in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer gas prior to sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration. At the conclusion of the sampling round, tracer monitoring will be performed a second time to confirm the integrity of the probe seals.

5.3.3.1 Ambient Air and Soil Vapor Sample Duplicates

Additionally, an ambient air sample will be collected each day soil vapor samples are collected. Samples will be collected in appropriate sized Summa canisters that have been batch-certified clean by the laboratory and samples will be analyzed by using USEPA Method TO-15. Flow rate for sampling will not exceed 0.6 L/min.

Duplicate soil vapor samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

5.3.4 PFAS Sampling Procedures

Soil sampling for PFAS analysis will be completed during the remedial action. All 66 confirmation soil samples collected during the proposed sampling event will be analyzed for PFAS. Field personnel conducting PFAS sampling will wear clothing and use equipment which does not contain PFAS materials including: powderless nitrile gloves, natural rubber overboots, and synthetic and natural fiber clothing. Clothing advertised as waterproof, water-repellant, and/or dirt and/or stain resistant will not be worn. Personal hygiene products with conditioning agents will be avoided prior to the sampling event. Insect repellent and sunscreen will be avoided. Consumption of food and/or beverages will be strictly prohibited during sampling activities, excluding bottled water for hydration. Ballpoint pens will be used as the sole writing instrument to complete labels and record field notes. Waterproof field books, including "Rite-in-Rain"™ will be avoided.

Only sampling equipment known to be devoid of PFAS containing materials will be used. Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. In general, PFAS-free pumps, tubing, interface probes, soil sampling equipment, and bottleware will be considered prior to the sampling event. It is not anticipated that groundwater samples will be collected for PFAS analysis;

however, if required, peristaltic pumps will be utilized as the depth of groundwater is less than 20-feet. If groundwater is determined to be greater than 20 feet deep, bladder pumps (QED Sample Pro, or equivalent) with a fluoropolymer-free bladder will be used. HDPE will be used for tubing, soil sampling equipment, and bottleware.

Field personnel will follow standard discrete soil sampling and low flow procedures when sampling for PFAS. When possible, disposable and dedicated equipment will be used for each sample location to avoid potential cross contamination and limit errors from inadequate decontamination between samples. Bladder pumps and/or peristaltic pump tubing will not be re-used and therefore decontamination of sampling equipment between samples will not be necessary. Nitrile gloves will be changed between each step during set up and sampling.

When sampling for PFAS, no sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

Whenever an action occurs outside of procedure, such as the writing of field notes, nitrile gloves will be changed. Sampling equipment will be staged 5-feet away from the boring or open wellhead. Equipment not directly related to sampling will be staged in a separate area away from the boring or open wellhead. When inserting the tubing into the well, the surrounding platform will be avoided as a source of transference. While stabilizing the well, the pump will not be allowed to stop as backflow from the water quality meter can pose a risk to cross contamination. Once stability has been achieved, sampling will occur. PFAS sample bottleware must be made of HDPE and bottleware must be filled to the container neck. Soil sample bottleware must only be filled half-way. The PFAS field and equipment blanks will be collected immediately following completion of PFAS sampling at the frequency discussed above (Sections 5.3.1.1 and 5.3.2.1).

5.4 Sample Containers and Handling

Certified, commercially clean sample containers will be obtained from the analytical laboratory. The laboratory will also prepare and supply the required field blank sample containers and reagent preservatives. Sample containers, including the field blank containers, will be placed in plastic coolers by the laboratory. These coolers will be received by the field sampling team within 24 hours of their preparation in the laboratory. Prior to the commencement of field work, Langan field personnel will fill the plastic coolers with regular ice only in Ziploc® bags (or equivalent) to maintain a temperature of 4°C±2° C.

Samples collected in the field for laboratory analysis will be placed directly into the laboratory-supplied sample containers. Samples will then be placed and stored on-ice in laboratory provided coolers until shipment to the laboratory. The temperature in the coolers containing samples and associated field blanks will be maintained at a temperature of 4°C±2°C while on-site and during sample shipment to the analytical laboratory.

Possession of samples collected in the field will be traceable from the time of collection until they are analyzed by the analytical laboratory or are properly disposed. Chain-of-custody procedures, described in Section 5.9, will be followed to maintain and document sample possession. Samples will be packaged and shipped as described in Section 5.6.

5.5 Sample Preservation

Sample preservation measures will be used in an attempt to prevent sample decomposition by contamination, degradation, biological transformation, chemical interactions and other factors during the time between sample collection and analysis. Preservation will commence at the time of sample collection and will continue until analyses are performed. Should chemical preservation be required, the analytical laboratory will add the preservatives to the appropriate sample containers before shipment to the office or field. Samples will be preserved according to the requirements of the specific analytical method selected, as shown in Attachment C.

5.6 Sample Shipment

5.6.1 Packaging

Sample containers will be placed in plastic coolers. Regular ice only in Ziploc® bags (or equivalent) will be placed around sample containers. Cushioning material will be added around the sample containers if necessary. Chains-of-custody and other paperwork will be placed in a Ziploc® bag (or equivalent) and placed inside the cooler and custody seals will be affixed to one side of the cooler at a minimum. If the samples are being shipped by an express delivery company (third-party courier, e.g., FedEx) then laboratory address labels will be placed on top of the cooler.

5.6.2 Shipping

Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

- All environmental samples will be transported to the laboratory from the site or Langan office by a laboratory provided courier under the chain-of-custody protocols described in Section 5.9. A third-party courier may be used if necessary.
- Prior notice will be provided to the laboratory regarding when to expect shipped samples. If the number, type or date of shipment changes due to site constraints or program changes, the laboratory will be informed.

5.7 Decontamination Procedures

Though not anticipated, decontamination procedures will be used if non-dedicated sampling equipment is utilized during the RI. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
2. Generous tap water rinse
3. Distilled/de-ionized water rinse

Field sampling equipment that will be used for the collection of PFAS samples that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and clean, PFAS-free water scrub to remove visual contamination
2. Generous clean, PFAS-free water rinse

5.8 Residuals Management

Debris (e.g., paper, plastic and disposable PPE) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings) will be placed back in the borehole from which it was sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

5.9 Chain of Custody Procedures

A chain-of-custody protocol has been established for collected samples was and will be followed during sample handling activities in both field and laboratory operations. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through shipping, storage and analysis to data reporting and disposal. Chain-of-custody refers to actual possession of the samples. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except for third-party shipping couriers, is responsible for sample integrity and safe keeping. Chain-of-custody procedures are provided below:

- Chain-of-custody will be initiated by the laboratory supplying the pre-cleaned and prepared sample containers. Chain-of-custody forms will accompany the sample containers.
- Following sample collection, the chain-of-custody form will be completed for the samples collected. The sample identification number, date and time of sample collection, analysis requested and other pertinent information (e.g., preservatives) will be recorded on the form. Entries will be made in waterproof, permanent blue or black ink.

- Langan field personnel will be responsible for the care and custody of the samples collected until the samples are transferred to another party, dispatched to the laboratory, or disposed. The sampling/Field Team Leader will be responsible for enforcing chain-of-custody procedures during field work.
- When the form is full or when all samples have been collected that will fit in a single cooler, the sampling/Field Team Leader will check the form for possible errors and sign the chain-of-custody form. Any necessary corrections will be made to the record with a single strike mark, dated, and initialed.

Samples will be packaged for shipment or pickup via courier to the laboratory with the appropriate chain-of-custody form. If applicable, a shipping bill will be completed for each cooler and the shipping bill number recorded on the chain-of-custody form. A copy of the form will be retained by the Langan sampling team for the project file, and the original will be sent to the laboratory with the samples. Bills of lading will also be retained as part of the documentation for the chain-of-custody records, if applicable. When transferring custody of the samples, the individuals relinquishing and receiving custody of the samples will verify sample numbers and condition and will document the sample acquisition and transfer by signing and dating the chain-of-custody form. This process documents sample custody transfer from the sampler to the analytical laboratory.

Laboratory chain-of-custody will be maintained throughout the analytical processes as described in the laboratory's Quality Assurance Manual. The analytical laboratory will provide a copy of the chain-of-custody in the analytical data deliverable package. The chain-of-custody becomes the permanent record of sample handling and shipment.

5.10 Laboratory Sample Storage Procedures

The subcontracted laboratory will use a laboratory information management system (LIMS) to track and schedule samples upon receipt by the analytical laboratories. Any sample anomalies identified during sample log-in must be evaluated on individual merit for the impact upon the results and the data quality objectives of the project. When irregularities do exist, Langan must be notified to discuss recommended courses of action and documentation of the issue must be included in the project file.

For samples requiring thermal preservation, the temperature of each cooler will be immediately recorded. Each sample and container will be assigned a unique laboratory identification number and secured within the custody room walk-in coolers designated for new samples. Samples will be, as soon as practical, disbursed in a manner that is functional for the operational team. The temperature of all coolers and freezers will be monitored and recorded using a certified temperature sensor. Any temperature excursions outside of acceptance criteria (i.e., below 2°C or above 6°C) will initiate an investigation to determine whether any samples may have been affected. Following analysis, the laboratory's specific procedures for retention and disposal will be followed as specified in the laboratory's SOPs and/or QA manual.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

6.1 Introduction

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

6.2 Data Reduction

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS. To avoid transcription errors, data will be loaded directly into the American Standard Code for Information Interchange (ASCII) format from the LIMS. If this cannot be

accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

6.3 Data Validation

Data validation will be performed in accordance with the USEPA Region 2 SOPs for data validation and USEPA's National Functional Guidelines for Organic and Inorganic Data Review. Tier 1 data validation (the equivalent of USEPA's Stage 2A validation) will be performed to evaluate data quality. Tier 1 data validation is based on completeness and compliance checks of sample-related QC results including:

- Holding times;
- Sample preservation;
- Blank results (method, trip, and field blanks);
- Surrogate recovery compounds and extracted internal standards (as applicable);
- LCS and LCSD recoveries and RPDs;
- MS and MSD recoveries and RPDs;
- Laboratory duplicate RPDs; and
- Field duplicate RPDs

A DUSR will be prepared by the data validator and reviewed by the Program Quality Assurance Monitor before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method;
- "N" – Tentative identification. Analyte is considered present in the sample;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and,
- No Flag - Result accepted without qualification.

7.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

7.1 Introduction

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

7.2 System Audits

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of

the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

7.3 Performance Audits

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

7.4 Formal Audits

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

8.0 CORRECTIVE ACTION

8.1 Introduction

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

8.2 Procedure Description

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and,
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited

at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 8.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 8.1

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOWUP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

9.0 REFERENCES

NYSDEC. Division of Environmental Remediation. DER-10/Technical Guidance for Site Investigation and Remediation, dated May 3, 2010.

NYSDEC. Division of Environmental Remediation. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, dated 17 January 2021.

NYSDOH. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan

USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D.C.

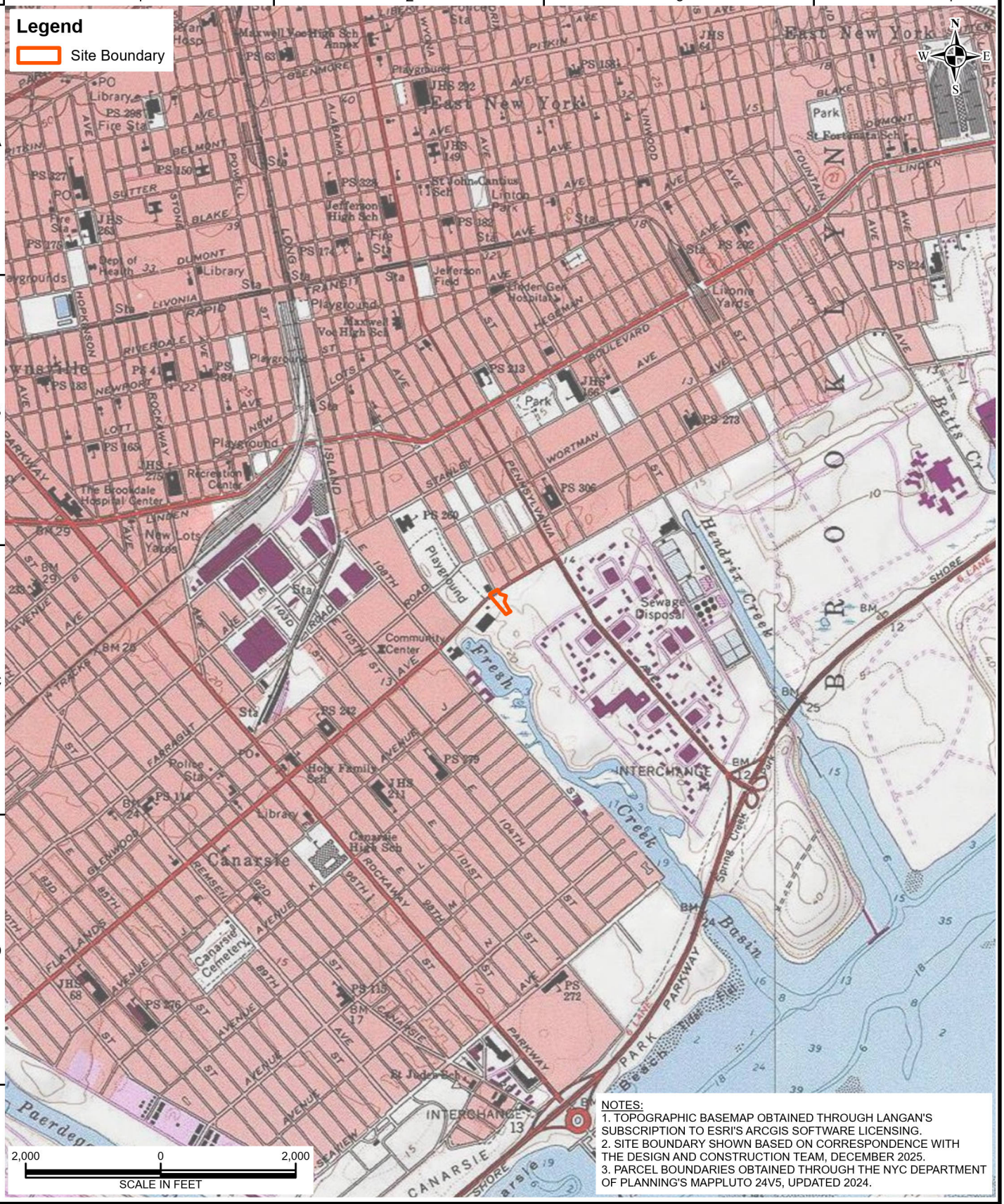
USEPA, 1987. Data Quality Objectives for Remedial Response Actions Activities: Development Process, EPA/540/G-87/003, OSWER Directive 9355.0-7 - U.S. Environmental Protection Agency, Washington, D.C.

USEPA, 1992a. CLP Organics Data Review and Preliminary Review. SOP No. HW-6, Revision #8, dated January 1992. USEPA Region II.

USEPA, 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90. SOP No. HW-2, Revision XI, dated January 1992. USEPA Region II.

USEPA. Hazardous Waste Support Section. Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15. SOP No. HW-31, Revision #6, dated June 2014.

FIGURES



NOTES:
1. TOPOGRAPHIC BASEMAP OBTAINED THROUGH LANGAN'S SUBSCRIPTION TO ESRI'S ARCGIS SOFTWARE LICENSING.
2. SITE BOUNDARY SHOWN BASED ON CORRESPONDENCE WITH THE DESIGN AND CONSTRUCTION TEAM, DECEMBER 2025.
3. PARCEL BOUNDARIES OBTAINED THROUGH THE NYC DEPARTMENT OF PLANNING'S MAPPLUTO 24V5, UPDATED 2024.

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

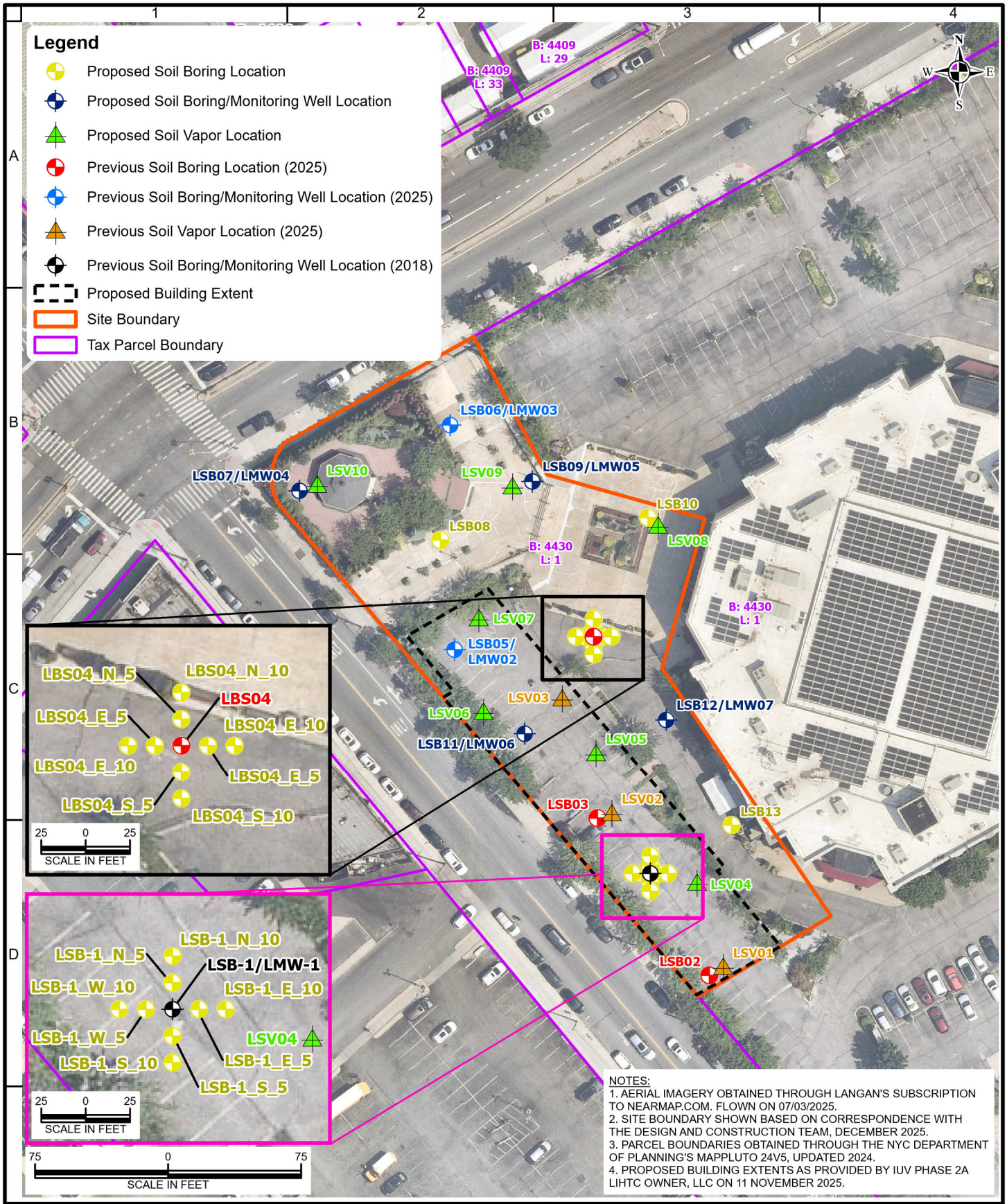
Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
SITE LOCATION PLAN

Project No.	Figure No.
100688801	1
Date: 1/12/2026	
Scale: 1"=2,000'	
Drawn By: RDB	

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Path: \\Langan.com\data\PAR\data8\100688801\Project Data\ArcGIS\APRX\Christian Cultural Center_Overview



NOTES:
1. AERIAL IMAGERY OBTAINED THROUGH LANGAN'S SUBSCRIPTION TO NEARMAP.COM. FLOWN ON 07/03/2025.
2. SITE BOUNDARY SHOWN BASED ON CORRESPONDENCE WITH THE DESIGN AND CONSTRUCTION TEAM, DECEMBER 2025.
3. PARCEL BOUNDARIES OBTAINED THROUGH THE NYC DEPARTMENT OF PLANNING'S MAPPLUTO 24V5, UPDATED 2024.
4. PROPOSED BUILDING EXTENTS AS PROVIDED BY IUV PHASE 2A LIHTC OWNER, LLC ON 11 NOVEMBER 2025.

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

Project
LOUISIANA AVE LANDFILL AUTO WRECKING PROJECT 7 SITE
BLOCK 4430, FUTURE LOT 101
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
PROPOSED SAMPLE LOCATION PLAN

Project No.	Figure No.
100688801	2
Date: 1/12/2026	
Scale: 1"=75'	
Drawn By: RDB	

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Path: \\Langan.com\data\PAR\data8\100688801\Project Data\ArcGIS\APRX\Christian Cultural Center_Overview

ATTACHMENT A

Resumes

Amanda Forsburg, CHMM

Project Scientist

Environmental Oversight, Remedial Investigation, Remedial Action



9 years in the industry ~ 9 years with Langan

Ms. Forsburg has over nine years of experience that includes working on environmental projects, particularly investigation and remediation of environmental contamination. She has assisted in remedial investigations and has been involved in the collection of field data and assisted in the preparation of reports and other environmental regulatory documents for projects in New Jersey and New York.

Ms. Forsburg's field experience includes investigation and remediation of contaminated sites including the collection of soil, groundwater, and air samples for environmental analysis, supervision of injections and remedial excavations, and the completion of air monitoring to ensure OSHA compliance on HAZWOPER sites. Office experience includes management of field investigation and remediation as well as completion of proposals, Phase I Environmental Site Assessments, remedial investigation reports, and remedial closure reports in support of these activities. Ms. Forsburg has worked on projects under regulatory oversight of the New Jersey Department of Environmental Protection (NJDEP), New York State Department of Environmental Conservation (NYSDEC), and New York City Office of Environmental Remediation (NYCOER).

Selected Projects

NYSDEC Brownfield Redevelopment, Remedial Investigation and Remediation Action – 363 and 365 Bond Street, Brooklyn, NY
NYSDEC Brownfield Redevelopment, Remedial Investigation – Fashion Outlets of Niagara Falls, NY
NYSDEC Spills Redevelopment, Remedial Action – 540 West 26th Street, New York, NY
NYSDEC Spills Redevelopment, Remedial Investigation and Remedial Action – 101 Murray Street, New York, NY
NYSDEC Spills Redevelopment, Remedial Investigation and Remedial Action – 110 University Place, New York, NY
NYSDEC Spills Redevelopment, Remedial Action, Lowe's Home Centers, Kings Plaza Site Redevelopment – Brooklyn, NY
NYSDEC Spills Remediation, Con Edison Soil Remediation - Bronx, NY
NYSDEC Spills Remediation, Con Edison NAPL Monitoring and Removal, Various Sites – Manhattan, NY
NYCOER E-Designation Remediation and Volunteer Cleanup Program Redevelopment, Remedial Investigation and Remedial Action – 400 Park Avenue South, New York, NY
NYCOER E-Designation Remediation and Volunteer Cleanup Program Redevelopment, Remedial Investigation and Remedial Action – 540 West 53rd Street, New York, NY
Remedial Action – 508 West 24th Street, New York, NY

Education

B.A., Environmental Studies
Bucknell University

B.A., Environmental Geology
Bucknell University

Professional Registration

Certified Hazardous Materials Manager (CHMM)

OSHA 29 CFR 1910.120 Certification (HAZWOPER)

Professional Affiliations

New Jersey Society of Women Environmental Professionals (NJSWEP)

Association of Environmental and Engineering Geologists – *New York-Philadelphia Chapter Secretary*

Professional Women in Construction - *New York Chapter Program Committee*

Alliance of Hazardous Materials Professionals New Jersey Chapter (AHMPNJ)

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NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 505 W 19th Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 53 West 53rd Street (MoMA Expansion), New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 525 West 52nd Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 412 Greenwich Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 508 West 24th Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 68 Charlton Street, New York, NY
NYCDEP Remediation, Remedial Investigation and Remedial Action – 225 East 39th Street, New York, NY
Sky View Parc Mixed-Use Construction, Sub-Slab Vapor Ventilation System Construction – Flushing, NY
Liberty Plaza Redevelopment Site, Remedial Investigation and Remedial Action – Randallstown, MD
Former Penick Corporation Facility RCRA Site, Remedial Investigation and Remedial Action – Montville, NJ
Former Pan Graphics Facility, Soil and Groundwater Remediation – Garfield, NJ
Former Pan Graphics Facility, Sediment Investigation and Cap Construction – Lodi, NJ
Former Flintkote Facility, Soil and Groundwater Investigation – East Rutherford, NJ
Interport Site, Impacted Soils Delineation and Remediation – Newark, NJ
Lowe's Home Center Store, Sub-Slab Vapor Ventilation System O&M – Eatontown, NJ
Lowe's Home Center Store, Sub-Slab Methane Gas Ventilation System O&M – Woodbridge, NJ
Lowe's Home Center Store, Sub-Slab Vapor Barrier Construction – Rosedale, NY
Stop & Shop, Groundwater and Indoor Air Monitoring – Emerson, NJ
Stop & Shop, Methane Gas Ventilation System O&M – Raritan, NJ
Stop & Shop, Sub-Slab Vapor Ventilation System O&M – New Paltz, NY
Former First Aviation Services Facility, Groundwater Monitoring and Remediation, Teterboro, NJ
Phase I Environmental Site Assessments and Due Diligence Investigations, Various Sites – NJ and NY

ASHLEY SANDVE

PROJECT ENGINEER

ENVIRONMENTAL ENGINEERING

Ms. Sandve's 9 years of experience includes field work and office work on environmental investigation and remediation projects. Her field work experience includes soil, soil vapor, indoor air and groundwater sampling; drilling oversight; air monitoring; soil management; and remediation oversight, including excavation and off-site soil disposal. Her office work experience includes environmental site background research, state environmental database research, EQuIS database management, data evaluation, remedial design, and report work, including, but not limited to, Phase I ESAs, Preliminary Assessment/Site Investigations, Spill Closure Reports, Remedial Investigation Reports, Remedial Action Work Plans, and Remedial Action Reports. Ms. Sandve is proficient in excel and database management and has ample experience researching sites through the online NJDEP and NYSDEC portals.



EDUCATION

M.Eng, Environmental Engineering
Stevens Institute of Technology

B.E., Environmental Engineering
Stevens Institute of Technology

PROFESSIONAL REGISTRATION

40 Hour HAZWOPER

OSHA 29 CFR 1910.120 Certification (HAZWOPER)

SELECTED PROJECTS

- 1 MacDonough Street, Brooklyn, NY
- 1 Nassau Place, Staten Island, NY
- 1 Washington Avenue, Fairfield, NJ
- 10 Godwin Avenue, Ridgewood, NJ
- 100 Jefferson Road, Parsippany, NJ
- 1011 Washington Avenue, Bronx, NY
- 1075 First Avenue, King of Prussia, PA
- 110 First Street, Jersey City, NJ
- 119 Division Avenue, Brooklyn, NY
- 12 West 48th Street, Phase II Environmental Investigation, New York, NY
- 1203 East New York Avenue, Brooklyn, NY
- 125 Greenbush Road, Soil and Groundwater Investigation, Orangeburg, NY
- 125 West End Avenue, New York, NY
- 138 Bruckner Boulevard, Bronx, NY
- 14-16 Burma Road, Jersey City, NJ
- 147-171 King Street, Brooklyn, NY
- 1487 First Avenue, New York, NY
- 150 52nd Street, Brooklyn, NY
- 1500 Harbor Boulevard, Weehawken, NJ
- 1538 Stillwell Avenue, NYCOER E-Designation and VCP Site Remediation, Bronx, NY
- 16 Court Street, Brooklyn, NY
- 160-186 Ease 22nd Street, Brooklyn, NY
- 16-63 Cody Avenue, Ridgewood, NY
- 171 River Road, Middlesex, NJ
- 174 Route 17 North, Rochelle Park, NJ
- 1921 Atlantic Avenue, NYSDEC BCP Site Remediation, Brooklyn, New York

ASHLEY SANDVE

- 2 Shore Lane, Jersey City, NJ
- 23-30 Borden Avenue, Long Island City, NY
- 239 10th Avenue, New York, NY
- 24-02 49th Avenue, New York, NY
- 2447 Third Avenue, Bronx, NY
- 28-90 Review Avenue, NYSDEC BCP Site Remediation, Queens, NY
- 29 Country Road, Tenafly, NJ
- 2924 8th Avenue, New York, NY
- 33-00 Northern Boulevard, Long Island City, NY
- 333 Johnson Avenue, Brooklyn, NY
- 363 Bond Street, Brooklyn, NY
- 384 Passaic Avenue, Fairfield, NJ
- 401 Washington Street, New York, NY
- 412 Greenwich Street, NYCOER E-Designation Remediation, New York, NY
- 425 Meadowlands Parkway, Secaucus, NJ
- 42-50 24th Street, Long Island City, NY
- 44 Whippany Road, Morristown, NJ
- 46 Crown Street, Brooklyn, NY
- 460 West 41st Street, New York, NY
- 479 Degraw Street, Brooklyn, NY
- 5055 Broadway, New York, NY
- 507 Osborn Street, Brooklyn, NY
- 507-511 West 19th Development, New York, NY
- 525 West 52nd Street, New York, NY
- 536-544 W. 26th Street Development, New York, NY
- 537 Columbia Street Development, Brooklyn, NY
- 540 West 26th Street, NYSDEC Spills Redevelopment, Remedial Action, New York, NY
- 550 Tenth Avenue, NYSDEC BCP Site Remediation, New York, NY
- 554 Old Water Works Road, Old Bridge, NJ
- 56 7th Avenue, New York, NY
- 60 East 9th Street, New York, NY
- 68 Charlton Street, NYCOER E-Designation Remediation, New York, NY
- 72 Caton Place, New York, NY
- 724 Park Place, Long Beach, NY
- 740 8th Avenue, New York, NY
- 75 Park Lane South, Jersey City, NJ
- 95 Worth Street, New York, NY
- Avalon Bay Portfolio, New York, NY
- Baker Center Redevelopment, Elizabeth, NJ
- Belleville Logistics Center, Belleville, NJ
- Bright Horizons, Preliminary Assessment and Site Investigation, Roseland, NJ
- Brixmor, Tinton Falls, NJ
- Brodson, Montville, NJ
- Broome Street Parking Lot Site, NYSDEC BCP Site Remediation, New York, NY
- Bryant Street, Brooklyn, NY
- CareOne, East Brunswick, NJ
- Carlyle Residential Portfolio, Brooklyn & Queens, NY
- Centerton Square Retail Shopping Center, Mount Laurel, NJ

- Christian Cultural Center, Brooklyn, NY
- Con Edison 11th Avenue & 50th Street, New York, NY
- Former BMS Campus, Hopewell, NJ
- Former Chevron Site, Bayonne, NJ
- Former Flintkote Facility, East Rutherford, NJ
- Former Hess Terminal, Remediation Oversight, Edgewater, NJ
- Former Penick Corporation Facility RCRA Site, Data Management, Remedial Investigation, and Remedial Action, Montville, NJ
- Giralda Farms, Chatham, NJ
- Haddonfield Road, Cherry Hill, NJ
- Icon Riverwalk, Plainsboro, NJ
- International House, New York, NY
- Kehilath Jeshurun Synagogue, New York, NY
- Lincoln Equities, Piscataway, NJ
- Marble Collegiate Church Office Building, New York, NY
- Mobil, Raritan, NJ
- Newels Development, Bloomfield, NJ
- NJ Turnpike Interchange 8, Hightstown, NJ
- Norfolk Street Site, NYCOER E-Designation Remediation, New York, NY
- One Burma Road, Jersey City, NJ
- Pan Graphics, Garfield, NJ
- Paragon, Cherry Hill, NJ
- Park Slope Portfolio, Brooklyn, NY
- Phase I Environmental Site Assessments and Due Diligence Investigations, Various Sites, NJ and NY
- Queens Plaza Park, Long Island City, NY
- Randallstown Maryland, Windsor Mill, MD
- Realterm, 1538 Stillwell Avenue, Bronx, NY
- RonBet Portfolio, New York, NY
- Self Storage Facility, Far Rockaway, NY
- Seward Park, New York, NY
- Shops at Pennsville, Pennsville, NJ
- Simply Self-Storage, Glen Rock, NJ
- Somerset Corporate Center, Bridgewater, NJ
- Stop & Shop, Raritan, NJ
- Stop & Shop, Soil Vapor Intrusion Investigation, Emerson, NJ
- Suffolk Street, New York NY
- Sunset Industrial Park, Brooklyn, NY
- Surf Avenue, Brooklyn, NY
- Target, Riverdale, NJ
- The Ritz Plaza, New York, NY
- ThorLabs, Groundwater and Soil Vapor Intrusion Investigation, Andover, NJ
- Z+G Residential Portfolio, Multiple Locations, Brooklyn, NY

MARLENA JEWETT

DATA ANALYST

CAD/GIS

1 year in the industry

Proposed Title: Field Technician



Ms. Jewett is a data analyst with experience in database design, management and visualization using EarthSoft's EQuIS™ database in support of environmental site characterizations for sites regulated under federal and state compliance programs. Her expertise includes integration of analytical databases and coordination with GIS users.

In her current role Marlena assists project teams with planning and implementation of project databases and data visualization. This includes coordinating with field staff and laboratories to define, workflows, SOPs and ensure the receipt of the proper deliverables for field and lab data; reviewing and managing project data and information using EQuIS™, Microsoft® Access, and Excel; generating data reports including tables, graphs, charts, and GIS compatible files; and generating and reviewing electronic data deliverables following project or agency specific formats.

Education

B.A., Environmental Economics
Colgate University

Work History

Equitable Advisors
Financial Advisor
9/7/2020-4/23/2021

Langan
Data Analyst
5/10/2021 – Present

SELECTED PROJECTS

EQuIS Management and NYSDEC deliverables – Data Analyst. Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a remedial investigation and waste characterizations of New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), NYC Office of Environmental Remediation (OER), and due diligence sites. Provided final report deliverables including sample summaries; tags; and exceedance summary exports from EQuIS. Completed this work for the following projects:

- **2-8 Main Street**
- **28-90 Review Avenue**
- **34-15 10th Street**
- **37-11 30th Street**
- **44-01 Northern Boulevard**
- **45 Commercial Avenue**
- **50 Jersey Avenue**
- **111 Willow Street**
- **118 West 13th Street**
- **122 Fifth Avenue**
- **155 Third Street**
- **160 East 125th Street**
- **210 Clarkson Avenue**
- **241 West 28th Street**
- **266 West 96th Street**
- **445 Gerard Avenue**
- **475 Bay Street and 31 Wave Street**

- **495 Peninsula Boulevard**
- **561 Greenwich Street**
- **563 Sackett Street**
- **805-825 Atlantic Avenue**
- **1525 Bedford Avenue**
- **2455 Third Avenue**
- **4650 Broadway**
- **ABC Block 27**
- **Bay Crane**
- **Broome Street**
- **Former Grant Hardware**
- **Forsyth and Delancy Street**
- **Gowanus Canal Northside**
- **Greenpoint Landing E1**
- **Greenpoint Landing Parcel H3**
- **John Evans**
- **Kissena Boulevard**
- **NYCHA Farragut**
- **Remeeder**

RONALD D. BOYER, PE

PRINCIPAL/VICE PRESIDENT

GEOTECHNICAL ENGINEERING

Mr. Boyer is an experienced geotechnical engineer whose practice involves coordination and supervision of subsurface investigations; establishment and monitoring of geotechnical instrumentation; design of shallow and deep foundation systems; evaluation of earth slope stability; design and inspection of subgrade improvement applications; preparation of geotechnical engineering reports and construction specifications; performance of pre-construction conditions documentation; coordination and supervision of construction inspection services; and monitoring of adjacent structures during demolition and construction.



SELECTED PROJECTS

- 11 Hubert Street, New York, NY
- 110 University Place, New York, NY
- 111 Murray Street Development, New York, NY
- 120 Neptune Avenue, Brooklyn, NY
- 125 Greenwich Street Development, New York, NY
- 150 Amsterdam Avenue, New York, NY
- 22 Thames Street, New York, NY
- 225 East 39th Street Development, New York, NY
- 2329 Nostrand Avenue, Brooklyn, NY
- 259 West 10th Street, New York, NY
- 315 East 46th Street, New York, NY
- 414 West 15thh Street, New York, NY
- 485 Fifth Avenue, New York, NY
- 510 West 22nd Street, New York, NY
- 57 Reade Street Development, New York, NY
- 92 Fulton Street, New York, NY
- American Dream Meadowlands, East Rutherford, NJ
- Avalon Bay, Boonton, NJ
- Bank Street Commons, White Plains, NY
- Brooklyn Law School Dormitory, Brooklyn, NY
- Cape Liberty Cruise Port, Bayonne, NJ
- CarMax - Waterbury, CT
- Christian Cultural Center, Brooklyn, NY
- Christiana Phase 2 Retail Development, Christiana, DE
- Circuit City Store, Wayne, NJ
- Clifton Commons, Clifton, NJ
- Colgate-Palmolive Waterfront Development, Various Locations
- Daily News Printing Press Facility, Jersey City, NJ
- DDC Rikers Island, New York, NY
- Essex Street Roadway Improvements, Hackensack, NJ
- Fifth Avenue Presbyterian Church, New York, NY
- General Motors - Lighthouse Landing, Sleepy Hollow, NY
- Giants Training Facility, East Rutherford, NJ
- Golden Orchards Geotechnical Support, Washington Township, NJ

EDUCATION

M.S., Civil Engineering (Geotechnical) Virginia Tech

B.S., Civil Engineering Virginia Tech

PROFESSIONAL REGISTRATION

Professional Engineer (PE) in NJ, NY

AFFILIATIONS

Deep Foundations Institute (DFI)

American Institute of Architects

Associated General Contractors of NJ

- Greenwich School, Greenwich, NJ
- Hudson County Courthouse, Jersey City, NJ
- K. Hovnanian at Bedminster Stormwater Detention System, Bedminster, NJ
- Kinko's, Norwalk, CT
- Kohl's Distribution Center, Mamakating, NY
- Lehman Brothers Data Center, Cranford, NJ
- Lehman Brothers Data Center, Piscataway, NJ
- Lowe's Norwalk, CT
- MetLife Stadium, East Rutherford, NJ
- Metropolitan Executive Towers, East Rutherford, NJ
- Morgan Stanley Data Center, Somerset, NJ
- Morristown Airport Hanger, Morristown, NJ
- MOMA West, New York, NY
- Newark International Airport, CONRac, Newark, NJ
- Newark International Airport, AirTrain Replacement, Newark, NJ
- New Britain Retail Center, New Britain, CT
- Northwest Airlines Cargo Facility, JFK International Airport, Queens, NY
- Norwalk Retail Development, Norwalk, CT
- One Bridge Plaza, Fort Lee, NJ
- PRBC - Medical Office Building, East Stroudsburg, PA
- Prospect Plaza, Brooklyn, NY
- PSEG Overhead Transmission, Throughout NJ
- River Bend at Port Imperial, West New York, NJ
- River Street Redevelopment, Hackensack, NJ
- Riverfront Stadium Redevelopment, Newark, NJ
- Riverside Square Mall Expansion, Hackensack, NJ
- Roosevelt Island DEP Seawall, New York, NY
- Roosevelt Island Park, Esplanade and Seawall, New York, NY
- Route 209 Expansion, Mamakating, NY
- Route 3 Flyover Bridge, Meadowlands, East Rutherford, NJ
- St Barnabas Hospital, Livingston, NJ
- Stevens Institute of Technology, Student Housing and University Center, Hoboken, NJ
- Stop & Shop, Various Locations
- T172 & S171N Transmission Lines, North Smithfield, RI
- Target Development, Bethel, CT
- Target Store, Horn Lake, MS
- Temporary Office Trailer Complex, East Rutherford, NJ
- The Standard, New York, NY
- The Venetian, Brooklyn, NY
- Westlakes Office Complex, Berwyn, PA
- Yonkers Avenue Bridge, Westchester County, NY

JOSEPH CONBOY

STAFF CHEMIST

ENVIRONMNETAL

Mr. Conboy has seven years of environmental chemistry, quality assurance, and environmental database management experience, with a current emphasis on validation of laboratory data for submittal to NJDEP via the New Jersey Data of Known Quality Protocols and to NYSDEC. Previous work experience includes performing validation of data for projects in USEPA Regions 2 and 3 while employing appropriate validation guidelines for each region, managing large data sets, updating appropriate regulatory limits, performing statistical evaluations, and preparing electronic data deliverables and report deliverables using the Earthsoft EQuIS database program, and acted as an intermediary between project managers, field staff, and laboratories. Mr. Conboy also has experience in field sampling techniques and maintains current OSHA HAZWOPER certification.



EDUCATION

B.Sc., Chemistry with a minor in Mathematics
Rowan University

CERTIFICATIONS & TRAINING

OSHA 40-Hour HAZWOPER 29 CFR 1910.120(e)(4) Certification

NJ Analytical Guidance and Data Usability Training

USEPA Data Validation Training

Earthsoft EQuIS Environmental Database Training

SELECTED PROJECTS

- 1400 Ferris, Bronx, NY – Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs and SVOCs including 1,4-dioxane, and tangentially used based on professional judgment to perform validation of PFAS data.
- Broome Street Parking Lot, NY - Completed validation of waste characterization data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs, SVOCs, herbicides, PCBs, pesticides, metals including mercury, ignitability temperature, pH, reactive cyanide, reactive sulfide, cyanide, and hexavalent chromium. Toxicity characteristic leachate procedure extraction data for VOCs, SVOCs, herbicides, pesticides, metals, and mercury were also validated.
- 215 North 10th Street, Brooklyn, NY - Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data.
- 35 Commercial Street, Brooklyn, NY - Completed validation of soil data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data, and tangentially used based on professional judgment to perform validation of PFAS data.
- Suffolk Street, Lower East Side, NY- Completed validation of soil, groundwater, and soil vapor data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II

guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, VOCs by USEPA TO-15, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data, and tangentially used based on professional judgment to perform validation of PFAS data.

- Managed a database for a confidential client containing 10+ years of environmental chemical data from multiple laboratories, requiring select data validation in accordance with New Jersey Data of Known Quality Protocols and identifying areas of delineation from historic field information. Once identified, NJDEP designated groundwater, surface water, soil, sediment, soil vapor, and custom screening criteria were researched and applied to each area, requiring individualized flagging for reporting.*
- Prepared the New Jersey Data of Known Quality Protocol Data Usability Evaluation and managed the database for a confidential client for a data set greater than 20 years old. A DUE or any validation effort was not prepared in the 20 years prior to current. This included data from variations of methods for volatile organic compounds, semivolatile organic compounds, total and dissolved metals, pesticides, herbicides, natural attenuation parameters, and per- and polyfluoroalkyl substances in multiple media.*
- Performed 200+ Stage 2a validations for a combined 87-acre USEPA designated Corrective Action site under the Resource Conservation and Recovery Act, including a quick-turn USEPA required PCB by soxhlet extraction investigation across multiple plants. Once a former train car painting facility, USEPA required a quick-turn PCB by soxhlet extraction soil investigation.
- Preparation of a quality assurance program for a confidential client in West Virginia. A quick turn QAPP was prepared in a service location new to the consultant, resulting in research into state requirements for data usability and auditing newly employed laboratories. The QAPP was understood to be prepared for groundwater only, but the client did not reveal the need for sediment and soil. Two QAPPs were submitted for review to governing agencies.*
- Used statistical software to determine a localized background upper confidence limit of chromium for a confidential client's sand and gravel site. Validation was used to confirm laboratory procedures, and data was used in ProUCL calculations to compare to researched background chromium levels for Pennsylvania soils. *
- Prepared daily perimeter dust and air monitoring summaries and validation of low level mirex data for a confidential client's superfund site. Low level mirex data was generated by university laboratories and subject to validation following national functional guidelines to aide in river clean-up, including sediment, surface water, and treatment system water matrices.*

**Project completed prior to employment at LANGAN.*

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

LANGAN

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	1,1,1,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,1-Trichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2-Trichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1-Dichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Bromochloromethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2,3-Trichloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,2,4-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2,4-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dibromo-3-chloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dibromoethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,3,5-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,3-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,4-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	Cyclohexane	0.2	0.5	ug/L
EPA 8260C	Water	2-Butanone	0.2	0.5	ug/L
EPA 8260C	Water	2-Hexanone	0.2	0.5	ug/L
EPA 8260C	Water	4-Methyl-2-pentanone	0.2	0.5	ug/L
EPA 8260C	Water	Acetone	1	2	ug/L
EPA 8260C	Water	Acrolein	0.2	0.5	ug/L
EPA 8260C	Water	Acrylonitrile	0.2	0.5	ug/L
EPA 8260C	Water	Benzene	0.2	0.5	ug/L
EPA 8260C	Water	Bromodichloromethane	0.2	0.5	ug/L
EPA 8260C	Water	Bromoform	0.2	0.5	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	Bromomethane	0.2	0.5	ug/L
EPA 8260C	Water	Carbon disulfide	0.2	0.5	ug/L
EPA 8260C	Water	Carbon tetrachloride	0.2	0.5	ug/L
EPA 8260C	Water	Chlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	Chloroethane	0.2	0.5	ug/L
EPA 8260C	Water	Chloroform	0.2	0.5	ug/L
EPA 8260C	Water	Chloromethane	0.2	0.5	ug/L
EPA 8260C	Water	cis-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	cis-1,3-Dichloropropylene	0.2	0.5	ug/L
EPA 8260C	Water	Dibromochloromethane	0.2	0.5	ug/L
EPA 8260C	Water	Dibromomethane	0.2	0.5	ug/L
EPA 8260C	Water	Dichlorodifluoromethane	0.2	0.5	ug/L
EPA 8260C	Water	Naphthalene	1	2	ug/L
EPA 8260C	Water	Ethyl Benzene	0.2	0.5	ug/L
EPA 8260C	Water	Methylcyclohexane	0.2	0.5	ug/L
EPA 8260C	Water	Hexachlorobutadiene	0.2	0.5	ug/L
EPA 8260C	Water	Isopropylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Methyl acetate	0.2	0.5	ug/L
EPA 8260C	Water	Methyl tert-butyl ether (MTBE)	0.2	0.5	ug/L
EPA 8260C	Water	Methylene chloride	1	2	ug/L
EPA 8260C	Water	n-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	n-Propylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	o-Xylene	0.2	0.5	ug/L
EPA 8260C	Water	p- & m- Xylenes	0.5	1	ug/L
EPA 8260C	Water	1,2,3-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	p-Isopropyltoluene	0.2	0.5	ug/L
EPA 8260C	Water	sec-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Styrene	0.2	0.5	ug/L
EPA 8260C	Water	tert-Butyl alcohol (TBA)	0.5	1	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	tert-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Tetrachloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Toluene	0.2	0.5	ug/L
EPA 8260C	Water	trans-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	trans-1,3-Dichloropropylene	0.2	0.5	ug/L
EPA 8260C	Water	Trichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Trichlorofluoromethane	0.2	0.5	ug/L
EPA 8260C	Water	Vinyl Chloride	0.2	0.5	ug/L
EPA 8260C	Water	Xylenes, Total	0.6	1.5	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	Acenaphthene	0.05	0.05	ug/L
EPA 8270D	Water	Acenaphthylene	0.05	0.05	ug/L
EPA 8270D	Water	Acetophenone	2.5	5	ug/L
EPA 8270D	Water	Aniline	2.5	5	ug/L
EPA 8270D	Water	Anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Atrazine	0.5	0.5	ug/L
EPA 8270D	Water	Benzaldehyde	2.5	5	ug/L
EPA 8270D	Water	Benzidine	10	20	ug/L
EPA 8270D	Water	Benzo(a)anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(a)pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(b)fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(g,h,i)perylene	0.05	0.05	ug/L
EPA 8270D	Water	Benzoic acid	25	50	ug/L
EPA 8270D	Water	Benzo(k)fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Benzyl alcohol	2.5	5	ug/L
EPA 8270D	Water	Benzyl butyl phthalate	2.5	5	ug/L
EPA 8270D	Water	1,1'-Biphenyl	2.5	5	ug/L
EPA 8270D	Water	4-Bromophenyl phenyl ether	2.5	5	ug/L
EPA 8270D	Water	Caprolactam	2.5	5	ug/L
EPA 8270D	Water	Carbazole	2.5	5	ug/L
EPA 8270D	Water	4-Chloro-3-methylphenol	2.5	5	ug/L
EPA 8270D	Water	4-Chloroaniline	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroethoxy)methane	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroethyl)ether	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroisopropyl)ether	2.5	5	ug/L
EPA 8270D	Water	2-Chloronaphthalene	2.5	5	ug/L
EPA 8270D	Water	2-Chlorophenol	2.5	5	ug/L
EPA 8270D	Water	4-Chlorophenyl phenyl ether	2.5	5	ug/L
EPA 8270D	Water	Chrysene	0.05	0.05	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	Dibenzo(a,h)anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Dibenzofuran	2.5	5	ug/L
EPA 8270D	Water	Di-n-butyl phthalate	2.5	5	ug/L
EPA 8270D	Water	1,4-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	1,2-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	1,3-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	3,3'-Dichlorobenzidine	2.5	5	ug/L
EPA 8270D	Water	2,4-Dichlorophenol	2.5	5	ug/L
EPA 8270D	Water	Diethyl phthalate	2.5	5	ug/L
EPA 8270D	Water	2,4-Dimethylphenol	2.5	5	ug/L
EPA 8270D	Water	Dimethyl phthalate	2.5	5	ug/L
EPA 8270D	Water	4,6-Dinitro-2-methylphenol	2.5	5	ug/L
EPA 8270D	Water	2,4-Dinitrophenol	2.5	5	ug/L
EPA 8270D	Water	2,4-Dinitrotoluene	2.5	5	ug/L
EPA 8270D	Water	2,6-Dinitrotoluene	2.5	5	ug/L
EPA 8270D	Water	Di-n-octyl phthalate	2.5	5	ug/L
EPA 8270 SIM	Water	1,4-Dioxane	0.2	0.4	ug/L
EPA 8270D	Water	1,2-Diphenylhydrazine (as Azobenzene)	2.5	5	ug/L
EPA 8270D	Water	Bis(2-ethylhexyl)phthalate	0.5	0.5	ug/L
EPA 8270D	Water	Fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Fluorene	0.05	0.05	ug/L
EPA 8270D	Water	Hexachlorobenzene	0.02	0.02	ug/L
EPA 8270D	Water	Hexachlorobutadiene	0.5	0.5	ug/L
EPA 8270D	Water	Hexachlorocyclopentadiene	2.5	5	ug/L
EPA 8270D	Water	Hexachloroethane	0.5	0.5	ug/L
EPA 8270D	Water	Indeno(1,2,3-cd)pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Isophorone	2.5	5	ug/L
EPA 8270D	Water	2-Methylnaphthalene	2.5	5	ug/L
EPA 8270D	Water	2-Methylphenol	2.5	5	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	3- & 4-Methylphenols	2.5	5	ug/L
EPA 8270D	Water	Naphthalene	0.05	0.05	ug/L
EPA 8270D	Water	3-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	4-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	2-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	Nitrobenzene	0.25	0.25	ug/L
EPA 8270D	Water	4-Nitrophenol	2.5	5	ug/L
EPA 8270D	Water	2-Nitrophenol	2.5	5	ug/L
EPA 8270D	Water	N-nitroso-di-n-propylamine	2.5	5	ug/L
EPA 8270D	Water	N-Nitrosodimethylamine	0.5	0.5	ug/L
EPA 8270D	Water	N-Nitrosodiphenylamine	2.5	5	ug/L
EPA 8270D	Water	Pentachlorophenol	0.25	0.25	ug/L
EPA 8270D	Water	Phenanthrene	0.05	0.05	ug/L
EPA 8270D	Water	Phenol	2.5	5	ug/L
EPA 8270D	Water	Pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Pyridine	2.5	5	ug/L
EPA 8270D	Water	1,2,4,5-Tetrachlorobenzene	2.5	5	ug/L
EPA 8270D	Water	2,3,4,6-Tetrachlorophenol	2.5	5	ug/L
EPA 8270D	Water	1,2,4-Trichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	2,4,6-Trichlorophenol	2.5	5	ug/L
EPA 8270D	Water	2,4,5-Trichlorophenol	2.5	5	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Pesticides					
EPA 8081B	Water	Aldrin	0.004	0.004	ug/L
EPA 8081B	Water	alpha-BHC	0.004	0.004	ug/L
EPA 8081B	Water	beta-BHC	0.004	0.004	ug/L
EPA 8081B	Water	delta-BHC	0.004	0.004	ug/L
EPA 8081B	Water	gamma-BHC (Lindane)	0.004	0.004	ug/L
EPA 8081B	Water	gamma-Chlordane	0.01	0.01	ug/L
EPA 8081B	Water	alpha-Chlordane	0.004	0.004	ug/L
EPA 8081B	Water	Chlordane, total	0.04	0.04	ug/L
EPA 8081B	Water	4,4'-DDD	0.004	0.004	ug/L
EPA 8081B	Water	4,4'-DDE	0.004	0.004	ug/L
EPA 8081B	Water	4,4'-DDT	0.004	0.004	ug/L
EPA 8081B	Water	Dieldrin	0.002	0.002	ug/L
EPA 8081B	Water	Endosulfan I	0.004	0.004	ug/L
EPA 8081B	Water	Endosulfan II	0.004	0.004	ug/L
EPA 8081B	Water	Endosulfan sulfate	0.004	0.004	ug/L
EPA 8081B	Water	Endrin	0.004	0.004	ug/L
EPA 8081B	Water	Endrin aldehyde	0.01	0.01	ug/L
EPA 8081B	Water	Endrin ketone	0.01	0.01	ug/L
EPA 8081B	Water	Heptachlor	0.004	0.004	ug/L
EPA 8081B	Water	Heptachlor epoxide	0.004	0.004	ug/L
EPA 8081B	Water	Methoxychlor	0.004	0.004	ug/L
EPA 8081B	Water	Toxaphene	0.1	0.1	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PCBs					
EPA 8082A	Water	Aroclor 1016	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1221	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1232	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1242	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1248	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1254	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1260	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1262	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1268	0.05	0.05	ug/L
EPA 8082A	Water	Total PCBs	0.05	0.05	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Metals					
EPA 6010C	Water	Aluminum	0.01	0.01	mg/L
EPA 6010C	Water	Antimony	0.005	0.005	mg/L
EPA 6010C	Water	Arsenic	0.004	0.004	mg/L
EPA 6010C	Water	Barium	0.01	0.01	mg/L
EPA 6010C	Water	Beryllium	0.001	0.001	mg/L
EPA 6010C	Water	Cadmium	0.003	0.003	mg/L
EPA 6010C	Water	Calcium	0.05	0.05	mg/L
EPA 6010C	Water	Chromium	0.005	0.005	mg/L
EPA 6010C	Water	Cobalt	0.005	0.005	mg/L
EPA 6010C	Water	Copper	0.003	0.003	mg/L
EPA 6010C	Water	Iron	0.02	0.02	mg/L
EPA 6010C	Water	Lead	0.003	0.003	mg/L
EPA 6010C	Water	Magnesium	0.05	0.05	mg/L
EPA 6010C	Water	Manganese	0.005	0.005	mg/L
EPA 7473	Water	Mercury	0.002	0.002	mg/L
EPA 6010C	Water	Nickel	0.005	0.005	mg/L
EPA 6010C	Water	Potassium	0.05	0.05	mg/L
EPA 6010C	Water	Selenium	0.01	0.01	mg/L
EPA 6010C	Water	Silver	0.005	0.005	mg/L
EPA 6010C	Water	Sodium	0.1	0.1	mg/L
EPA 6010C	Water	Thallium	0.005	0.005	mg/L
EPA 6010C	Water	Vanadium	0.01	0.01	mg/L
EPA 6010C	Water	Zinc	0.01	0.01	mg/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PFAS					
EPA 1633	Water	11CL-PF3OUdS	8	8	ng/L
EPA 1633	Water	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	8	8	ng/L
EPA 1633	Water	1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	8	8	ng/L
EPA 1633	Water	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	8	8	ng/L
EPA 1633	Water	3-Perfluoroheptyl propanoic acid (FHpPA)	25	25	ng/L
EPA 1633	Water	3-Perfluoropentyl propanoic acid (FPePA)	25	25	ng/L
EPA 1633	Water	3-Perfluoropropyl propanoic acid (FPrPA)	5	5	ng/L
EPA 1633	Water	9CL-PF3ONS	8	8	ng/L
EPA 1633	Water	ADONA	8	8	ng/L
EPA 1633	Water	HFPO-DA (Gen-X)	8	8	ng/L
EPA 1633	Water	N-EtFOSA	0.2	0.2	ng/L
EPA 1633	Water	N-EtFOSAA	2	2	ng/L
EPA 1633	Water	N-EtFOSE	20	20	ng/L
EPA 1633	Water	N-MeFOSA	2	2	ng/L
EPA 1633	Water	N-MeFOSAA	2	2	ng/L
EPA 1633	Water	N-MeFOSE	20	20	ng/L
EPA 1633	Water	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	4	4	ng/L
EPA 1633	Water	Perfluoro-1-decanesulfonic acid (PFDS)	2	2	ng/L
EPA 1633	Water	Perfluoro-1-heptanesulfonic acid (PFHpS)	2	2	ng/L
EPA 1633	Water	Perfluoro-1-nonanesulfonic acid (PFNS)	2	2	ng/L
EPA 1633	Water	Perfluoro-1-octanesulfonamide (FOSA)	2	2	ng/L
EPA 1633	Water	Perfluoro-1-pentanesulfonate (PFPeS)	2	2	ng/L
EPA 1633	Water	Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	4	4	ng/L
EPA 1633	Water	Perfluoro-4-oxapentanoic acid (PFMPA)	4	4	ng/L
EPA 1633	Water	Perfluoro-5-oxahexanoic acid (PFMBA)	4	4	ng/L
EPA 1633	Water	Perfluorobutanesulfonic acid (PFBS)	0.2	2	ng/L
EPA 1633	Water	Perfluorodecanoic acid (PFDA)	2	2	ng/L
EPA 1633	Water	Perfluorododecanesulfonic acid (PFDoS)	2	2	ng/L
EPA 1633	Water	Perfluorododecanoic acid (PFDoA)	2	2	ng/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PFAS					
EPA 1633	Water	Perfluoroheptanoic acid (PFHpA)	0.2	2	ng/L
EPA 1633	Water	Perfluorohexanesulfonic acid (PFHxS)	0.2	2	ng/L
EPA 1633	Water	Perfluorohexanoic acid (PFHxA)	0.2	2	ng/L
EPA 1633	Water	Perfluoro-n-butanoic acid (PFBA)	8	8	ng/L
EPA 1633	Water	Perfluorononanoic acid (PFNA)	0.2	2	ng/L
EPA 1633	Water	Perfluorooctanesulfonic acid (PFOS)	0.2	2	ng/L
EPA 1633	Water	Perfluorooctanoic acid (PFOA)	0.2	2	ng/L
EPA 1633	Water	Perfluoropentanoic acid (PFPeA)	4	4	ng/L
EPA 1633	Water	Perfluorotetradecanoic acid (PFTA)	2	2	ng/L
EPA 1633	Water	Perfluorotridecanoic acid (PFTrDA)	2	2	ng/L
EPA 1633	Water	Perfluoroundecanoic acid (PFUnA)	2	2	ng/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	1,1,1,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,1-Trichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2-Trichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1-Dichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Bromochloromethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2,3-Trichloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,2,4-Trichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2,4-Trimethylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dibromo-3-chloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dibromoethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,3,5-Trimethylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,3-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,4-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,4-Dioxane	10	10	ug/kg
EPA 8260C	Soil	Cyclohexane	2.5	5	ug/kg
EPA 8260C	Soil	2-Butanone	2.5	5	ug/kg
EPA 8260C	Soil	2-Hexanone	2.5	5	ug/kg
EPA 8260C	Soil	4-Methyl-2-pentanone	2.5	5	ug/kg
EPA 8260C	Soil	Acetone	5	10	ug/kg
EPA 8260C	Soil	Acrolein	5	10	ug/kg
EPA 8260C	Soil	Acrylonitrile	2.5	5	ug/kg
EPA 8260C	Soil	Benzene	2.5	5	ug/kg
EPA 8260C	Soil	Bromodichloromethane	2.5	5	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	Bromoform	2.5	5	ug/kg
EPA 8260C	Soil	Bromomethane	2.5	5	ug/kg
EPA 8260C	Soil	Carbon disulfide	2.5	5	ug/kg
EPA 8260C	Soil	Carbon tetrachloride	2.5	5	ug/kg
EPA 8260C	Soil	Chlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	Chloroethane	2.5	5	ug/kg
EPA 8260C	Soil	Chloroform	2.5	5	ug/kg
EPA 8260C	Soil	Chloromethane	2.5	5	ug/kg
EPA 8260C	Soil	cis-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	cis-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260C	Soil	Dibromochloromethane	2.5	5	ug/kg
EPA 8260C	Soil	Dibromomethane	2.5	5	ug/kg
EPA 8260C	Soil	Dichlorodifluoromethane	2.5	5	ug/kg
EPA 8260C	Soil	Naphthalene	2.5	10	ug/kg
EPA 8260C	Soil	Ethyl Benzene	2.5	5	ug/kg
EPA 8260C	Soil	Methylcyclohexane	2.5	5	ug/kg
EPA 8260C	Soil	Hexachlorobutadiene	2.5	5	ug/kg
EPA 8260C	Soil	Isopropylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Methyl acetate	2.5	5	ug/kg
EPA 8260C	Soil	Methyl tert-butyl ether (MTBE)	2.5	5	ug/kg
EPA 8260C	Soil	Methylene chloride	5	10	ug/kg
EPA 8260C	Soil	n-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	n-Propylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2,3-Trichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	o-Xylene	2.5	5	ug/kg
EPA 8260C	Soil	p- & m- Xylenes	5	10	ug/kg
EPA 8260C	Soil	p-Isopropyltoluene	2.5	5	ug/kg
EPA 8260C	Soil	sec-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Styrene	2.5	5	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	tert-Butyl alcohol (TBA)	2.5	5	ug/kg
EPA 8260C	Soil	tert-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Tetrachloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Toluene	2.5	5	ug/kg
EPA 8260C	Soil	trans-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	trans-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260C	Soil	Trichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Trichlorofluoromethane	2.5	5	ug/kg
EPA 8260C	Soil	Vinyl Chloride	2.5	5	ug/kg
EPA 8260C	Soil	Xylenes, Total	7.5	15	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Acenaphthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Acenaphthylene	20.9	41.7	ug/kg
EPA 8270D	Soil	Acetophenone	20.9	41.7	ug/kg
EPA 8270D	Soil	Aniline	83.5	167	ug/kg
EPA 8270D	Soil	Anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Atrazine	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzaldehyde	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzidine	83.5	167	ug/kg
EPA 8270D	Soil	Benzo(a)anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(a)pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(b)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(g,h,i)perylene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzoic acid	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(k)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzyl alcohol	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzyl butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,1'-Biphenyl	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Bromophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Caprolactam	41.7	83.3	ug/kg
EPA 8270D	Soil	Carbazole	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chloro-3-methylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chloroaniline	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroethoxy)methane	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroethyl)ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroisopropyl)ether	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Chloronaphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Chlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chlorophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Chrysene	20.9	41.7	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Dibenzo(a,h)anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Dibenzofuran	20.9	41.7	ug/kg
EPA 8270D	Soil	Di-n-butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,2-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	1,3-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	1,4-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	3,3'-Dichlorobenzidine	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4-Dichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Diethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4-Dimethylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Dimethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	4,6-Dinitro-2-methylphenol	41.7	83.3	ug/kg
EPA 8270D	Soil	2,4-Dinitrophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	2,4-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270D	Soil	2,6-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270D	Soil	Di-n-octyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,2-Diphenylhydrazine (as Azobenzene)	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-ethylhexyl)phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	Fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Fluorene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorobutadiene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorocyclopentadiene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachloroethane	20.9	41.7	ug/kg
EPA 8270D	Soil	Indeno(1,2,3-cd)pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Isophorone	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Methylnaphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Methylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	3- & 4-Methylphenols	20.9	41.7	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Naphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	2-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	3-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	Nitrobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Nitrophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Nitrophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	N-nitroso-di-n-propylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	N-Nitrosodimethylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	N-Nitrosodiphenylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	Pentachlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Phenanthrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Phenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Pyridine	83.5	167	ug/kg
EPA 8270D	Soil	1,2,4,5-Tetrachlorobenzene	41.7	83.3	ug/kg
EPA 8270D	Soil	2,3,4,6-Tetrachlorophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	1,2,4-Trichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4,6-Trichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4,5-Trichlorophenol	20.9	41.7	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Pesticides					
EPA 8081B	Soil	Aldrin	0.33	0.33	ug/kg
EPA 8081B	Soil	alpha-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	beta-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	delta-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	gamma-BHC (Lindane)	0.33	0.33	ug/kg
EPA 8081B	Soil	gamma-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Soil	alpha-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Soil	Chlordane, total	1.32	1.32	ug/kg
EPA 8081B	Soil	4,4'-DDD	0.33	0.33	ug/kg
EPA 8081B	Soil	4,4'-DDE	0.33	0.33	ug/kg
EPA 8081B	Soil	4,4'-DDT	0.33	0.33	ug/kg
EPA 8081B	Soil	Dieldrin	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan I	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan II	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan sulfate	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin aldehyde	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin ketone	0.33	0.33	ug/kg
EPA 8081B	Soil	Heptachlor	0.33	0.33	ug/kg
EPA 8081B	Soil	Heptachlor epoxide	0.33	0.33	ug/kg
EPA 8081B	Soil	Methoxychlor	1.65	1.65	ug/kg
EPA 8081B	Soil	Toxaphene	16.7	16.7	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PCBs					
EPA 8082A	Soil	Aroclor 1016	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1221	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1232	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1242	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1248	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1254	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1260	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1262	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1268	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Total PCBs	0.0167	0.0167	mg/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Metals					
EPA 6010C	Soil	Aluminum	1	1	mg/kg
EPA 6010C	Soil	Antimony	0.5	0.5	mg/kg
EPA 6010C	Soil	Arsenic	1	1	mg/kg
EPA 6010C	Soil	Barium	1	1	mg/kg
EPA 6010C	Soil	Beryllium	0.1	0.1	mg/kg
EPA 6010C	Soil	Cadmium	0.3	0.3	mg/kg
EPA 6010C	Soil	Calcium	0.5	5	mg/kg
EPA 6010C	Soil	Chromium	0.5	0.5	mg/kg
EPA 6010C	Soil	Cobalt	0.5	0.5	mg/kg
EPA 6010C	Soil	Copper	0.5	0.5	mg/kg
EPA 6010C	Soil	Iron	2	2	mg/kg
EPA 6010C	Soil	Lead	0.3	0.3	mg/kg
EPA 6010C	Soil	Magnesium	5	5	mg/kg
EPA 6010C	Soil	Manganese	0.5	0.5	mg/kg
EPA 7473	Soil	Mercury	0.03	0.03	mg/kg
EPA 6010C	Soil	Nickel	0.5	0.5	mg/kg
EPA 6010C	Soil	Potassium	5	5	mg/kg
EPA 6010C	Soil	Selenium	1	1	mg/kg
EPA 6010C	Soil	Silver	0.5	0.5	mg/kg
EPA 6010C	Soil	Sodium	10	10	mg/kg
EPA 6010C	Soil	Thallium	1	1	mg/kg
EPA 6010C	Soil	Vanadium	1	1	mg/kg
EPA 6010C	Soil	Zinc	1	1	mg/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PFAS					
EPA 1633	Soil	11CL-PF3OUdS	0.8	0.8	ug/kg
EPA 1633	Soil	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.8	0.8	ug/kg
EPA 1633	Soil	1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	0.8	0.8	ug/kg
EPA 1633	Soil	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.8	0.8	ug/kg
EPA 1633	Soil	3-Perfluoroheptyl propanoic acid (FHpPA)	5	5	ug/kg
EPA 1633	Soil	3-Perfluoropentyl propanoic acid (FPePA)	5	5	ug/kg
EPA 1633	Soil	3-Perfluoropropyl propanoic acid (FPrPA)	1	1	ug/kg
EPA 1633	Soil	9CL-PF3ONS	0.8	0.8	ug/kg
EPA 1633	Soil	ADONA	0.8	0.8	ug/kg
EPA 1633	Soil	HFPO-DA (Gen-X)	0.8	0.8	ug/kg
EPA 1633	Soil	N-EtFOSA	0.2	0.2	ug/kg
EPA 1633	Soil	N-EtFOSAA	0.2	0.2	ug/kg
EPA 1633	Soil	N-EtFOSE	2	2	ug/kg
EPA 1633	Soil	N-MeFOSA	0.2	0.2	ug/kg
EPA 1633	Soil	N-MeFOSAA	0.2	0.2	ug/kg
EPA 1633	Soil	N-MeFOSE	2	2	ug/kg
EPA 1633	Soil	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	0.4	0.4	ug/kg
EPA 1633	Soil	Perfluoro-1-decanesulfonic acid (PFDS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoro-1-heptanesulfonic acid (PFHpS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoro-1-nonanesulfonic acid (PFNS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoro-1-octanesulfonamide (FOSA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoro-1-pentanesulfonate (PFPeS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	0.4	0.4	ug/kg
EPA 1633	Soil	Perfluoro-4-oxapentanoic acid (PFMPA)	0.4	0.4	ug/kg
EPA 1633	Soil	Perfluoro-5-oxahexanoic acid (PFMBA)	0.4	0.4	ug/kg
EPA 1633	Soil	Perfluorobutanesulfonic acid (PFBS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorodecanoic acid (PFDA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorododecanesulfonic acid (PFDoS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorododecanoic acid (PFDoA)	0.2	0.2	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PFAS					
EPA 1633	Soil	Perfluoroheptanoic acid (PFHpA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorohexanesulfonic acid (PFHxS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorohexanoic acid (PFHxA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoro-n-butanoic acid (PFBA)	0.8	0.8	ug/kg
EPA 1633	Soil	Perfluorononanoic acid (PFNA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorooctanesulfonic acid (PFOS)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorooctanoic acid (PFOA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoropentanoic acid (PFPeA)	0.4	0.4	ug/kg
EPA 1633	Soil	Perfluorotetradecanoic acid (PFTA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluorotridecanoic acid (PFTrDA)	0.2	0.2	ug/kg
EPA 1633	Soil	Perfluoroundecanoic acid (PFUnA)	0.2	0.2	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	1,1,1,2-Tetrachloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,1-Trichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2,2-Tetrachloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2-Trichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1-Dichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1-Dichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	1,2,4-Trichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2,4-Trimethylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dibromoethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichloropropane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichlorotetrafluoroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3,5-Trimethylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3-Butadiene	0.3	0.3	ppb
EPA TO-15	Soil Vapor	1,3-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3-Dichloropropane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,4-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,4-Dioxane	0.2	0.2	ppb
EPA TO-15	Soil Vapor	2-Butanone	0.1	0.1	ppb
EPA TO-15	Soil Vapor	2-Hexanone	0.2	0.2	ppb
EPA TO-15	Soil Vapor	3-Chloropropene	0.5	0.5	ppb
EPA TO-15	Soil Vapor	4-Methyl-2-pentanone	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Acetone	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Acrolein	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Acrylonitrile	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Benzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Benzyl chloride	0.1	0.1	ppb

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	Bromodichloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Bromoform	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Bromomethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Carbon disulfide	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Carbon tetrachloride	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Chlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloroform	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	cis-1,2-Dichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	cis-1,3-Dichloropropylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Cyclohexane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Dibromochloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Dichlorodifluoromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Ethanol	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Ethyl acetate	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Ethyl Benzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Hexachlorobutadiene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Isopropanol	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Isopropylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methyl Methacrylate	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methyl tert-butyl ether (MTBE)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methylene chloride	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Naphthalene	0.2	0.2	ppb
EPA TO-15	Soil Vapor	n-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Heptane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Hexane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Propylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	o-Xylene	0.1	0.1	ppb

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	p- & m- Xylenes	0.2	0.2	ppb
EPA TO-15	Soil Vapor	p-Ethyltoluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	p-Isopropyltoluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Propylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	sec-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Styrene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	tert-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Tetrachloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Tetrahydrofuran	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Toluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	trans-1,2-Dichloroethylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	trans-1,3-Dichloropropylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Trichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Trichlorofluoromethane (Freon 11)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl acetate	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl bromide	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl Chloride	0.025	0.025	ppb

ATTACHMENT C

Analytical Methods / Quality Assurance Summary Table

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ATTACHMENT C
ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

Matrix Type	Field Parameters	Laboratory Parameters	Analytical Methods	Sample Preservation	Sample Container Volume and Type	Sample Hold Time	Number of Samples to be Collected	Field Duplicate Samples	Equipment Blank Samples	Trip Blank Samples	Ambient Air Samples	MS/MSD Samples
Soil	Total VOCs via PID	Part 375 + TCL VOCs / CP-51 VOCs	EPA 8260C	Cool to 4°C	Two 40-ml VOC vials with 5ml H_2O, one with MeOH or 3 Encore Samplers (separate container for % solids)	14 days, freeze at lab within 48 hours	91	1 per 20 samples (minimum 1)	1 per 20 samples, if needed (minimum 1, if needed)	1 per shipment of VOC samples	NA	1 per 20 samples (minimum 1)
		Part 375 + TCL SVOCs / CP-51 SVOCs	EPA 8270D	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		1,4-Dioxane	EPA 8270D	Cool to 4°C	8 oz. jar	14 days extract, 40 days after extraction to analysis						
		Part 375 + TAL Metals	EPA 6010C, EPA 7470, EPA 7196A, EPA 9014/9010C	Cool to 4°C	2 oz. jar*	6 months, except Mercury 28 days						
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	2 oz. jar*	28 days						
		Perfluoroalkyl Substances (PFAs)	EPA 1633	Cool to 4°C	8 ounce HDPE container	90 days						
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
Groundwater	Headspace VOCs via PID, synoptic groundwater level measurement, Temperature, Turbidity, pH, ORP, Conductivity	Part 375 + TCL VOCs	EPA 8260C	Cool to 4°C; HCl to pH <2;no headspace	Three 40-mL VOC vials with Teflon®-lined cap	14 days	7	1 per 20 samples (minimum 1)	1 per 20 samples, if needed (minimum 1, if needed)	1 per shipment of VOC samples	NA	1 per 20 samples (minimum 1)
		Part 375 + TCL SVOCs / CP-51 SVOCs	EPA 8270D	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extract, 40 days after extraction to analysis						
		1,4-Dioxane	EPA 8270D SIM	Cool to 4°C	1-L Amber Glass	7 days to extract, 40 days after extraction to analysis						
		Part 375 + TAL Metals	EPA 6010C, EPA 7470, EPA 7196A, EPA 9014/9010C	Cool to 4°C	Two 1-Liter Amber Glass	6 months, except Mercury 28 days						
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	250 mL Plastic	24 hours						
		Perfluoroalkyl Substances (PFAs)	EPA 1633	Cool to 4°C	Three 500mL HDPE containers	28 days						
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extraction, 40 days after extraction to analysis						
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis						
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis						
Soil Vapor	Total VOCs via PID	Part 375 + TCL VOCs	EPA TO-15	NA	6L Summa Cannister	30 days	7	1 per 20 samples (minimum 1)	NA	NA	1 per day	NA

Notes:
*can be combined in one or more 8 oz. jars
mL = milliliter
VOC = Volatile organic compound
SVOC = Semi-volatile organic compound
PCB = Polychlorinated biphenyls
TAL = Total Analyte List
TCL = Target Criteria List
The PFAS compounds to be analyzed includes the expanded PFAS Analyte 40-list under the EPA's Draft Method 1633.

PID = Photoionization detector
Part 375 = New York State Department of Environmental Conservation (NYSDEC) Title 6 New York City Rules and Regulation (NYCRR) Part 375 List.
ORP = Oxidation reduction potential
EPA = U.S. Environmental Protection Agency
NA = Not applicable
ºC = degree Celsius

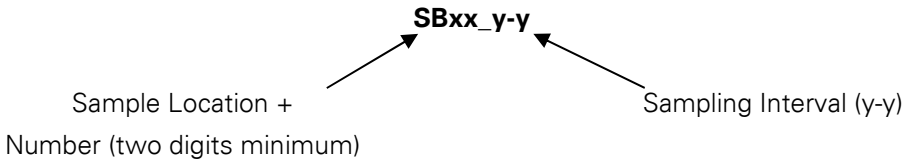
ATTACHMENT D

Sample Nomenclature

Requirements for Sample Nomenclature

The recommendations for sample nomenclature outlined below provide for consistency between sample events and projects but, most importantly, establish unique sample IDs that will avoid confusion months or years after the sample has been collected. Furthermore, unique sample IDs are required for any data submitted to the NYSDEC in EDD format or being uploaded to an EQuIS database.

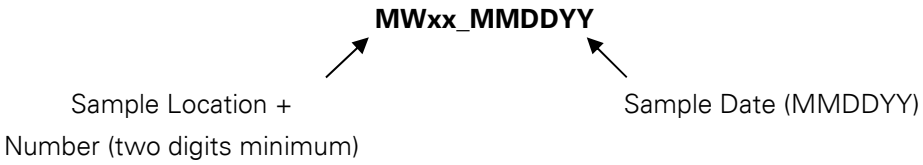
Soil and Sediment Samples



Sample Type	Sample Location	Sample Depth (feet bgs)	Sample Name
Phase II/Remedial Investigation			
Grab	SB01	2 to 4	**SB01_2-4**
	SB02	4	**SB02_4**
Waste Characterization			
Grab	WC01	2 to 4	**WC01_2-4**
	WC02	4	**WC02_4**
Composite	WC01 + WC02	0 to 10	**COMP01_0-10**
Endpoint Sampling			
Grab	EPSW01_N	5	**EPSW01_N_5**
	EPSW01_S	5	**EPSW01_S_5**
	EPSW01_E	5	**EPSW01_E_5**
	EPSW01_W	5	**EPSW01_W_5**
	EPB01	6	**EPB01_6**

- Boring ID (**SB01**_0-0.5) is a sequential number (starting with 01) and should be a minimum of two digits. Any additional characters do not count as part of the 2-digit minimum (SB01**A**, not SB1A).
- Sample Interval (SB01_**0-0.5**) is separated from the boring ID with an underscore, and the top and bottom interval with a dash. Soil and sediment sample intervals should always be in feet.

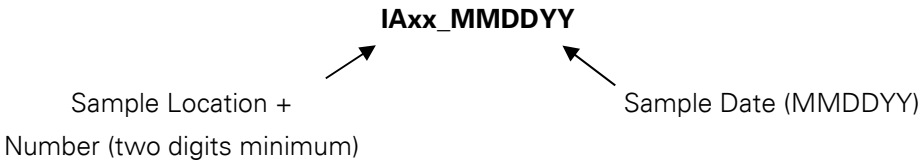
Groundwater and Surface Water Samples



Sample Type	Sample Location	Sample Date	Sample Name
Groundwater Sample	MW01	02/21/2013	**MW01_022113**
Surface Water Sample	SW01	02/21/2013	**SW01_022113**

- Well ID or surface water gauge ID (**MW01**_022113) is the common well name and should be a minimum of two digits. Any additional characters do not count as part of the 2-digit minimum (MW01**A**, not MW1A).
- Sample date (MW01_**022113**) is separated from the well ID (or gauge location) with an underscore and should be provided in MMDDYY format [the date can not contain "/" or "-"].
- If groundwater samples are collected from multiple intervals within one well, you may assign a letter designation (in lower case) to the well ID to differentiate between intervals (i.e., MW01a_022113, MW01b_022113, and MW01c_022113). The letter "a" would indicate the shallowest interval and "c" the deepest. The actual depth intervals should be documented in the project field book or field sheets and the letter designations should be used consistently between sampling events.

Vapor Investigation Samples



Sample Type	Sample Location	Sample Date	Sample Name
Ambient Air Sample	AA01	02/21/2013	**AA01_022113**
Air Sample	IA01	02/21/2013	**IA01_022113**
Soil Vapor Sample	SV01	02/21/2013	**SV01_022113**
Vapor Extraction Well Sample	SVE01 (Inlet/Midpoint/Outlet)	02/21/2013	**SVE01_IN_022113** **SVE01_ MID_022113** **SVE01_ OUT_022113**

- Sample number (**IA01**_022113) should be separated from the sample date by an underscore. Sample numbers should be sequential in order and be a minimum of two digits. Any additional characters do not count as part of the 2-digit minimum (IA01**A**, not IA1A). The location of each sequential sample number should be documented/ illustrated in project field books or field sheets.
- Sample date (IA01**_022113**) is separated from the sample number with an underscore and should be provided in MMDDYY format [the date can not contain "/" or "-"].
- Ambient air samples also need their own unique sample location name. If you revisit a previous ambient air sample location, you can reuse the location name with the new sample date appended to the end.

Duplicate Samples

Sample Type	Parent Sample Code	Date	Sample Name
Groundwater Duplicate Sample (DUP)	MW01_022113	02/21/2013	**DUP01_022113**

Field Blanks and Trip Blanks

Sample Type	Date	Sample Name
Equipment Blank (EB)	02/21/2013	**EB01_022113**
Field Blank (FB)	02/21/2013	**FB01_022113**
Trip Blank (TB)	02/21/2013	**TB01_022113**

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample Type	Sample Location	Parent Sample Name	Sample Name
Matrix Spike (MS)	SB01	SB01_2-4	**SB01_2-4MS**
Matrix Spike Duplicate (MSD)	SB01	SB01_2-4	**SB01_2-4MSD**

NOTES

1. Spaces should not be used in sample names.
2. Special characters should not be used in report naming with the exception of – and _.
3. Letter designations should be used consistently between sampling events.
4. According to USEPA's Contract Laboratory Program (CLP) Guidance for Field Samplers (January 2011), field duplicate samples should remain "blind" to the laboratory (i.e., they should have separate CLP Sample numbers). Assign two separate (unique) CLP sample numbers (i.e., one number to the field sample and one to the duplicate). Submit blind to the laboratory.

ATTACHMENT E

Laboratory Standard Operating Procedures for PFAS Analysis

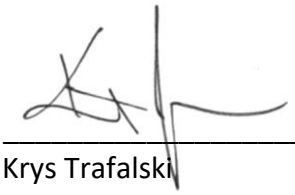
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Standard Operating Procedure

Determination of Target Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous and Solid matrices by Isotope Dilution Analysis by HPLC/MS-MS According to EPA Method 1633 Draft 3

Approvals

Laboratory Director/QA Officer



Krys Trafalski

General Manager

Scott R. Hall

Scott Hall

UNCONTROLLED COPY

Controlled Copy No. PFAS_LCMSMS1633, Rev 1.2-____

Issued to: NA

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1. SCOPE AND APPLICATION

This method is used to identify and quantitate specific PFAS compounds in extracts of non-potable water and solid (soil/sediment) samples using HPLC/MS-MS (High Pressure Liquid Chromatography/Tandem Mass Spectrometry). Currently the compounds (40) that are measured by this methodology are listed in Table 1.0 below.

Table 1.0-Target PFAS

Perfluoroalkyl carboxylic acids		
Perfluorobutanoic acid	PFBA	375-22-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorononanoic acid	PFNA	375-95-1
Perfluorodecanoic acid	PFDA	335-76-2
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluoroalkyl sulfonic acids Acid Form		
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluoropentansulfonic acid	PFPeS	2706-91-4
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Fluorotelomer sulfonic acids		
1*H*,1*H*, 2*H*, 2*H*-Perfluorohexane sulfonic acid	4:2FTS	757124-72-4
1*H*,1*H*, 2*H*, 2*H*-Perfluorooctane sulfonic acid	6:2FTS	27619-97-2
1*H*,1*H*, 2*H*, 2*H*-Perfluorodecane sulfonic acid	8:2FTS	39108-34-4
Perfluorooctane sulfonamides		
Perfluorooctanesulfonamide	PFOSA	754-91-6
N-methyl perfluorooctanesulfonamide	NMeFOSA	31506-32-8
N-ethyl perfluorooctanesulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids		
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols		
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2
Per- and Polyfluoroether carboxylic acids		
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
4,8-Dioxa-3*H*-perfluorononanoic acid	ADONA	919005-14-4
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Ether sulfonic acids		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	113507-82-7

Fluorotelomer carboxylic acids		
3-Perfluoropropyl propanoic acid	3:3FTCA	356-02-5
2*H*,2*H*,3*H*,3*H*-Perfluorooctanoic acid	5:3FTCA	914637-49-3
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4

The estimated reporting limits (MRL) based upon the preparation/analysis parameters herein at the time of this revision are approximately 2.0 - 25.0 ng/L (ppt) for aqueous samples and 0.5 - 5.0 µg/kg for solids. The linear range for these PFAS can be extended by dilution. These MRLs are based upon a volume of 250 mL - 500 mL extracted for aqueous samples and 2 - 5 g for solids. Please refer to *Appendix 1: Target Compound Reporting Limits* for limits of detection and quantitation based on a 5 g extract and 500 mL extract for soils and waters, respectively. Please note, MDL/LOD values are based on the initial November 2022 study and are subject to change based on ongoing study data. The most up-to-date study data will be kept on file by the Quality Department and readily available in the test code section(s) of Element LIMS.

This method is "performance-based," which means that modifications may be made without additional EPA review to improve performance (e.g., overcome interferences, or improve the sensitivity, accuracy, or precision of the results) *provided that all* performance criteria in this method are met. Requirements for establishing equivalency are in Section 9.1.2 and include 9.1.2.2c. For Clean Water Act (CWA) uses, additional flexibility is described at 40 CFR 136.6. Changes in performance, sensitivity, selectivity, precision, recovery, etc., that result from modifications within the scope of 40 CFR Part 136.6, and Section 9.0 of this method must be documented, as well as how these modifications compare to the specifications in this method. Changes outside the scope of 40 CFR Part 136.6 and Section 9.0 of this method may require prior review or approval.

2. SUMMARY

Environmental samples are prepared and extracted using method-specific procedures. Sample extracts are subjected to cleanup procedures designed to remove interferences. Analyses of the sample extracts are conducted by HPLC-MS/MS in the multiple reaction monitoring (MRM) mode. Sample concentrations are determined by isotope dilution or extracted internal standard quantification (see Section 10.3) using isotopically labeled compounds added to the samples before extraction.

2.1 Extraction

2.1.1 Aqueous samples are spiked with isotopically labeled standards, extracted using solid-phase extraction (SPE) cartridges and undergo cleanup using carbon before analysis.

2.1.2 Solid samples are spiked with isotopically labeled standards, extracted into basic methanol, and cleaned up by carbon and SPE cartridges before analysis.

2.2 Analysis

2.2.1 Extracts are analyzed by HPLC-MS/MS in MRM mode. Extracts contain Non-extracted Internal Standards (NIS) to monitor instrument performance and are used for quantitative analysis.

2.2.2 Individual PFAS analytes are identified through peak analysis of the quantification and confirmation ions (Precursor and product ions) where applicable.

2.2.3 The concentration of each analyte is calculated using the isotope dilution technique. This approach corrects the target analyte concentration based on recovery of isotopic analogues and essentially behave like extracted internal standards (EIS). For QC purposes, the percent recoveries of the isotope dilution analogues are calculated using the integrated peak areas of isotope performance standards, which are added to the final extract and function as traditional internal standards (non-extracted internal standards), exclusively applied to the isotope dilution analogues.

3. DEFINITIONS

3.1 ANALYTICAL SEQUENCE – A set of samples that are analyzed on the same instrument continuously over a period, typically a 24 hours. An analytical sequence may consist of multiple extraction batches and various matrices and is bracketed by method specific quality control analyses.

3.2 CALIBRATION STANDARD (CAL) – A solution of the method analytes, isotope dilution analogues, and isotope performance standards (Internal standards) prepared from primary dilution and stock standards. The calibration standards are used to calibrate the instrument response with respect to analyte concentration.

3.3 CONTINUING CALIBRATION VERIFICATION (CCV) – A calibration standard containing target compounds, isotopic analogues, and internal standards. The CCV is analyzed periodically to verify the accuracy of an existing calibration.

3.4 EXTRACTION BATCH – A set of up to 20 Field Samples (not including quality control samples) extracted together by the same person(s) during a workday using the same lot of standards and reagents.

3.5 FIELD DUPLICATES – Separate samples collected at the same time and sampling location, shipped, and stored under identical conditions. Method precision, including

the contribution from sample collection procedures, is estimated from the analysis of Field Duplicates. Field Duplicates may be used to prepare duplicate QC samples.

3.6 FIELD BLANK (FB) – An aliquot of reagent water free of constituents of concern that is placed in a sample container in the during field sampling and treated as a sample in all respects. This includes shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FB is to determine if method analytes or other interferences are introduced to the sample from shipping, storage, and the field environment.

3.7 ISOTOPE DILUTION ANALOGUES - Isotopically labeled analogues of the method analytes that are added to the sample prior to extraction in a known amount. Note: Not all target PFAS currently have an isotopically labeled analogue. In these cases, an alternate isotopically labeled analogue is used as detailed in this SOP and reference method.

3.8 ISOTOPE DILUTION TECHNIQUE - An analytical technique for measuring analyte concentration using the ratio of the peak area of a native analyte to that of an isotopically labeled analogue. The analogue is added to a sample in a known amount and carried through the entire analytical procedure. The ration is used to determine a correction factor that is applied to the native compound's result.

3.9 ISOTOPE PERFORMANCE STANDARDS (Internal Standards) - Quality control compounds that are added to all standard solutions and extracts in a known amount and used to measure the relative response of the isotopically labelled analogues that are components of the same solution. For this method, the isotope performance standards are three isotopically labeled analogues of the method analytes. The isotope performance standards are indicators of instrument performance and are used to calculate the recovery of the isotope dilution analogues through the extraction procedure. In this method, the isotope performance standards are not used in the calculation of the recovery of the native analytes.

3.10 METHOD BLANK – An aliquot of reagent water to which known quantities of the method analytes and isotope dilution analogues are added. The results of the MBLK verify method performance in the absence of sample matrix.

3.11 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) – Aliquots of field samples that have been fortified with a known concentration of target compounds, prior to sample preparation and extraction, and analyzed to measure the effect of matrix interferences. The use of MS/MSD samples is generally not required in isotope dilution methods because the labeled compounds added to every sample provide more performance data than spiking a single sample in each preparation batch.

3.11 SAMPLE DUPLICATE (DUP) – A duplicate aliquot of a field sample analyzed in the same manner as a parent sample to measure reproducibility.

3.12 LIMIT OF QUANTITATION (LOQ) – The smallest concentration that produces a quantitative result with known and recorded precision and bias. The LOQ shall be set at or above the concentration of the lowest initial calibration standard (the lowest calibration standard must fall within the linear range). Determined by matrix through the entire preparation and analysis process.

3.13 METHOD DETECTION LIMIT (MDL) – The minimum measured concentration of a substance that can be reported with 99% confidence that the measured analyte concentration is distinguishable from method blank results (40 CFR 136, Appendix B).

3.14 MINIMUM LEVEL OF QUANTITATION (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence. It may be equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed. Alternatively, the ML may be established by multiplying the MDL (pooled or not pooled, as appropriate) by 3.18 and rounding the result to the number nearest to 1, 2, or 5 x 10n, where n is zero or an integer (see 68 FR 11770).

3.15 PRECURSOR ION – For the purpose of this method, the precursor ion is the deprotonated molecule ($[M-H]^-$) of the method analyte (except for HFPO-DA, in which the precursor ion is formed by decarboxylation). In MS/MS, the precursor ion is mass selected and fragmented by collisionally activated dissociation to produce distinctive product ions of smaller *m/z*.

3.16 PRIMARY DILUTION STANDARD (PDS) SOLUTION – A solution containing the analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.

3.17 PRODUCT ION – For the purpose of this method, a product ion is one of the fragment ions produced in MS/MS by collisionally activated dissociation of the precursor ion.

3.18 INITIAL CALIBRATION VERIFICATION (ICV) – A calibration standard prepared independently from the primary calibration solutions. For this method, the ICV is a repeat of the entire dilution scheme starting with the same stock materials (neat compounds or purchased stock solutions) used to prepare the primary calibration solutions. Independent sources and separate lots of the starting materials are not required, provided the laboratory has obtained the purest form of the starting materials

commercially available. The purpose of the ICV is to verify the integrity of the primary calibration standards.

3.19 QUANTITATIVE STANDARD - A quantitative standard of assayed concentration and purity traceable to a Certificate of Analysis.

3.20 STOCK STANDARD SOLUTION - A concentrated solution containing one or more method analytes prepared in the laboratory using assayed reference materials or purchased from a reputable commercial source with a Certificate of Analysis.

3.21 TECHNICAL GRADE STANDARD – As defined for this method, a technical-grade standard includes a mixture of the branched and linear isomers of a method analyte. For the purposes of this method, technical-grade standards are used to identify retention times of branched and linear isomers of method analytes.

3.22 ANALYTE – A PFAS compound included in this method. The analytes are listed in Table 1.

3.23 CALIBRATION STANDARD (CS) – A solution prepared from a secondary standard and/or stock solutions and used to calibrate the response of the LC-MS/MS instrument.

3.24 CONTINUING CALIBRATION VERIFICATION (CCV) STANDARD – The mid-point calibration standard that is used to verify calibration.

3.25 CFR – Code of Federal Regulations

3.26 EXTRACTED INTERNAL STANDARD (EIS) QUANTIFICATION – The response of the target compound is compared to the response of the labeled analog of another compound in the same LOC.

3.27 INSTRUMENT SENSITIVITY CHECK – solution used to check the sensitivity of the instrument. The solution contains the native compounds at the concentration of the LOQ.

3.28 IPR – INITIAL PRECISION AND RECOVERY; four aliquots of a reference matrix spiked with the analytes of interest and labeled compounds and analyzed to establish the ability of the laboratory to generate acceptable precision and recovery. An IPR is performed prior to the first time this method is used and any time the method or instrumentation is modified.

3.29 OPR - ONGOING PRECISION AND RECOVERY- – Ongoing precision and recovery standard (OPR); a method blank spiked with known quantities of analytes. The OPR is analyzed exactly like a sample. Its purpose is to ensure that the results produced by the

laboratory remain within the limits specified in this method for precision and recovery. Applies to OPR and LLOPR (low level OPR at **2x** the LOQ level).

3.30 SPE – SOLID PHASE EXTRACTION; a technique in which an analyte is extracted from an aqueous solution or a solid extract by passage over or through a material capable of reversibly adsorbing an analyte. Also termed liquid-solid extraction.

4. INTERFERENCES

LC-MS/MS data from blanks, samples, and spikes must be evaluated for interferences. If any interferences are present, take corrective action if necessary. Do not use aluminum foil because PFAAs can be potentially transferred from the aluminum foil to the glassware. Only aluminum foil rinsed with LC/MS grade methanol can be used where necessary.

4.1 PFAS have been used in a wide variety of manufacturing processes, and laboratory supplies should be considered potentially contaminated until they have been tested and shown to be otherwise. The materials and supplies used during the method validation process have been tested and shown to be clean. These items are listed in the Reagents section.

4.2 Method interferences may be caused by contaminants in solvents, reagents (including DI water), sample bottles and caps, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in the chromatograms. All items such as these must be routinely demonstrated to be free from interferences (less than 1/2 the Reporting Limit), under the conditions of the analysis by analyzing Method Blanks. Subtracting blank values from sample results is not permitted.

4.3 PTFE products can be a source of PFAS (PFOA) contamination. The use of PTFE in the procedure should be avoided. Polypropylene (PP) or polyethylene (PE, HDPE) products may be used in place of PTFE products to minimize PFOA contamination.

4.3.1 Standards and samples are injected from polypropylene autosampler vials with polypropylene or polyolefin snap caps, once. Multiple injections may be performed on Primers when conditioning the instrument for analysis.

4.3.2 Random evaporation losses have been observed with the polypropylene caps causing high Internal Std. recovery after the vial was punctured and sample re-injected. For this reason, it is best to inject standards and samples once in the analytical sequence, then recap with polyolefin caps for storage.

4.3.2 Teflon-lined screw caps have detected PFAS at low concentrations. Repeated injection from the same Teflon-lined screw cap have detected PFNA at increasing concentration as each repeated injection was performed, therefore, it is best to use polypropylene snap caps.

4.3.3 Aqueous samples should not come in contact with any glass containers or pipettes as PFAS analytes can potentially adsorb to glass surfaces. Standards dissolved in organic solvent may be purchased in glass ampoules. These standards in organic solvent are acceptable and subsequent transfers may be performed using glass syringes and pipets. Following extraction, the eluate must be collected in a polypropylene tube prior to concentration to dryness. Concentration to dryness in glass tubes may cause poor recovery.

4.4 LC/MS grade methanol must be used for all steps where methanol is used in this method. HPLC grade methanol has been demonstrated to be acceptable if tested prior to use.

4.5 Matrix interferences may be caused by contaminants that are co-extracted from a sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the sample.

4.5.1 Co-extracted Organic Material - Under normal HPLC conditions matrix effects due to co-extracted organic material enhanced the ionization of 4:2 FTS appreciably. Total organic carbon (TOC) is a good indicator of humic content of the sample.

4.5.2 Solid phase extraction cartridges may be a source of interferences. The analysis of field and laboratory reagent blanks can provide important information regarding the presence or absence of such interferences. SPE cartridges should be sealed while in storage to prevent ambient contamination of the SPE sorbent.

4.6 Contamination by carryover can occur whenever a high-concentration and low concentration samples are sequentially analyzed. To reduce carryover, the sample syringe in automatically rinsed with solvent between injections. These operations are programmed into the LC multi-sampler system.

4.7 Volumetric glassware and syringes are difficult to clean after being used for solutions containing high levels of PFOA. These items should be labeled for use only with similarly concentrated solutions or verified clean prior to re-use. To the extent possible, disposable labware is used.

4.8 Both branched and linear PFAS isomers can potentially be found in the environment. Linear and branched isomers are known to exist for PFOS, PFOA, PFHxS, and PFBS, based upon scientific literature. We have also seen branched isomers for PFHpA, NMeFOSAA, NEtFOSAA and PFNA. If multiple isomers are present for one of these PFAS they likely are adjacent peaks that completely resolve or not, but usually with a deflection point resolved during peak integration. The later of these peaks matches the retention time of its labeled linear analog. In general, earlier peaks are the branched isomers and are not the result of peak splitting.

Currently, all these species are available as linear isomers. Some available branched and linear reference standards of the technical mixtures for these specific PFAS are used to ensure that all appropriate peaks are included during peak integration. These species currently include PFOA, PFHxS, NMeFOSAA, and NEtFOSAA. These branched isomers elute before the linear isomer and are integrated and reported as total for those species. Others are also included at this time such as those listed in section 7.3.4.

4.9 In an attempt to reduce PFOS bias, it is required that *m/z* 499>80 transition be used as the quantitation transition.

5. SAMPLE HANDLING

5.1 **Aqueous Samples** - samples are collected by our clients in 250 or 500ml HDPE bottles with unlined HDPE or polypropylene caps and filled to the neck. Each sample submitted should be submitted in triplicate-with one used for determination of Suspended solids and possible pre-screening. Sub-sampling should be avoided whenever possible. When historical data are available indicating high levels of PFAS, sub-sampling may be an advisable option.

5.2 **Soil Samples** – samples are collected in wide mouth 125- or 250-mL HDPE bottles with PP unlined caps.

5.3 SAMPLE SHIPMENT AND STORAGE/HOLDING TIMES – Maintain all aqueous samples protected from light at 0 - 6 ºC from the time of collection until shipped to the laboratory. Samples must be shipped as soon as practical with sufficient ice to maintain the sample temperature below 6 ºC during transport. Samples are to be received by the

laboratory within 48 hours of collection. The laboratory must confirm that the sample temperature is 0 - 6 ºC upon receipt. Once received by the laboratory, the samples may be stored at ≤ -20 ºC, or at 0 - 6 ºC, until sample preparation. However, the allowable holding time for samples depends on the storage temperature, as described below:

5.3.1 Aqueous samples may be held in the laboratory for up to 90 days from collection, when stored at ≤ -20 ºC and protected from the light. When stored at 0 - 6 ºC and protected from the light, aqueous samples may be held for up to **28 days**, with the caveat that issues were observed with certain perfluorooctane sulfonamide ethanols and perfluorooctane sulfonamidoacetic acids after **7 days**. These issues are more likely to elevate the observed concentrations of other PFAS compounds via the transformation of these precursors if they are present in the sample.

5.3.2 Solid samples (soils and sediments) may be held for up to 90 days, if stored in the dark at either 0 - 6 ºC or ≤ -20 ºC, with the caveat that samples may need to be extracted as soon as possible (within 7 days) if NFDHA is designated as an important analyte by the customer.

5.4 **SAMPLE EXTRACT HOLDING TIMES** – Store sample extracts in the dark at less than 0 - 4 ºC until analyzed. If stored in the dark at less than 0 - 4 ºC, sample extracts may be stored for up to 90 days, with the caveat that issues were observed for some ether sulfonates after 28 days. These issues may elevate the observed concentrations of the ether sulfonates in the extract over time. Samples may need to be extracted as soon as possible if NFDHA is an important analyte.

6. APPARATUS AND MATERIALS (as listed or demonstrated equivalents)

6.1 250 - 500 mL polypropylene bottles with polypropylene caps. VWR Scientific or equivalent: Part no. 414004-125, 12 pk. Alternate: White PP unlined lid L238WH and 16oz. clarified PP single wall jar 70-400 neck, item J066-Containers and Packaging.com or equivalent.

6.2 Transport Tube: Virgin Polypropylene, White, Plastic, 10 mL Capacity, 16 mm OD, 93 mm Overall Lg, Self-Standing, 250 PK, Item 710Z420, Gamut.com (Grainger), with PP cap or equivalent.

6.3 Graduated cylinders, 50, 100, 250, 500 and 1000mL, Polypropylene, VWR Scientific or equivalent

6.4 Analytical Balance, 0.0001g., checked for accuracy each day of use with Class S weights, certified annually by an outside service.

6.5 Extract concentrators: Organomation Model N-EVAP 112, 24 position concentrator with water batch control and nitrogen supply controls or equivalent

6.6 3.1 Micron in-line filters, Promochrom only

6.7 1.0-2.0 mL polypropylene snap cap vials, Agilent part no. 5182-0567 or equivalent

6.8 Snap caps, polypropylene or olefin, 11 mm, 11/9k, Agilent Part no. 5182-0542

6.9 Solid Phase Extraction Tubes: for EPA 1633: WAX (weak anion exchange mixed mode polymeric sorbent – Phenomenex No. 8B-S038-HCH 200 mg or Waters Oasis 150 mg Cat. # 186002493. Must have a pKa > 8 to remain positively charged during the extraction. Alternate is Agilent Bond Elute WAX 200 mg-cat. No. 5610-2151

6.10 Syringes, Hamilton or equivalent 5.0 µL, 10 µL 25 µL, 100 µL, 250 µL, 500 µL, Teflon free

6.11 Solid Phase Extraction System-automated-Promochrom 8 position autosampler system for 6 mL capacity SPE tubes. System retrofit to remove all PTFE components and replaced with PEEK tubing or PFAS free tubing. Automated bottle rinsing feature required with 3.1 um in line PP filters.

6.12 Nitrogen Evaporation System- TurboVap nitrogen evaporation system operated at less than 55C.

6.13 LC/MS-MS system- Agilent 1260 or 1290 HPLC system interfaced to an Agilent 6470A or 6460C Triple Quadrupole system. The instrument control and qualitative/quantitative software is Mass Hunter versions B.8.0 and B.9.0 or later.

6.13.1 HPLC System-Agilent 1260 or 1290 Infinity II

6.13.1.1 The Agilent 1260 or 1290 Infinity II HPLC system is configured with temperature-controlled column oven compartment. 4 column configuration, temperature controlled (refrigerated) auto sampler

compartments, injection valve, proportioning valves, variable flow controls and variable injection capabilities.

6.13.1.2 The delay column (PFAS and other interference removal) is an Agilent Eclipse Plus C18, 4.6mm x 50 mm, 3.5 um-Part no. 959943-902 or equivalent.

6.13.1.3 The analytical column is a Restek Raptor C18 part no. 9304252 50mm x 2.1 mm ID, 1.8 u particle size or equivalent.

6.13.2 Agilent LC/MS-MS- Agilent 6470AAR/6460C

6.14.2.1 Agilent model 6470AAR/6460C triple Quadrupole system with Agilent Jet Stream ESI source. UHP nitrogen is used as cell gas and High purity nitrogen is delivered for the sheath gas from a Peak Scientific nitrogen generator system.

6.14 Vortex Mixer- Benchmark Industries or equivalent

6.15 Variable Speed shaker table, 18" x 12"- Orbital Shaker- Jiangau Tenlin Instr. Co., Ltd., Model no. TLSK-III 20-230 RPM, 0-999 min, or equivalent

6.16 Centrifuge, 50 mL, Premiere Model XC-2450 Series Centrifuge 6 x 50 mL, 3500 RPM max., or equivalent

6.17 Mechanical Pipettors- 10-100 µL; 100-1000 µL; 1000-5000 µL-4 E'S Scientific or equivalent, calibrated quarterly.

6.18 Vortex Mixer- Benchmark Industries or equivalent

6.19 pH paper, short range 6-8 and full range with 0.5 pH readability- VWR Scientific or equivalent

6.20 15 mL PP or HDPE Centrifuge tubes, Corning Part no. 430791

6.21 3 mL Disposable Transfer pipets, PE, VWR part no. 16001-176

6.22 1.0 mL polypropylene snap cap vials, Agilent part no. 5182-0567

6.23 Snap caps, polypropylene, 11 mm, 11/9k, Agilent Part no. 5182-0542

6.24 2mL self-standing PP microcentrifuge snap cap tubes, SKS Scientific part no. 0747-17

6.25 Collection tubes, 15 mL graduated PP or HDPE Centrifuge tubes, Corning Part no. 430791

6.26 Disposable 10 mg scoops, PP

6.27 Ultrasonic mixer

6.28 10 mL disposable syringes, PP or HDPE, luer fitting

6.29 13mm or 25 mm 0.2 um Nylon membrane filters, PALL Acrodisc or equivalent

7. REAGENTS AND STANDARDS (as listed or demonstrated equivalents)

7.1 ALL REAGENTS and STANDARDS MUST BE LOGGED INTO THE ELEMENT LIMS SYSTEM. This includes lot numbers, expiration, open and prepared dates, receipt date, Certification/traceability documents from supplier(s) if provided and preparer.

7.2 SOLVENTS and REAGENTS-all as listed or equivalents

7.2.1 Methanol, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1060354000 or equivalent (HPLC Plus grade is an acceptable alternate)

7.2.2 Water, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1153334000 or equivalent (HPLC plus grade is an acceptable alternate). Alternatively, York PFAS free water demonstrated ion and PFAS free can be used.

7.2.3 Acetic Acid, glacial. ACS grade or equivalent.

7.2.4 Ammonium Hydroxide, conc. Cert. ACS grade, 28-30% in water, Sigma Aldrich part no.1054231000, or equivalent

7.2.5 Methanolic Potassium Hydroxide (0.05 M) – add 3.3 g of KOH to 1L MeOH.

7.2.6 Sodium Hydroxide, pellets, ACS grade- Sigma Aldrich part no. 221465-500G, or equivalent

7.2.7 Potassium Hydroxide, pellets, ACS grade

7.2.8 Ammonium Acetate – ACS grade or better, Ammonium Acetate, HPLC or cert. ACS grade. Sigma Aldrich Part no. 73594-100-G-F or equivalent.

7.2.9 Ammonium Acetate 5 mM for HPLC in aqueous solution: HPLC gradient A-- Weigh 0.3854 g (+ 0.0005) Ammonium Acetate and add to 1-liter hypergrade Water. Mix until dissolved then sonicate for 5 mins. To remove air bubbles. Stability - 2 weeks.

7.2.10 **Methanolic Ammonium Hydroxide 0.3 %** - take 2.5 mL of conc. ammonium hydroxide into 247 mL MeOH (measure the 247 mL in a PP graduated cylinder-they are under QQ1 somewhere). Use a mechanical pippetor to add the 2.5 mL (not strictly quantitative FYI)-**Make 4 bottles of this**. *Used for soil extractions*. - 1 month shelf life.

7.2.11 **Methanolic Ammonium Hydroxide 1.0 %** - take 8.25 mL of conc. ammonium hydroxide into 242 mL MeOH (measure the 242 mL in a PP graduated cylinder-they are under QQ1 somewhere). Use a mechanical pipet to add the 8.25 mL (not strictly quantitative FYI)- **Make 4 bottles of this -***used in Promochrom*-1 month life.

7.2.12 **Aqueous Ammonium Hydroxide 3%-** take 24.8 mL of ammonium hydroxide and add 242 mL PFAS free water. 3-month life- *used for pH adjustment*

7.2.13 **Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid** – add ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL), store at room temperature, replace after 1 month. **This solution is used to prepare the instrument blank, calibration standards, and is used to dilute the extracts of samples that exceed the calibration range.**

7.2.14 **Formic Acid 0.1M-aqueous** – add 873 µL formic acid into 250 mL PFAS free water- **Make 2 bottles of this-***used to prepare 7.2.16 below.* 2-year life

7.2.15 **Formic Acid, 0.3M**-aqueous- add 2.62 mL (2619 µL) into 250 mL PFAS free water- **Make 4 bottles of this -***used in Promochrom*-2 year life

7.2.16 **Formic Acid methanolic 1:1, 0.1M formic acid**- mix equal volumes of Methanol and 0.1 M formic acid- **Make 4 bottles of this -***used in Promochrom*-2 year life

7.2.17 **Formic Acid 5% aqueous**- add 12.5 mL Formic acid into 250 mL PFAS free water. *Used for pH adjustment.* 2-year shelf life

7.3 **Stock Standards**

Stock Standards are purchased in mid to high concentration levels from Wellington Laboratories, Inc. Guelph, ONT, CA. Currently, Wellington is the preferred supplier of these materials. As a second source verification, prepare a mid-level from the stock independently from the preparation used for initial calibration. Document this preparation in Element. See Attachments 1,2, and 3 for detailed information.

7.3.1 Internal Standards (7-Non-Extracted –NIS)) used for the method are MPFOA, MPFOS, M3PFBA, MPFDA, MPFHxA, MPFHxS and MPFNA. These are purchased at 250 - 1000 ng/mL depending upon the ISTD in a

mixture. This mixture is purchased from Wellington Labs in 1.2 mL volumes with the following **part no.: MPFAC-HIF-IS**. Stored at 4C or less unopened this solution has a 5-year shelf life. Once opened, the life is one year from open date.

7.3.2 Isotopic Surrogate Analogs (24 isotopes) are purchased for the method described from Wellington Labs at 250-5000 ng/mL levels, depending upon the isotope. Part no. is **MPFAC-HIF-ES**.

7.3.3 Stock Standard mixtures of both linear and branched isomers of the EPA 1633 40 compound list are purchased from Wellington Labs at varying concentrations in 5 different mixtures under part nos. PFAC-MXJ, PFAS-MXI, PFAC-MXH, PFAC-MXG, PFAC-MXF.

7.3.4 Second source standard mixture of both linear and branched isomers of the EPA 1633 40 compound list is purchased from Absolute Standards at 2 µg/mL under part no. 65735.

7.3.5 Qualitative branched isomers mix- individual available branched and linear mixes for the following PFAS are used daily to allow for qualitative knowledge of the PFAS branched isomers so they are integrated/included in quantitative analysis: T-PFOA, lp-PFNA, br-FOSA, br-NEtFOSA, br-NMeFOSA, br-NEtFOSE and br-NMeFOSE. These are purchased at 50,000 ng/mL levels from Wellington Labs-the names above are the Catalogue nos. These have a 5-year life at stock concentrations.

Make a 100 ng/mL Intermediate mix by adding 2.0 µL of the individual stocks up to 1.0 mL with MeOH.

Make a working solution by taking 200 µL of the 100 ng/mL intermediate into 750 µL of cal matrix solution (7.2.13) and add 50 µL of 1:10 EIS mix.

Transfer 300 µL to an autosampler vials, add 3 µL of ISTD working mix, cap vortex, and store until needed. Shelf life is 1 year.

The summary below details the procurement requirements for this method - All from Wellington Laboratories, Inc. except the second source from Absolute Standards:

Description	Part nos.	Comes in
40 Compound Target 1633 list targets	PFAC-MXJ PFAS-MXI PFAC-MXH PFAC-MXG PFAC-MXF	4 Days – 1.2 mL
Isotopic Surrogates-24	MPFAC-HIF-ES	4 Days – 1.2 mL
EPA 1633 – 7 Internal Std.	MPFAC-HIF-IS	4 Days – 1.2 mL
Method 1633 PFCs – Cal Std.	65735	2 days – 1.2 mL

7.4 Preparation of Standards

7.4.1 Preparation of Working Standards and Intermediates from STOCK Materials

All stock standards are prepared by the vendor in methanol containing a bit of sodium hydroxide to prevent losses of target PFAS compounds due to potential esterification in methanolic solution. The stocks come prepared with 4 molar equivalents (a 3x excess) of sodium hydroxide for stocks at the 50 µg/mL levels. This insures their stability with respect to potential loss due to esterification. The basic solution ensures that any acidic sites on the glass ampules or acidic impurities in the methanol are neutralized to prevent ester formation and forms the sodium salt of the PFAS to stabilize it.

When preparing any intermediate level standards, the dilution must be prepared in alkaline methanol to prevent the above from occurring.

To do this, prepare a 5.0 mM NaOH in Hypergrade Methanol (or LC/MSMS grade) by dissolving 0.02 g. of sodium hydroxide into 100 mL of MeOH. This has a 2-week life.

For intermediate standards that are made to 10 mL final volume, add 100 µL of 5.0 mM NaOH/MeOH as part of the preparation. This results in a final concentration of NaOH at 0.05 mM.

For intermediate standards prepared to a final volume of 1.0 mL. add 10 µL of the 5.0 mM NaOH/MeOH.

For working calibration standards/CCV/SCV made to 500 µL final volume, using the mixture detailed in section 7.1.13 (MeOH/Water/acetic acid/ammonium hydroxide). This approximates the matrix of the final extracts for analysis.

7.4.2 Storage and Handling of Standards

All working standards should be stored at either room temperature or 4 °C provided the containers are sealed properly.

Stock Standards may be stored at 4 - 10 °C but before using must sit to allow equilibration to room temperature followed by either vigorous vortex mixing or sonication for 3-5 mins.

7.4.3 Detailed Standards Preparation Procedure-EPA 1633

7.4.4 Internal Standards-*See Attachment 1*

Internal Standards are purchased as a **stock mixture** at 250-1000 ng/mL.

These as transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.

7.4.4.1 Working level of Non-Extracted Internal Standard (NIS) – make a 1:1 dilution of the stock by taking 500 µL of the Stock and adding 500 µL MeOH.

Use as is by adding 3 µL to 300 µL volumes for QC samples, or calibration.

7.4.5 Isotopic Surrogates (Extracted Internal Standards)- *See Attachment 2*

7.4.5.1 Stock Surrogates are purchased as a mixture at 250-5000 ng/mL. These are transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.

Option 1- Use Stock as received and add 25 µL to all samples/QC to be extracted.

Option 2- Prepare **2** mL of Working EIS by preparing a 1:2 dilution to yield 125-2500 ng/mL for use as follows:

Take 1000 µL of the Surrogate Stock, plus 25 µL of 5 mM NaOH/MeOH and 975 µL MeOH to give 2.0 mL final volume**. 50 µL are added to ALL preparation blanks, samples, and QC**. This is sufficient for approx. 40 x 50 µL additions to all blanks, QC, and samples.

This corresponds to adding 5 to 100 ng of EIS compounds to the initial samples and QC. The final volume of extractions will typically be 5.0 ml so this yields 1-20 ng/mL of the isotope EISs in the final extract for analysis.

For calibration, the Stock mix at 250-5000 ng/mL is used by adding 100 uL up to 1.0 mL final volume to yield 25/500 ng/mL in each calibration level as directed in the calibration section 7.4.7.1.

7.4.6 Target Analytes- EPA 1633- *See Attachment 3*

The target analytes for this method are purchased commercially from Wellington Labs using the five part numbers described in Section 7.3.3. They contain the method target analytes only at varying concentrations. These mixtures are transferred from their glass ampules to snap cap vials that have been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry. Again, these are the nominal concentrations and the actual anion concentrations for those present as salts are listed in the documentation and are reflected in both Mass Hunter and Element.

Preparation of a 1.0 mL volume of a 10x intermediate of each of the 5 mixes for Calibration. Some of the higher levels on the curve use aliquots of the stock as shown in Figure 2.

Scale the volume accordingly if less is desired. Note that the EPA 1633 mixes come 1.2 mL per vial so this recipe may consume one vial quickly.

7.4.6.1 OPR and LLOPR - these are a mid-level blank spike and low-level blank spike (at 2x the LOQ). These are prepared as follows from the EPA 1633 Target mixtures (5 components) by taking 200 µL of each STOCK into a snap cap vial giving 1.0 mL final volume.

1. Element ID Y22B199 - PFAC-MXF mix 200 µL.
2. Element ID Y22B200 - PFAC-MXG mix 200 µL.
3. Element ID Y22B201 - PFAC-MXH mix 200 µL.
4. Element ID Y22B204 - PFAC-MXI mix 200 µL.
5. Element ID Y22B205 - PFAC-MXJ mix 200 µL.

For OPR (BS) at mid-level add 100 µL to each matrix for the batch OPR and for the **LLOPR add 20 µL** of the spike mix and process through all steps of the specific matrix preparation.

7.4.7 Second Source Standard

The Second Source intermediate standard is prepared in a similar manner to Target Analytes detailed in the previous section whereby a 10x intermediate is prepared by diluting 100 µL of stock obtained from Absolute Standards (2 µg/mL) in 1.0 mL of solvent. The final concentration of this standard is nominally 200 ng/mL.

7.4.8 Calibration

Calibration of the LC-MSMS systems is done by an eight-level calibration covering the range 0.2 to 1650 ng/mL, nominal. Various PFAS species are present as salts and at differing concentrations and these are reflected in Mass Hunter and Element as their actual concentrations. Six to eight levels are prepared depending upon the analyte. These levels are prepared as directed below using the internal standards, surrogates, and target analytes from above.
This is made to a final volume of 1000 µL in the matrix described in section 7.1.13 (MeOH/Water/acetic acid/ammonium hydroxide)

This preparation excludes the ISTD in the initial preparation. After preparation as directed, withdraw 300 µL of each level into a 500 µL PP vial and add 3 µL of ISTD before analysis, cap, and vortex to mix.
These are stored at <10C and are stable for 6 months when prepared as directed.

7.4.7.1 Calibration Curve Preparation - Based upon a final volume of 1.0 mL in CAL Matrix Solution*

See Attachment 4 for details.

EPA 1633 Calibration Standard Preparation
Rev 1.,0 10/03/22

For Final volume of 1.0 mL
Recipe uses both a 1:10 intermediate for some levels AND the Stock for other points as indicated
All standards in Stds refrig. Adjacent to QQQ1 N2 generator in box labeled EPA 1633 standards- all are opened, labeled and good to use.

	Stock: Y22B201 **1633 MXH Targets Intermediate @10x ***	*Stock: Y22B200* **1633 MXG Targets Intermediate at 10x***	*Stock: Y22B199* **1633 MXF Targets Intermediate at 10x***	*Stock: Y22B204* **1633 MXI Targets Intermediate at 10x***	*Stock: Y22B205* **1633 MXJ Targets Intermediate at 10x***	*Stock: Y22B198* **1633 EIS isotope Mix Intermediate at 10x**
Level	**uL of MXH 10x Interm.**	**ul of MXG interm.**	**ul of MXF interm.**	**ul of MXI interm.**	**ul of MXJ interm.**	**uL of EIS Interm.**
1	2	2	4	2	2.5	50
2	5	5	10	5	6.25	50
3	12.5	12.5	25	12.5	15.6	50
4	25	25	50	25	31.3	50
5	50	50	100	50	62.5	50
6	125	125	250	125	15.6 of Stock	50
7	25 of Stock	25 of Stock	50 of Stock	25 of Stock	31.2 of Stock	50
8	62.5 of STOCK	62.5 of STOCK	125 of STOCK	62.5 of STOCK	78.0 of Stock	50

* 100 uL up to 1 mL in MeOH

*CAL MATRIX: Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid – Prepared by adding ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL), store at room temperature, replace after 1 month. This solution is used to prepare the instrument blank and is used to dilute the extracts of samples that exceed the calibration range.

Amount of CAL Matrix to make up to 1.0 mL Final volumes:

CAL LEVEL	µL of CAL Matrix
1	937.5
2	918.8
3	871.9
4 *	793.7
5	637.5
6	309.0
7	843.8
8	609.5

INTERNAL STANDARD MIX (non-extracted IS-NIS). Mix 500 µL of STOCK ISTD at 250-1000 ng/mL with 500 µL of Methanol. This results in 125-500 ng/mL Intermediate ISTD. See 7.4.4.1.

Add 3.0 µL to 300 µL of each level 1-8 in a 500 µL PP autosampler vials and cap with polyolefin cap, vortex to mix and run. Add 3 µL to 300 µL of all sample/QC extracts before analysis.

*Level 4 is also used as the CCV for each analysis sequence run initially, then after every 10 samples and at the end of the sequence. Multiple vials should be prepared for this level.

7.4.9 Checking the Efficacy of the Surrogate/Spike Mixes

On a monthly basis the surrogate (EIS) and spike mixes from the vials used for spiking are assayed to ensure stability. These are prepared for the analysis by taking 3.0 µL of the surrogate (EIS) mix and 3 µL of the Spike mix into 294 µL MeOH/Water/Acetic Acid/Ammonium hydroxide from 7.1.13, then add 3 µL of NIS (ISTD). This yields a 1:100 dilution of the EIS and Spike mixes. Use 100 as the dilution factor in the Mass Hunter worklist.

7.4.10 Second Source - Initial Calibration Verification (ICV)

The initial calibration verification is prepared in a similar manner to calibration standards whereby 50 µL of intermediate stock is diluted in 1.0 mL of solvent. The final concentration of this standard is nominally 10 ng/mL.

8. PROCEDURE

8.1 Preventative and Routine Maintenance

HPLC/MS/MS Preventative Maintenance	
As Needed: Change pump seals. Change in-line filters in autosampler (HPLC). Check/replace in-line frit if excessive pressure or poor performance. Replace column if no change following in- line frit change. Clean needle. Replace or clean Capillary Replace fused silica tube in ESI interface. Clean lenses. Clean skimmer. Ballast rough pump 30 minutes. Check Nozzle flow pattern	**Daily (When in use)** Check solvent reservoirs for sufficient level of solvent. Verify that pump is primed, operating pulse free. (ripple < 1%) Check needle wash reservoir for sufficient solvent. Verify capillary heater temperature functioning. Verify vaporizer heater temperature. Verify rough pump oil levels. Verify turbo-pump functioning. Verify nitrogen pressure for auxiliary and sheath gasses. Possible Checktune
Semi-Annually Replace oil mist and odor elements. Replace activated alumina filter if applicable	**Annually** Vacuum system components including fans and fan covers. Clean/replace fan filters, if applicable.

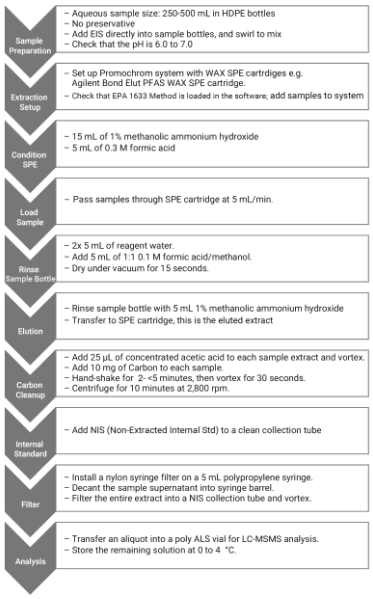
8.2 Sample Preparation (Extraction, Clean-up and Concentration)- Aqueous Matrices

A summary of the steps for the steps related to aqueous samples are shown in Figure 1.0 and in the summary below.

1. Determine % Suspended Solids – 10.0 mL $\pm$ 0.02 mL through a tared 0.2 um PP filter. Dry filter $\geq$ 12 hours @ 105C, cool in desiccator. Calc % TSS.
2. Check pH with short range pH paper to insure pH = 6.5 $\pm$ 0.5. Adjust as necessary with either 5% aqueous formic acid to lower pH or with 3% aqueous ammonium hydroxide to raise pH.
3. Weigh sample bottle as is to $\pm$ 0.1 g.-remove cap first since that will not be weighed later since autosampler caps are used.
4. Homogenize sample by inversion 3-4 x-place full volume on Promochrom System using WAX SPE cartridges.
5. Set up MBLK, OPR at 2x LOQ (low LCS) and mid-level OPR (mid-level LCS)-spike with 10 µL of Spike mix for LLOPR and 100 µL of spike mix for mid-OPR.
6. Spike all with 25 µL EIS solution (isotopic surrogates)

7. Follow Promochrom method for EPA 1633
8. Initiate SPE program EPA1633AQ on the Promochrom system
9. Once the program is finished there will be 5 ml in the collection tube. If less, make up to exactly 5.0 mL with MeOH.
10. Remove the sample bottle from the Promochrom system and weigh the empty bottle. That will determine the weight (volume for water) assume 1 g = 1.0 mL. Enter this value into the element bench sheet and the initial volume.
11. Add 25 µL of concentrated acetic acid to each collection tube and vortex to mix.
12. Add 10 mg of activated carbon to all samples and QC. Hand mix and vortex mix for no more than 2 minutes.
13. Centrifuge at 2800 rpm for approx. 10 minutes.
14. Filter the final volume through 0.2 um nylon filter using a syringe.
15. If the client provides only 250 mL of sample, in order to meet reporting limits, it may be required to concentrate the unfiltered extract by a factor of at least 2 on a TurboVap at 1.2 Liters/min with nitrogen at <55 ^{o}C. For example, if the final volume is 5.0 mL, concentrate to 2.0 mL final volume (2.5 x concentration). If 500 mL is provided, skip this step.
16. Enter the final volume achieved into the bench sheet in Element.
17. Transfer a portion of the final extract to a 2 mL snap cap, labeled.
18. Take a 300 µL portion of the extract into a 500 µL PP autosampler vial, add 3 µL of NIS (non-extracted internal std.). Cap, vortex, store at <6 ^{o}C.
19. Sample is ready for analysis.

Figure 1.0 Aqueous Sample Preparation Steps



8.2.1 To measure sample initial volume for aqueous samples, remove the cap and weight the bottle and record the weight in the sample weight. For MBLK, LLOPR and OPR use 250-500 mL volumes). After SPE processing, be sure the empty bottle is dry and weight to determine the amount of sample in grams (essentially equal to volume in mL). Use that number for the initial volume in Element LIMS.

8.2.2 For every 20 field samples (Field blanks are considered field samples in as they are treated as such), a blank (MBLK), blank spikes, (2 levels-LLOPR and OPR as BS1 and BS2 respectively. A matrix spike is not necessary since isotope dilution is used. If an MS/MSD is required by a specific project, spike 100 µL of the mid-level BS mix (OPR).

8.2.3 All polypropylene equipment including graduated cylinders and sample transfer lines/reservoirs should be washed prior to using with extraction solvent (Methanol).

8.2.4 Add 25 µL of EIS (isotopic surrogates) (250/5000 ng/mL) to each sample and QC sample, recap, and invert to mix well.

8.2.5 Add, 20 µl (low level spike), 100 µL (mid-level spike)

8.2.6 Using the Promochrom automated system, run a cleaning run. Be sure the reservoirs of LC/MS grade methanol and HPLC plus grade water or equivalent are full. Prime all lines and align all components.

8.2.7. Load in the EPA1633 method and adjust the sample volume to 10 mL more than the highest volume container measured by visual comparison to a calibrated bottle of the same size. Please refer to *Appendix 2: Promochrom Method* detailing the automated SPE extraction method on the Promochrom system.

8.2.8 The SPE method solvents for extractions are as follows:

- Solvent 1 = MeOH
- Solvent 2 = H_2O
- Solvent 3 = 0.3 M Formic acid,
- Solvent 4 = 1:1 0.1M Formic Acid/MeOH,
- Solvent 5 = MeOH with 1% ammonium hydroxide (“Basic MeOH”)
  W1 = Aqueous waste, W2 = Organic waste

8.2.9 Place labeled 15 mL graduated collection vessels in the sample collection tray and use Element labels to identify the vials at this point. Print 2 sets of labels for each since they will be used after the concentration step as well. These are graduated.

8.2.10 Connect the bottles to the automated system.

8.2.12 Initiate the EPA1633Aq SPE Extraction Program. Each run is approximately 1 hour 45 minutes.

8.2.13 **Evaporation Options** - Aqueous Samples

N-EVAP systems

8.2.13.1 The resulting 5 mL extracts are not further concentrated unless Work Plan reporting limits need to be lower than standard RLs. When this is required by the Work Plan, the extracts and QC are transferred to the N-EVAP concentrator systems operated at 50-55 degrees C (never more than 55C) in their original collection vials. The nitrogen flow is initiated at 1.2 ml/min and adjusted on each individual sample to provide a gentle stream causing a slight disturbance at the surface of the methanol extracts.

8.2.13.2 As this evaporation proceeds the walls of each vessel are rinsed with methanol when the volume is approximately 2.5 mL and then again when the volume is reduced to just below 2.0 mL. Then Bring up the final volume to 2.5 mL. This is a 2x concentration when needed.

8.2.14 Swirl final extract, make up to 2.0 mL with methanol. Using a disposable polypropylene pipet, carefully transfer to a 2 mL PP snap cap vial.

8.2.15 Withdraw an aliquot of 300 µL into a 500 µL autosampler vial (PP) and add 3.0 µL of ISTD (NIS) mix.

8.2.16 Cap with polyolefin flexible caps and vortex to mix.

8.2.17 Store Extracts at <6^{o}C until analysis.

8.3 Sample Preparation (Extraction, Clean-up, and Concentration) - Soil Matrices

1. Determine % solids: use 5 grams; dry at 110C $\geq$ 12 hours.
2. Mix sample with a stainless-steel spatula to homogenize-exclude Sticks, vegetation, rocks and the like.
3. Remove 5.0 g. from the homogenized sample container. Add to a tared 50 mL centrifuge tube. Determine the weight $\pm$ 0.01 g.
4. Prepare QC using clean matrix (Ottawa Sand) wetted with 1 mL PFAS free water in 50 mL centrifuge tubes.
5. For all samples, QC blanks and LCSs (LLOPR and ML OPR) and a 25 µL aliquot of EIS onto the soil. The current Element standard ID is Y22J305. For the OPRs add

appropriate amount of spike solution (20 µL for LLOPR and 100 µL for OPR. The current Element Std ID is Y22J304.

6. Swirl the samples to mix then let sit for 30 minutes.
7. Add 10 mL of 0.3% methanolic ammonium hydroxide to each centrifuge tube.
8. Vortex to mix then shake on the shaker table for 30 minutes.
9. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
10. Transfer the supernatant liquid to a clean 50 mL centrifuge tube
11. Add 15 mL of 0.3% methanolic ammonium hydroxide to each of the original centrifuge tubes.
12. Vortex to mix then shake on the shaker table for 30 minutes.
13. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
14. Transfer the supernatant liquid to the centrifuge tubes from 10.0 above.
15. Add another 5 mL of 0.3% methanolic ammonium hydroxide to each of the original centrifuge tubes.
16. Vortex to mix then shake on shaker table for 30 minutes.
17. Next, centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes.
18. Transfer the supernatant liquid to the centrifuge tubes from 10.0 above.
19. Add 10 mg of activated carbon to the combined extract using a 10 mg scoop and hand swirl for 2 minutes (never more than 5 minutes of losses of Target PFAS will occur)
20. Centrifuge at 3500 rpm for 5 minutes or 2800 rpm for 10 minutes
21. Immediately Decant into a 50 mL centrifuge tube.
22. Place in TurboVap or on the N-EVAP system and concentrate at 55 deg. C to a final volume of approx. 7 mL at a nitrogen flow of 1.2 mL/min.
23. Add 35-40 mL of PFAS free water to the tube and vortex to mix.
24. Check the pH= 6.5 $\pm$ 0.5 if not adjust accordingly using 5% formic acid to lower pH or 3% aqueous ammonium hydroxide to raise pH to within this range.
25. Set up the soil EPA 1633 method on the Promochrom be sure volume is set to 50 ml for sample size. Please refer to *Appendix 2: Promochrom Method* detailing the automated SPE extraction method on the Promochrom system.
26. Place samples and QC centrifuge tubes on the autosampler
27. Once the program is finished, note the final volume and use that in the Element bench sheet as final volume. Should be 5.0 mL. If less make up to 5.0 mL with MeOH.
28. Add 25 µL of concentrated acetic acid to each collection tube and vortex to mix.
29. Add 10 mg of carbon to all samples and QC and mix for 2 minutes (no more than 5 minutes).
30. Immediately centrifuge at 2800 rpm for 10 minutes.

31. Filter the extract through a 0.2 um nylon membrane using a syringe and filter into a 2 mL snap cap vial.
32. When ready for analysis, remove 300 µL of extract and transfer to a 500 µL autosampler vial. Add 3 µL of NIS (internal standard), vortex to mix. Cap with polyolefin flexible caps and vortex to mix.
33. Store Extracts at <6^{o}C until analysis
34. Samples/QC are now ready for analysis.

8.4 Sample Analysis--Running Samples/QC - Acquisition Method

The acquisition method is detailed in Attachment 4 (HPLC) and Attachment 5 (MS/MS) of this SOP. The method is an HPLC with dynamic MRM method with precursor and product ions with specific acquisition parameters to maximize sensitivity and specificity. This list may be modified to add other PFAS target analytes as necessary.

8.3.1 The triple Quadrupole (QQQ) system must be optimized for each target analyte (including surrogates and internal standards) using the Mass Hunter Optimizer program. This program determines the most abundant precursor and product ions for each compound and their abundances. These data are then used to build an MRM (multiple reaction monitor) method for acquisition. This is done initially or after any major maintenance procedures are performed to the triple quadrupole system. A high-level standard is used for this in the $[M-H]^-$ mode or M-COOH for HFPO-DA.

8.3.2 The MS/MS is checked for tuning on a weekly basis (if necessary) before analysis using the Tune context by selecting the CHECKTUNE radio button. This is done only in negative ion mode since that is what we are operating under. If the Checktune fails, run the Autotune program-note: this takes approx. 45 mins. in negative mode. After autotune or any tuning adjustment, a re-calibration of the instrument is required.

8.3.3 Before any QC or samples can be run, the HPLC must be allowed to purge for at least thirty minutes. This purge must be done using the initial mobile phase conditions used in the method must be allowed to run for 15 minutes or until pressure has stabilized (ripple must be < 1%)

8.3.4 An instrument sequence (Worklist) is then made. It should begin with a blank, a primer (5 ng/mL) followed by a blank with ISTD to establish system cleanliness.

8.3.5 After a successful initial calibration has been completed, the analytical sequence for a batch of samples analyzed during the same time period is as follows. Standards and sample extracts must be brought to room temperature and

vortexed prior to aliquoting into an instrument vial in order to ensure homogeneity of the extract.

8.3.6 **Analysis Sequence**

1. Instrument Blank *
2. Instrument Sensitivity Check –**LOQ Standard Level (SEQ-CAL 1) S/N > 3:1**
3. Calibration Verification Standard (CCV)
4. Qualitative Identification Standards –Branched PFAS
   PFOA, PFNA, PFOSA, NMeFOSA, NEtFOSA, NEtFOSE, and NMeFOSE.
5. Instrument Blank (SEQ-CCB) *
6. Method Blank (Batchxxxx-BLK1)
7. Low-level OPR (LLOPR) (Batchxxxx-BS1)
8. OPR (Batchxxxx-BS2)
9. Field Samples (10 or fewer)
10. Calibration Verification Standard (SEQ-CCVn)
11. Instrument Blank (SEQ-CCBn) *
12. Field Samples (10 or fewer)
13. Calibration Verification Standard (SEQ-CCVn)
14. Instrument Blank (SEQ-CCBn) *

* Contains solvent system for calibration, NIS, and EIS

8.3.7 The run can end with a script to put the instrument into standby mode.

8.4 Daily Sample Preparation/Analysis Sequence

- Prepare extracts for analysis by placing a 300 µl aliquot of sample extract containing 3 µL of internal standards into a PP auto-sampler vial. Apply Polyolefin cap.
- Confirm that the samples loaded on the auto-sampler were entered correctly in the injection log. Make any necessary corrections.
- Run instrument CCV checks at the RL (0.25-0.5 ng/mL), then at a mid-level and high level rotating every ten samples (5, 25 ng/mL) and ending with a mid-level CCV.
- Enter the Worklist (injection sequence) into the instrument software and load samples onto the auto-sampler in the order shown above in Section 8.3.6

8.5 Data Review

The Agilent Mass Hunter Quantitation program is used to review all data. All identifications are based upon retention time (RT) of the transition of the precursor to product ion represented by a peak. Retention times should not vary

more than ± 0.5 minutes as compared to the initial CCV analyzed for an analytical sequence. All positive detections of target PFAS must be less than the high point concentration of the calibration curve.

8.5.1 Since certain PFAS species are manufactured by different processes the presence of branched as well as linear isomers may be found. To properly quantitate these species, the analyst must sum the related branched and linear isomers. This affects the following species: PFOS, PFHxS, PFOA, PFNA, PFOSA, NMeFOSA, NEtFOSA, NEtFOSE, and NMeFOSE.

8.5.2 Any detection greater than the upper limit of the calibration curve requires dilution into the upper half of the curve, where possible.

9. CALIBRATION

9.1 Initial Calibration

The initial calibration covers the range 0.20 ng/mL to 1560 ng/mL nominal conc. or higher depending upon the linearity of the PFAS species. After acquisition, the data are quantitated in Mass Hunter and the default calibration model for target compounds is generated using Quadratic regression, FORCED through the origin where applicable. All same level species (EIS) used average response factor model. Depending upon the response and accuracy at each level as shown in the Mass Hunter program, use Linear, Forced, weighted (1/x) or quadratic, Forced, with or without weighting to achieve the best fit which is based upon the best accuracy on a compound-by-compound basis. In any case, the correlation coefficient must be greater than 0.990. Average Response Factor (RF) or Relative Standard Deviation (RSD) should be $\leq$ 20% where used.

9.1.1 The calibration levels as shown in Section 7.4.7 use 8 levels. All points are included in the calibration with the exception of some species that saturate at levels 7 and 8.

9.2 Calibration Verification

9.2.1 Relative Standard Error (RSE): For calibrations using an average RF curve fit, the relative standard deviation (RSD) is the measure of relative error. However, if a quadratic regression is used RSE should be calculated for calibration curve. RSE is calculated by the Mass Hunter software. The RSE for all method analytes should be ≤ 20% to establish instrument linearity.

9.2.2 An independently prepared Initial Calibration Verification must be run immediately following initial calibration. The concentration of this standard should be in the middle of the calibration range (e.g., 5.0 ng/mL) and prepared from a separate preparation as that of the calibration. Unless project-specific data quality objectives are required, the values from the second-source check should be ± 30% of the expected concentration.

9.2.2.1 **Corrective Action**: Quantitative sample analyses should not proceed for a failing ICV. Recalibrate and re-run the ICV if necessary.

An independently prepared Initial Calibration Verification must be run immediately following initial calibration. The concentration of this standard should be in the middle of the calibration range (e.g., 5.0 ng/mL) and prepared from a separate preparation as that of the calibration. Unless project-specific data quality objectives are required, the values from the second-source check should be ± 30% of the expected concentration.

Corrective Action: Quantitative sample analyses should not proceed for a failing ICV. Recalibrate and re-run the ICV if necessary.

9.3 Continuing Calibration Verification

The first CCV is at a mid-level and analyzed every 10 client samples including a closing CCV.

The mid-Level CCV must be ± 30% of the true value.

Corrective Action: If any of the required calibration check criteria fail, the system must be evaluated, and any appropriate instrument repair or maintenance must be performed. Sample data are unacceptable and must be rerun. Reinjection of the standard may be done. If the calibration check standard still fails, the system must be recalibrated.

10. Quality Control

10.1 Initial Demonstration of Capability (IDOC)

10.1.1 The initial demonstration requirement of EPA 1633 must be acceptable before analysis of samples may begin. To establish the ability to generate acceptable precision and recovery, the laboratory must perform the following operations for each sample matrix type to which the method will be applied by that laboratory.

The IDOC includes the following key elements:

- Initial Demonstration of Precision and Recovery (IPR)
- MDL determination

10.1.2 Initial Demonstration of Precision and Recovery-IPR

- Extract, concentrate, and analyze four aliquots of aqueous and soil matrices spiked with 100 µL of the native spike solution OPR Mix Y22J304, 50 µL of the EIS solution no. Y22J305. At least one method blank, matching the matrix being analyzed, must be prepared with the IPR batches by matrix. All sample processing steps that are used for processing samples, including preparation and extractions, cleanup and concentration, must be included in this test.

- Using results of the set of four analyses, compute the average percent recovery (R) of the extracts and the relative standard deviation (RSD) of the concentration for each target and EIS compound.
- For each native and isotopically labeled compound, compare RSD and % recovery with the corresponding limits for initial precision and recovery in Table 5. If RSD and R for all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin. *Note these acceptance criteria are not finalized and are based upon a single lab validation. Data for this table is derived from the single-laboratory validation study and are only provided as examples for this draft method. The data will be updated to reflect the inter-laboratory study results in a subsequent revision. Therefore, these criteria will change after inter-laboratory validation. Several sections of this method state that Table 5 criteria are required, this is standard language that will be applicable when the method is finalized.*

10.1.3 MDL Determination

MDL Determination –In order to perform the MDL study, 7 total extractions are performed on 3 different days (Extraction Day 1= 3 LRBs and 3 LFBs, Extraction Day 2 is 2 of each, and Extraction Day 3 is also 2 of each).

The levels extracted represent approx. 3-5 x the expected LOQ.

Once extracted, the analyses are conducted on 3 separate days the MDL is determined according to the EPA MDL protocol defined in Definition and

Procedure of the Determination of the Method Detection Limit, Revision 2 Dec. 2016 as detailed below:

Make all computations as specified in the analytical method and express the final results in the method-specified reporting units.

Calculate the sample standard deviation (SD) of the replicate spiked sample measurements and the sample standard deviation of the replicate method blank measurements from all instruments to which the MDL will be applied.

Compute the MDLs (the MDL based on spiked samples) as follows:

MDL_s = 3.143 x SD (for seven replicates; SD = Standard Deviation)

Compute the MDL_b (MDL based on method blanks-LRBs) as follows:

- If none of the blanks give numerical results, then the MDL_b does not apply.
- If only some of the blanks (but not all) give a result, set the MDL_b to the highest result found.
- If ALL method blanks show a detection, then use the following calculation to determine MDL_b:

MDL_b = Average of Blank Detections + (3.143 x Std. Dev.)

Calculate the final MDL by selecting the greater of MDL_s or MDL_b.

10.2 On-going QC Requirements

Preparation Batches are defined at the sample preparation step. Batches should be kept together through the whole analytical process as far as possible, but it is not mandatory to analyze prepared extracts on the same instrument or in the same sequence.

The quality control batch is a set of up to 20 samples of the same matrix processed using the same procedure and reagents within the same time period. The quality control batch may contain a matrix spike/matrix spike duplicate (MS/MSD), two laboratory control samples (LCS-LLOPR and OPR) and a method blank. Laboratory generated QC samples (Blank, LLOPR, OPR, MS/MSD) do not count toward the maximum 20 samples in a batch. Field QC samples are included in the batch count. In some cases, at client request, the MS/MSD may be replaced with a matrix spike and sample duplicate.

10.2.1 METHOD BLANK - One method blank must be extracted with every prep batch of similar matrix, not to exceed twenty (20) samples. For aqueous samples the matrix is Lab reagent water. For Soils the method blank matrix is

Ottawa sand. Criteria:

- The method blank must not contain any analyte at or above 1/2 the LOQ (Reporting Limit).

- Re-extraction and reanalysis of samples associated with an unacceptable method blank is required when reportable concentrations are determined in the samples.

10.2.2 LABORATORY CONTROL SAMPLES (LCS- also called OPR and LLOPR) must be extracted with every process batch of similar matrix, not to exceed twenty (20) samples. The LCS is an aliquot of laboratory matrix (e.g., water for aqueous spiked with analytes of known identity and concentration and isotopic surrogate analogs. The OPRs must be processed in the same manner and at the same time as the associated samples. Recovery for Aqueous low level OPR target analytes are 40-150% until more data are derived. For all other Aqueous OPR levels recovery targets are 50-150%. These data are based upon EPA 1633 draft ranges that will change and are not used for acceptance/rejection but are reported until such time that fully validated acceptance ranges are provided in the final version of the method.

10.2.3 Matrix spike/Matrix spike duplicate (MS/MSD or MS/MSD). These are not typically required since each sample contains isotopic PFAS analogues that correct for any matrix effects. If the client requests them, then they are processed accordingly but are not a requirement of this method. If done they are by matrix, not to exceed twenty (20) samples. An MS/MSD pair is aliquots of a selected field sample spiked with analytes of known identity and concentration. The MS/MSD pair must be processed in the same manner and at the same time as the associated samples. Spiked analytes with recoveries or precision outside of the Laboratory control limits are flagged accordingly. Until enough statistical data per matrix is available, no criteria are offered. If a specific QA Project Plan has required limits, this is preempted. Any outliers must be qualified accordingly.

10.2.4 Initial calibration verification (ICV) –A second source standard is not required for this method. A second independently prepared mid-level standard is prepared and used for this purpose and analyzed after the ICAL. The concentration should be at the mid-range of the curve and must recover within 70-130 % of expected value.

Corrective actions for the ICV include:

- Rerun the ICV
- Remake or acquire a new ICV.
- Evaluate the instrument conditions.

- Evaluate the initial calibration standards.
- Rerun the initial calibration.

10.2.5 Internal Standard- The Non-extracted Internal Standard (NIS) is added to each field and QC sample prior to analysis. The IS response (peak area) must not deviate by more than 50-200% from the mean response (peak area) of the initial calibration. If the areas are low for all the field samples and QC samples in the batch, it suggests a loss of instrument sensitivity, while low areas in only some field or QC samples suggests a possible bad injection.

Corrective action includes:

- Reinject the questionable samples.
- Verifying the CCV NIS areas are compliant with the range, if so, this suggests either matrix effects or may require a small dilution to mitigate interference if only some of the NIS compounds are affected.
- Qualify affected data.

10.3 Initial Demonstration of Capability (IDC)

Initial Demonstration of Capability involves the following processes listed ion Table 1.0 as follows.

Table 1.0 - Initial Demonstration of Capability (IDC)

Requirement	Specification and Frequency	Acceptance Criteria
Initial Demonstration of Precision and Recovery (IPR)	Extract, concentrate, and analyze four aliquots of the matrix (aqueous and soil) spiked with target native standard solution, EIS solution and finally the NIS (ISTD). Extract a method blank of each matrix with each matrix IPR batch. All steps that are used for processing samples, including preparation and extraction must be included.	Using results of the set of four analyses, compute the average percent recovery (R) of the extracts and the relative standard deviation (RSD) of the concentration for each target and EIS compound.
		For each native and isotopically labeled compound, compare RSD and % recovery with the corresponding limits for initial precision and recovery in Table 5. If RSD and R for all compounds meet the acceptance criteria, system performance is acceptable, and analysis of blanks and samples may begin.
Method Detection Limit (MDL)	Method detection limit (MDL) - Each laboratory must also establish MDLs for all the analytes using the MDL procedure at 40 CFR Part 136, Appendix B. An MDL determination must be performed for all target compounds.	The minimum level of quantification (ML) can be calculated by multiplying the MDL by 3.18 and rounding to the nearest integer

Calibration Verification (ICV or SCV) *Section 9.1.5*	Analyze a mid-level ICV, each time a new calibration is performed or at a minimum, quarterly. The ICV must be an independent dilution beginning with the common starting materials used for ICAL. No 2nd source is required due to availability.	Results must be 70-130% of true value.

10.4 **QC Requirements**

Ongoing QC requirements are detailed in Table 3.0 as follows.

Table 3.0 QC Requirements

Summary of Quality Control		
Method Reference	**Requirement**	**Specification and Frequency**
Section 10.1	Mass Calibration	Annually and on as-needed basis
Section 10.1.7	Mass Calibration Verification	After mass calibration
Section 10.3	Initial Calibration (ICAL)	Minimum 6 calibration standards for linear models and 7 calibration standards for non-linear models.
Sections 10.2.2, 14.4	Retention Time (RT) window	After ICAL and at the beginning of analytical sequence
Sections 7.3.1, 9.4	Extracted Internal Standard (EIS) Analytes	All CAL standards, batch QC and field samples
Sections 7.3.2	Non-extracted Internal Standards (NIS)	All CAL standards, batch QC and field samples
Sections 7.3.4, 10.3.1, 13.3	Instrument Sensitivity Check (ISC)	Daily, prior to analysis
Section 14.2	Calibration Verification (CV) (CCV)	At the beginning and every 10 samples and at the end
Section 14.6	Instrument Blank	Daily prior to analysis and after high standards
Sections 9.1.3, 9.5, 14.7	Method Blank (MB)	One per preparation batch
Section 14.5	Ongoing Precision Recovery (OPR)	One per preparation batch
Section 11.0	Limit of Quantitation Verification (LLOPR)	Prior to analyzing samples
Section 11.0	Matrix Spike (MS/MSD)	One per preparation batch (if required) Normally not needed, since Isotope dilution is employed

11.0 DATA REVIEW, CALCULATIONS AND REPORTING

Samples concentrations are determined using either linear regression or quadratic regression FORCED through the origin. Weighted ($1/x$ or $1/x^2$) may assist with low level accuracy and is recommended where necessary. All calibration curves have greater than 6 points. Any target analyte exceeding the calibration range will require dilution.

11.1 Data interpretation

All sample data calculations are performed by the Agilent Mass Hunter software in ng/mL and then final data are calculated considering final extract volumes and the initial sample volumes extracted which are entered into the Element bench sheet.

11.2 Linear and Branched Isomers are addressed in Section 8.5 and are reported for the noted species as Total which is a sum of the linear and branched isomers for affected species.

11.3 All Data are uploaded into Element LIMS and all final concentration calculations and associated recoveries are detailed. All pdfs of Mass Hunter Quant reports are uploaded to the Element Raw Data drive for association with ICALs and all batch and analysis sequence runs. Data are set to Analyzed status once uploaded and initially reviewed, then locked.

11.4 The Data is then evaluated using the York Qualinator ^{TM} data review tool which evaluates all data CCVs, QC, ISTDS, Recoveries, etc. and automatically assigns outlier qualifiers for review and acceptance by the reviewer. The accepted data are then uploaded to Element and final reviewed in Laboratory Data Entry/Review module. Once reviewed, the status is set to Reviewed indicating the data are ready to be Reported by the Reporting Group.

12. HEALTH AND SAFETY

12.1 General safety considerations and requirements are detailed in the York Laboratory Safety and Health Standard Operating Procedure No. Safety011600.

Specific safety rules applying to the conduct of this analysis requiring the following:

- When handling standards and samples, latex gloves are required.
- Also, when handling neat materials, a fume hood and safety glasses are required.
- When handling samples, gloves and glasses are required.
- Highly odorous samples must be handled in a fume hood.
- Refer to SDSs for specific safety/health information.

12.2 The analysts must exercise normal care and be supervised and trained to work in an analytical chemistry laboratory. The analysts will be handling fragile glassware, needles, syringes, volatile and flammable chemicals, toxic chemicals, and corrosive chemicals.

- No smoking or open flames are allowed.
- No food or food products may be brought into the laboratory.

Solvents should not be left uncovered on the laboratory benches.
All solvent transfers should be done in the hoods.

Hood doors must be kept in a position which yields approx. 100 fpm face velocity.
Solvent evaporation must be done in the hood with exhaust elevated and in the rear.

Waste containers that had solvents must be vented to a hood until all solvents have evaporated.

Safety glasses are provided and must always be worn in the laboratory.
Gloves are provided and must be worn when working with chemicals.
Laboratory coats are provided and should be worn to protect the analysts' clothes.
Syringes and needles must be kept in their original cases when not in use.
Care must be exercised in using and handling syringes to avoid injury.
Report any sticking with a needle immediately to your supervisor.

12.3 Specific Safety Concerns

12.3.1 Preliminary toxicity studies indicate that PFAS could have significant toxic effects. In the interest of keeping exposure levels as low as reasonably achievable, PFAS must be handled in the laboratory as hazardous and toxic chemicals.

12.3.2 Exercise caution when using syringes with attached filter disc assemblies. Application of excessive force has, upon occasion, caused a filter disc to burst during the process.

12.3.3 Laboratory procedures such as repetitive use of pipets, repetitive transferring of extracts and manipulation of filled separatory funnels and other glassware represent a significant potential for repetitive motion or other ergonomic injuries. Laboratory associates performing these procedures are in the best position to realize when they are at risk for these types of injuries.

12.3.4 Eye protection, laboratory coat, and nitrile gloves must be worn while handling samples, standards, solvents, and reagents. Disposable gloves that have been contaminated will be removed and discarded; other gloves will be cleaned immediately.

12.3.5 Perfluorocarboxylic acids are acids and are not compatible

with strong bases.

12.3.6 Primary Materials Used- The following is a list of the materials used in this method, which have a serious or significant hazard rating. NOTE: This list does not include all materials used in the method. The table contains a summary of the primary hazards listed in the SDS for each of the materials listed in the table. A complete list of materials used in the method can be found in the reagents and materials section. Employees must review the information in the SDS for each material before using it for the first time or when there are major changes to the SDS.

Methanol	-Flammable Poison -Irritant	200 ppm (TWA)	A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Symptoms of overexposure may include headache, drowsiness and dizziness. Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure. Irritant to the eyes.
Acetic Acid, Glacial	-Flammable liquid and vapor. -Irritation	10 ppm TWA; 25 mg/m3 TWA	**Eye:** Causes severe eye irritation. Contact with liquid or vapor causes severe burns and possible irreversible eye damage. **Skin:** Causes skin burns. May be harmful if absorbed through the skin. Contact with the skin may cause blackening and hyperkeratosis of the skin of the hands. **Ingestion:** May cause severe and permanent damage to the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause polyuria, oliguria (excretion of a diminished amount of urine in relation to the fluid intake) and anuria (complete suppression of urination). Rapidly absorbed from the gastrointestinal tract. **Inhalation:** Effects may be delayed. Causes chemical burns to the respiratory tract. Exposure may lead to bronchitis, pharyngitis, and dental erosion. May be absorbed through the lungs. **Chronic:** Chronic exposure to acetic acid may cause erosion of dental enamel, bronchitis, eye irritation, darkening of the skin, and chronic inflammation of the respiratory tract. Acetic acid can cause occupational asthma. One case of a delayed asthmatic response to glacial acetic acid has been reported in a person with bronchial asthma. Skin sensitization to acetic acid is rare, but has
Ammonium Hydroxide, conc. 28-30%	- Inhalation hazard - Skin Corrosion -Eye Damage and Irritation	OSHA PEL: 35 mg/m3 ; 50 ppm OSHA TWA: 18 mg/m3; 25 ppm	Ammonia is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. The extent of injury produced by exposure to ammonia depends on the duration of the exposure, the concentration of the liquid or vapor and the depth of inhalation. Exposure Routes: Inhalation (vapors), skin and/or eye contact (vapors, liquid), ingestion (liquid).

Formic Acid, conc.	-Flammable liquid and vapor -Harmful if swallowed -Causes severe skin burns and eye damage -Toxic if inhaled -May cause respiratory irritation	OSHA TWA: 5 ppm or 9 mg/m3 OSHA PEL: 10 ppm	Formic acid is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. The extent of injury produced by exposure to ammonia depends on the duration of the exposure, the concentration of the liquid or vapor and the depth of inhalation. Exposure Routes: Inhalation (vapors), skin and/or eye contact (vapors, liquid), ingestion (liquid).

13. WASTE MANAGEMENT/POLLUTION PREVENTION

Neat Materials

Waste management procedures require the prudent use of neat materials. The ordering of neat standards and materials must be done to minimize unused material which would result in storage or handling of excess material. Quantities ordered should be sufficient to provide for necessary standards with consideration to shelf life. When ordering a unique material for a standard, be sure to order the smallest practical quantity.

Solvents

The solvents used at York for this procedure include isopropanol and Methanol. These solvents are used for sample extraction or LC cleanup, all amounts are either consumed during concentration or placed in one-liter amber jars in the hood areas for evaporation. Any remaining solvent/water is transferred to a drum designated for solvent waste.

Acids and Bases

The acids and bases used for this procedure include Acetic Acid and Formic Acid. The bases used are Ammonium hydroxide, sodium hydroxide and potassium hydroxide. Store concentrated base and acids separately whether waste or neat material.

Samples

Unused or remaining water samples are returned to the sample control room for continued storage for proper disposal by the sample control group.

14. REFERENCES

1. EPA METHOD 1633 Draft 3 December, 2022- Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS; EPA 821-D-22-001

15. REVISION HISTORY

Revision 1.0	10/24/2022	First issue.
Revision 1.1	02/10/2023	Modified LLOPR in Section 7.4.6.1 to reflect 2x the MRL
Revision 1.2	06/23/2023	Added *Appendix 1: Target Compound Reporting Limits*. Updated Section 9.2 to add acceptable limits for ICAL RSE. Described the Promochrom extraction method in Sections 8.2, 8.3, and added *Appendix 2: Promochrom Method*. Redefined analytical batch as analytical sequence. Updated Reference to EPA 1633 Draft 3. Added reference to and preparation procedures for a second source standard in Section 7. Revised qualitative identification requirements for analytes in Section 8. Minor formatting edits.

Appendix 1 – Target Compound Reporting Limits

Target Compoud	Soil		Water	
	MDL/LOD	RL/LOQ	MDL/LOD	RL/LOQ
	µg/kg	µg/kg	ng/L	ng/L
Perfluorobutanesulfonic acid (PFBS)	0.111	0.177	0.47	1.77
Perfluorohexanoic acid (PFHxA)	0.053	0.200	0.35	2.00
Perfluoroheptanoic acid (PFHpA)	0.105	0.200	0.71	2.00
Perfluorohexanesulfonic acid (PFHxS)	0.179	0.183	0.68	1.83
Perfluorooctanoic acid (PFOA)	0.172	0.200	0.42	2.00
Perfluorooctanesulfonic acid (PFOS)	0.167	0.186	0.82	1.86
Perfluorononanoic acid (PFNA)	0.189	0.200	0.52	2.00
Perfluorodecanoic acid (PFDA)	0.191	0.200	0.75	2.00
Perfluoroundecanoic acid (PFUnA)	0.198	0.200	1.13	2.00
Perfluorododecanoic acid (PFDoA)	0.163	0.200	0.88	2.00
Perfluorotridecanoic acid (PFTrDA)	0.125	0.200	0.74	2.00
Perfluorotetradecanoic acid (PFTA)	0.103	0.200	0.69	2.00
N-MeFOSAA	0.148	0.200	0.79	2.00
N-EtFOSAA	0.194	0.200	1.03	2.00
Perfluoropentanoic acid (PFPeA)	0.109	0.400	0.23	4.00
Perfluoro-1-octanesulfonamide (FOSA)	0.146	0.200	0.88	2.00
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.155	0.200	0.91	1.91
Perfluoro-1-decanesulfonic acid (PFDS)	0.191	0.193	1.32	1.93
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.595	0.760	1.06	7.60
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.755	0.768	2.05	7.68
Perfluoro-n-butanoic acid (PFBA)	0.109	0.800	0.33	8.00
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	0.139	0.356	0.50	3.56
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	0.193	0.400	2.14	4.00
Perfluoro-4-oxapentanoic acid (PFMPA)	0.062	0.400	0.25	4.00
Perfluoro-5-oxahexanoic acid (PFMBA)	0.096	0.400	0.37	4.00
Perfluoro-1-pentanesulfonate (PFPeS)	0.157	0.188	0.76	1.88
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	0.595	0.750	1.79	7.50
HFPO-DA (Gen-X)	0.608	0.800	3.23	8.00
11CL-PF3OUdS	0.311	0.756	1.38	7.56
9CL-PF3ONS	0.246	0.748	0.70	7.48
ADONA	0.174	0.756	0.53	7.56
Perfluorododecanesulfonic acid (PFDoS)	0.169	0.194	0.93	1.94
Perfluoro-1-nonanesulfonic acid (PFNS)	0.124	0.192	0.86	1.92
3-Perfluoropropyl propanoic acid (FPrPA or 3:3FTCA)	0.634	1.000	2.03	5.00
3-Perfluoropentyl propanoic acid (FPePA or 5:3 FTCA)	2.098	5.000	7.33	25.00
3-Perfluoroheptyl propanoic acid (FHpPA or 7:3FTCA)	1.500	5.000	9.47	25.00
N-MeFOSE	0.611	2.000	3.99	20.00
N-MeFOSA	0.180	0.200	1.58	2.00
N-EtFOSE	0.697	2.000	3.99	20.00
N-EtFOSA	0.198	0.200	1.80	2.00

Appendix 2: Promochrom Method

Step	Action	Inlet 1	Inlet 2	Flow (mL/min)	Volume (mL)	Target
1	Elute	1% Basic Methanol	-	8	15	Waste
2	Elute	0.3M Formic Acid	-	8	5	Waste
3	Add Sample	Sample Inlet	-	10	60 or 510*	Waste
4	Rinse Sample	Water	Air (20%)	70	2.5	Sample Container
5	Add Sample	Sample Inlet	-	5	5	Waste
6	Rinse Sample	Water	Air (20%)	70	5	Sample Container
7	Add Sample	Sample Inlet	-	5	5	Waste
8	Rinse Sample	Water	Air (20%)	70	5	Sample Container
9	Add Sample	Sample Inlet	-	5	5	Waste
10	Rinse Sample	1:1 0.1M Formic Acid/Methanol	Air (20%)	70	1.3	Sample Container
11	Add Sample	Sample Inlet	-	5	3	Waste
12	Rinse Sample	1:1 0.1M Formic Acid/Methanol	Air (20%)	70	5	Sample Container
13	Add Sample	Sample Inlet	-	5	5	Waste
14	Air Purge	SPE Cartridge	-	5	5 Minutes	
15	Add Sample	Sample Inlet	-	5	5	Waste
16	Blow N2	Sample Inlet	-	5	1 Minute	
17	Rinse Sample	1% Basic Methanol	Air (20%)	70	1.3	Sample Container
18	Collect	Sample Inlet	-	5	3	Centrifuge Tube
19	Rinse Sample	1% Basic Methanol	Air (20%)	70	5	Sample Container
20	Collect	Sample Inlet	-	5	5	Centrifuge Tube
21	Collect	Sample Inlet	-	5	5	Centrifuge Tube

*60 mL is used for soil matrices and 510 mL is used for aqueous matrices.

Attachment 1 – Non-Extracted Internal Standards (NIS)

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B197**

Description:	MPFAC-HIF-IS-EPA 1633 ISTD STOCK	Prepared:	02/16/2022
Standard Type:	Other	Expires:	09/07/2026
Solvent:	Methanol/Water (<1%)	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	MPFACHIFIS0921
Vendor:	Wellington Laboratories		

Comments: Stock ISTD for EPA method 1633

Analyte	CAS Number	Concentration	Units
M3PFBA		1	ug/mL
MPFDA		0.25	ug/mL
MPFHxA		0.5	ug/mL
MPFHxS		0.474	ug/mL
MPFNA		0.25	ug/mL
MPFOA		0.5	ug/mL
MPFOS		0.479	ug/mL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

MPFAC-HIF-IS

Mass-Labelled Perfluoroalkyl Substance Injection Standard Solution/Mixture

PRODUCT CODE:	MPFAC-HIF-IS
LOT NUMBER:	MPFACHIFIS0921
SOLVENT(S):	Methanol/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	09/07/2021
LAST TESTED: (mm/dd/yyyy)	09/07/2021
EXPIRY DATE: (mm/dd/yyyy)	09/07/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

MPFAC-HIF-IS is a solution/mixture of five mass-labelled (^{13}C) perfluoroalkylcarboxylic acids (C_4, C_8, C_9-C_{10}) and two mass-labelled (^{18}O and ^{13}C) perfluoroalkanesulfonates (C_6 and C_8). The components and their concentrations are given in Table A.

The individual mass-labelled perfluoroalkylcarboxylic acids and mass-labelled perfluoroalkanesulfonates all have chemical purities of >98% and isotopic purities of ≥99% per ^{13}C or >94% per ^{18}O.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Table A: **MPFAC-HIF-IS; Components and Concentrations (ng/mL, ± 5% in methanol/water (<1%))**

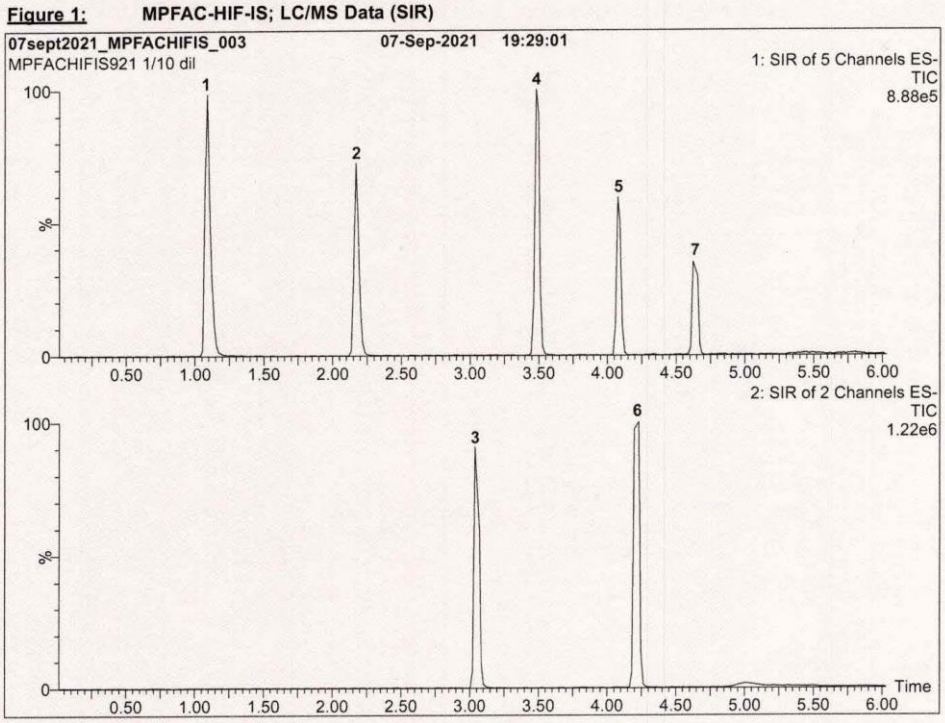
Compound	Acronym	Concentration (ng/mL)		Peak Assignment in Figure 1
Perfluoro-n-(2,3,4-$^{13}C_3$)butanoic acid	M3PFBA	1000		1
Perfluoro-n-(1,2-$^{13}C_2$)hexanoic acid	MPFHxA	500		2
Perfluoro-n-(1,2,3,4-$^{13}C_4$)octanoic acid	MPFOA	500		4
Perfluoro-n-(1,2,3,4,5-$^{13}C_5$)nonanoic acid	MPFNA	250		5
Perfluoro-n-(1,2-$^{13}C_2$)decanoic acid	MPFDA	250		7
Compound	**Acronym**	**Concentration* (ng/mL)**		**Peak Assignment in Figure 1**
		as the salt	**as the acid**	
Sodium perfluoro-1-hexane($^{18}O_2$)sulfonate	MPFHxS	500	474	3
Sodium perfluoro-1-(1,2,3,4-$^{13}C_4$)octanesulfonate	MPFOS	500	479	6

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 10/13/2021 (mm/dd/yyyy)

B.G. Chittim, General Manager

Figure 1: **MPFAC-HIF-IS; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

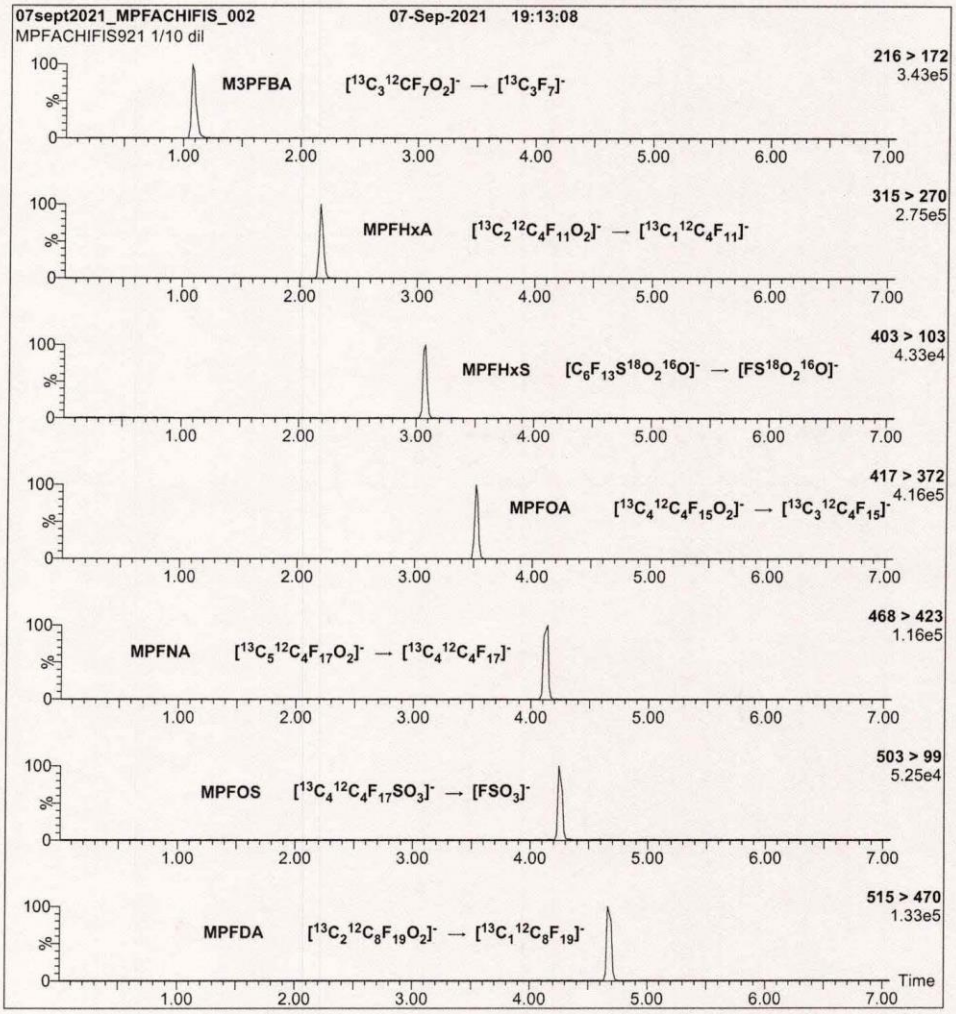
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (2-6)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

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Revision#:9, Revised 2020-12-23

MPFACHIFIS0921 (4 of 5)
rev1

Figure 2: **MPFAC-HIF-IS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (MPFAC-HIF-IS)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:

Collision Gas (mbar) = 3.18e-3
Collision Energy (eV) = 4-64 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFIS0921 (5 of 5)
rev1

Attachment 2 – Extracted Internal Standards (EIS)

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B198**

Description:	MPFAC-HIF-ES-EPA 1633 STOCK EIS mix	Prepared:	02/17/2022
Standard Type:	Other	Expires:	08/06/2024
Solvent:	MeOH/IPA/1% H2O	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	MPFACHIFES0821
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
d3-N-MeFOSAA		1	ug/mL
d5-N-EtFOSAA		1	ug/mL
d7-N-MeFOSE		5	ug/mL
d9-N-EtFOSE		5	ug/mL
d-N-EtFOSA		0.5	ug/mL
d-N-MeFOSA		0.5	ug/mL
M2-4:2FTS		0.938	ug/mL
M2-6:2FTS		0.951	ug/mL
M2-8:2FTS		0.96	ug/mL
M2PFTeDA		0.25	ug/mL
M3HFPO-DA		2	ug/mL
M3PFBS		0.466	ug/mL
M3PFHxS		0.474	ug/mL
M4PFHpA		0.5	ug/mL
M5PFHxA		0.5	ug/mL
M5PFPeA		1	ug/mL
M6PFDA		0.25	ug/mL
M7PFUdA		0.25	ug/mL
M8FOSA		0.5	ug/mL
M8PFOA		0.5	ug/mL
M8PFOS		0.479	ug/mL
M9PFNA		0.25	ug/mL
MPFBA		2	ug/mL
MPFDoA		0.25	ug/mL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

MPFAC-HIF-ES

Mass-Labelled Per- and Poly-fluoroalkyl Substance Extraction Standard Solution/Mixture

PRODUCT CODE:	MPFAC-HIF-ES
LOT NUMBER:	MPFACHIFES0821
SOLVENT(S):	Methanol/Isopropanol (1%)/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	08/05/2021
LAST TESTED: (mm/dd/yyyy)	08/16/2021
EXPIRY DATE: (mm/dd/yyyy)	08/16/2024
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

MPFAC-HIF-ES is a solution/mixture of ten mass-labelled (^{13}C) perfluoroalkylcarboxylic acids (C_4-C_{12}, C_{14}), three mass-labelled (^{13}C) perfluoroalkanesulfonates (C_4, C_8, and C_8), three mass-labelled (one ^{13}C and two ^{2}H) perfluoro-1-octanesulfonamides, three mass-labelled (^{13}C) fluorotelomer sulfonates (4:2, 6:2, and 8:2), two mass-labelled (^{2}H) perfluorooctanesulfonamidoacetic acids, two mass-labelled (^{2}H) perfluorooctanesulfonamidoethanols, and mass-labelled (^{13}C) hexafluoropropylene oxide dimer acid. The components and their concentrations are given in Table A.

The individual mass-labelled perfluoroalkylcarboxylic acids, mass-labelled perfluoroalkanesulfonates, mass-labelled fluorotelomer sulfonates, perfluoro-1-($^{13}C_8$)octanesulfonamide, and mass-labelled hexafluoropropylene oxide dimer acid all have chemical purities of >98% and isotopic purities of ≥99%. The individual mass-labelled perfluorooctanesulfonamidoacetic acids, mass-labelled perfluorooctanesulfonamidoethanols, and two mass-labelled (^{2}H) perfluoro-1-octanesulfonamides all have chemical purities of >98% and isotopic purities of ≥98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

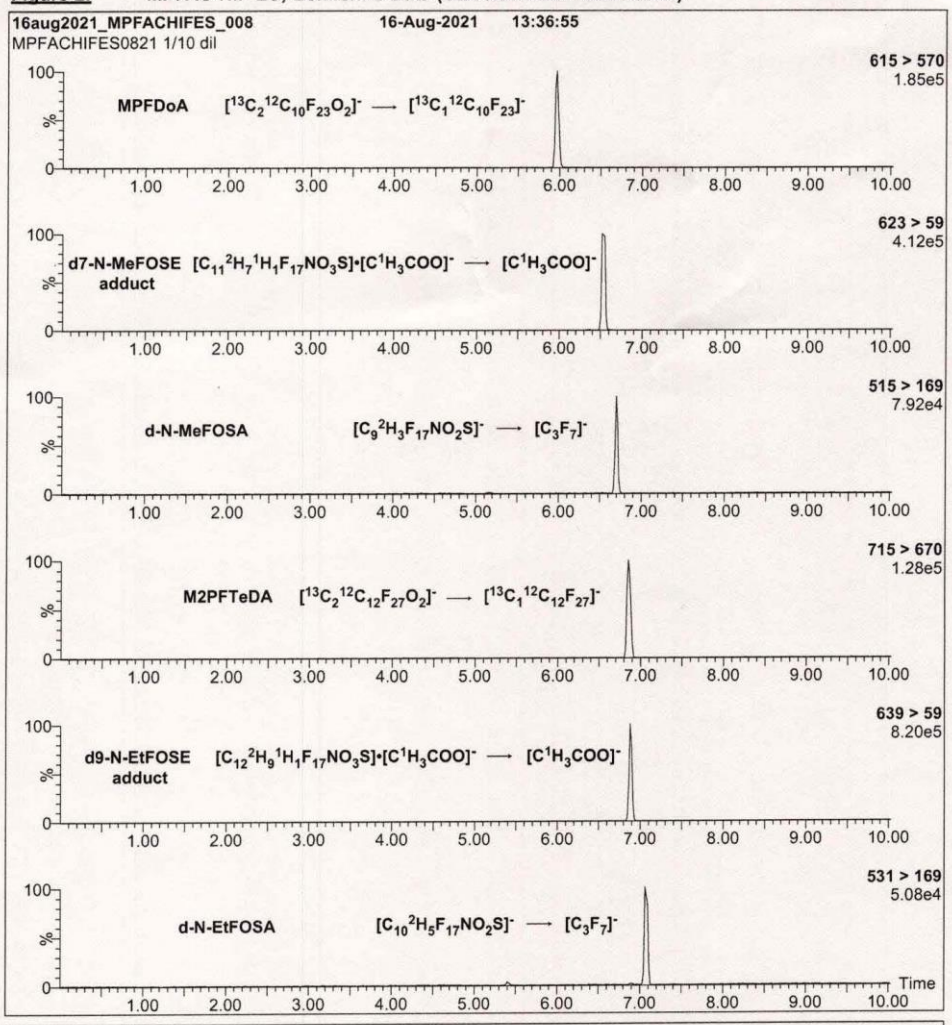
ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (2 of 7)
rev1

Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (MPFAC-HIF-ES)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:

Collision Gas (mbar) = 3.41e-3
Collision Energy (eV) = 4-64 (variable)

Form#:13, Issued 2004-11-10
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MPFACHIFES0821 (7 of 7)
rev1

Table A: **MPFAC-HIF-ES; Components and Concentrations (ng/mL, ± 5% in Methanol/Isopropanol (1%)/Water (<1%))**

Compound	Acronym	Concentration (ng/mL)	Peak Assignment in Figure 1
Perfluoro-n-($^{13}C_4$)butanoic acid	MPFBA	2000	1
Perfluoro-n-($^{13}C_5$)pentanoic acid	M5PFPeA	1000	2
Perfluoro-n-(1,2,3,4,6-$^{13}C_5$)hexanoic acid	M5PFHxA	500	5
Perfluoro-n-(1,2,3,4-$^{13}C_4$)heptanoic acid	M4PFHpA	500	7
Perfluoro-n-($^{13}C_8$)octanoic acid	M8PFOA	500	10
Perfluoro-n-($^{13}C_9$)nonanoic acid	M9PFNA	250	11
Perfluoro-n-(1,2,3,4,5,6-$^{13}C_6$)decanoic acid	M6PFDA	250	14
Perfluoro-n-(1,2,3,4,5,6,7-$^{13}C_7$)undecanoic acid	M7PFUdA	250	17
Perfluoro-n-(1,2-$^{13}C_2$)dodecanoic acid	MPFDoA	250	19
Perfluoro-n-(1,2-$^{13}C_2$)tetradecanoic acid	M2PFTeDA	250	22
Perfluoro-1-($^{13}C_8$)octanesulfonamide	M8FOSA	500	18
N-methyl-d_3-perfluoro-1-octanesulfonamide	d-N-MeFOSA	500	21
N-ethyl-d_5-perfluoro-1-octanesulfonamide	d-N-EtFOSA	500	24
N-methyl-d_3-perfluoro-1-octanesulfonamidoacetic acid	d3-N-MeFOSAA	1000	15
N-ethyl-d_5-perfluoro-1-octanesulfonamidoacetic acid	d5-N-EtFOSAA	1000	16
2-(N-methyl-d_3-perfluoro-1-octanesulfonamido)ethan-d_4-ol	d7-N-MeFOSE	5000	20
2-(N-ethyl-d_5-perfluoro-1-octanesulfonamido)ethan-d_4-ol	d9-N-EtFOSE	5000	23
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)($^{13}C_3$)propanoic acid	M3HFPO-DA	2000	6

Compound	Acronym	Concentration* (ng/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Sodium perfluoro-1-(2,3,4-$^{13}C_3$)butanesulfonate	M3PFBS	500	466	3
Sodium perfluoro-1-(1,2,3-$^{13}C_3$)hexanesulfonate	M3PFHxS	500	474	8
Sodium perfluoro-1-($^{13}C_8$)octanesulfonate	M8PFOS	500	479	12
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)hexanesulfonate	M2-4:2FTS	1000	938	4
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)octanesulfonate	M2-6:2FTS	1000	951	9
Sodium 1H,1H,2H,2H-perfluoro-(1,2-$^{13}C_2$)decanesulfonate	M2-8:2FTS	1000	960	13

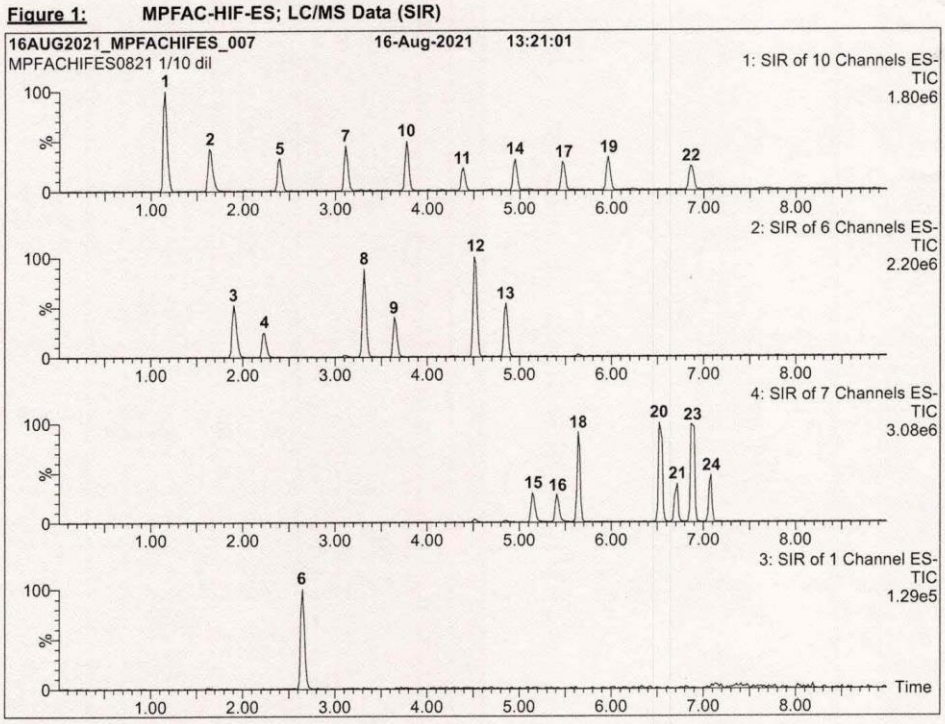
* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 10/13/2021 (mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

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rev1

Figure 1: **MPFAC-HIF-ES; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

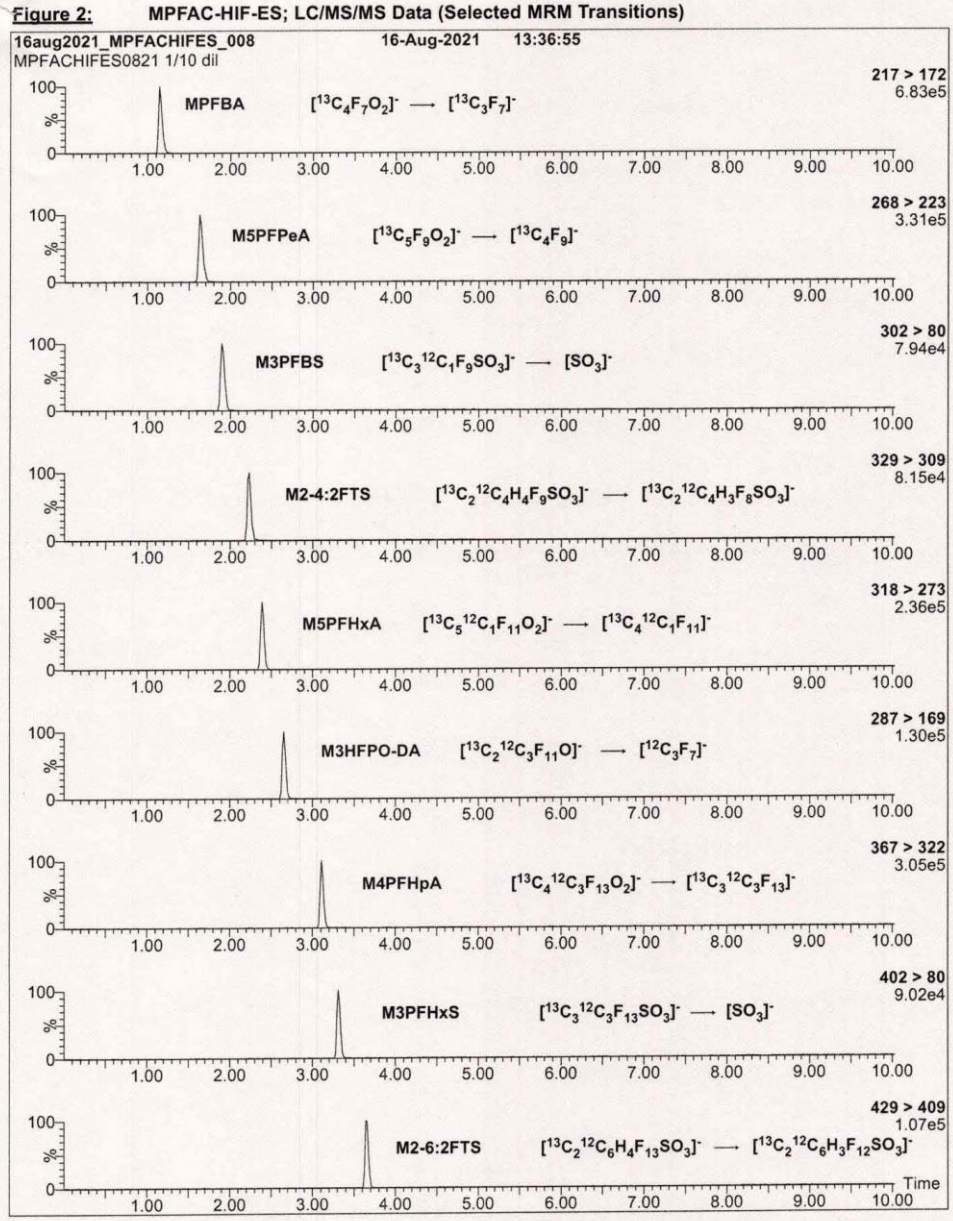
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (2-44)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

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Revision#:9, Revised 2020-12-23

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rev1

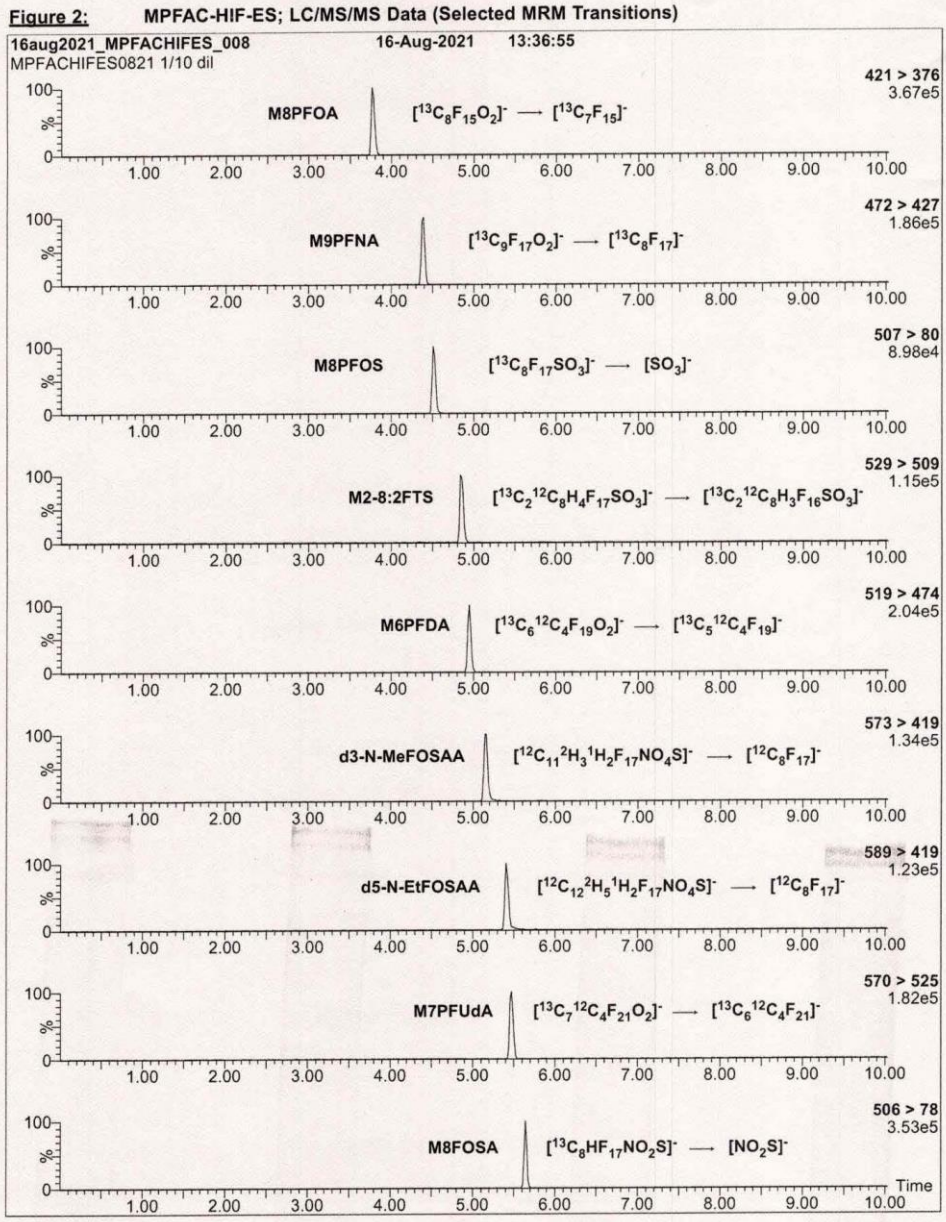
Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**



Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (5 of 7)
rev1

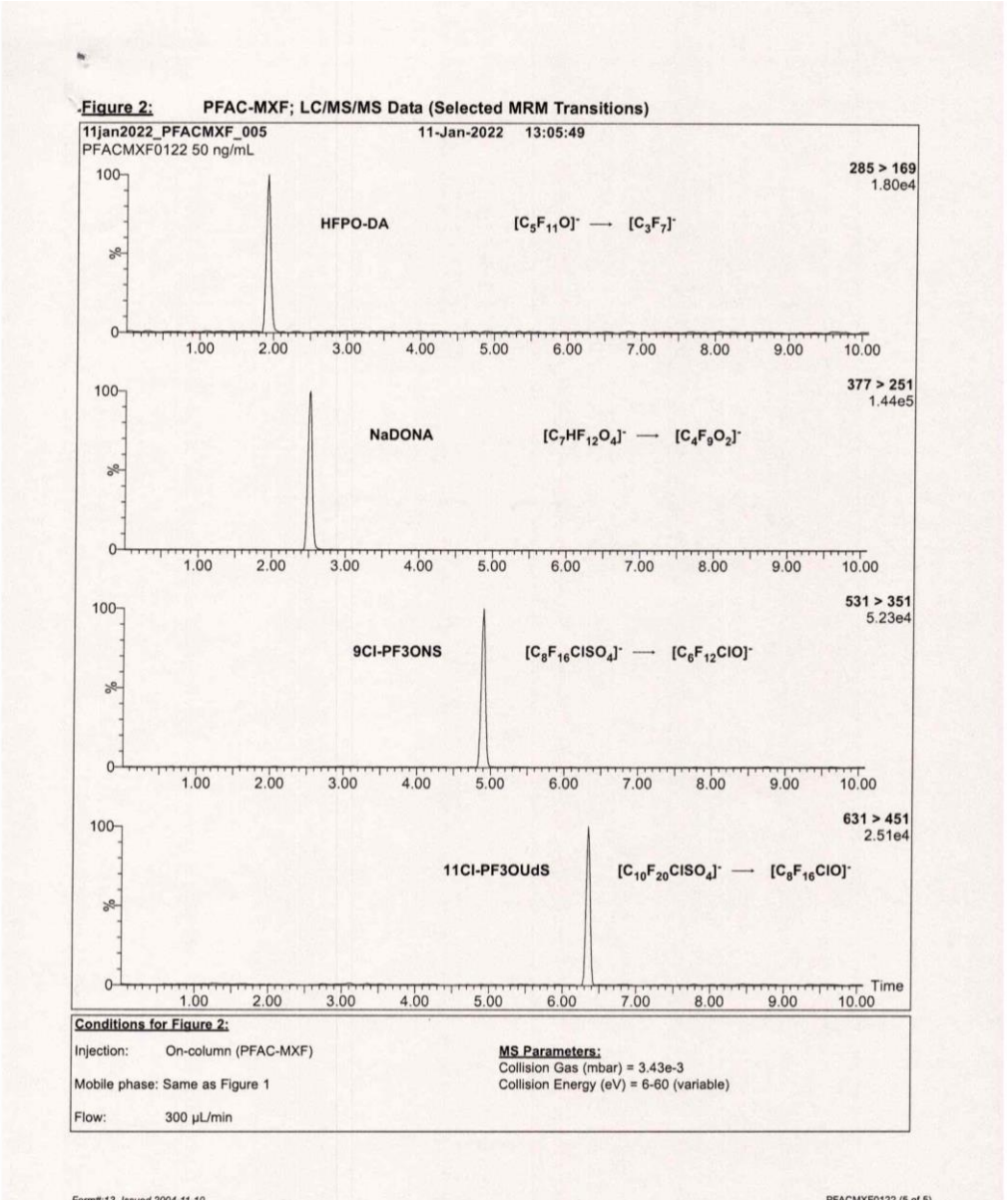
Figure 2: **MPFAC-HIF-ES; LC/MS/MS Data (Selected MRM Transitions)**



Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

MPFACHIFES0821 (6 of 7)
rev1

Attachment 3 – Target Analyte



Mixtures

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:13, Issued 2004-11-10
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PFACMXF0122 (2 of 5)
rev0

Table A: **PFAC-MXF; Components and Concentrations (ng/mL; ± 5% in Methanol/Water (<1%))**

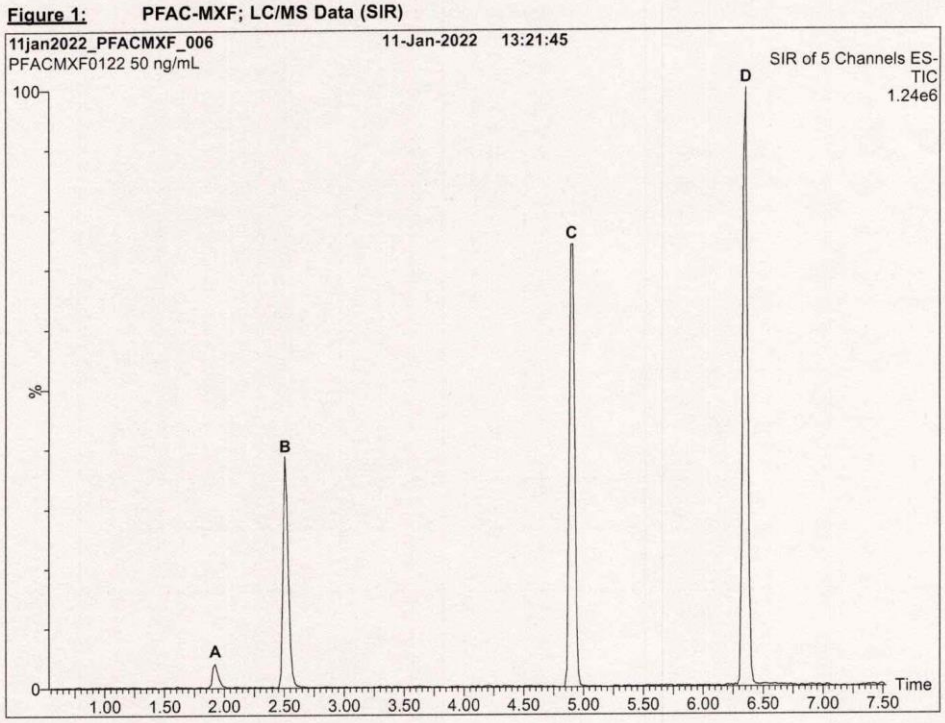
Compound	Acronym	Concentration* (ng/ml)	Peak Assignment in Figure 1
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000	A

Compound	Acronym	Concentration* (ng/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	B
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1870	C
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1890	D

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 01/12/2022
(mm/dd/yyyy)
B.G. Chittim, General Manager

Figure 1: **PFAC-MXF; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% H_2O / 55% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min
before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (15-74)
Desolvation Temperature (°C) = 325
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXF0122 (4 of 5)
rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B199**

Description:	PFAC-MXF-Native Repl.STOCK EPA 1633 PFAS	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**01/11/2025**
Solvent:	MeOH/H20	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXF0122
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
11CL-PF3OUdS	763051-92-9	1.89	ug/mL
9CL-PF3ONS	756426-58-1	1.87	ug/mL
ADONA	919005-14-4	1.89	ug/mL
HFPO-DA (Gen-X)	13252-13-6	2	ug/mL

Reviewed By Date

Page 1 of 1

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXF

Native Replacement PFAS Solution/Mixture

PRODUCT CODE:	PFAC-MXF
LOT NUMBER:	PFACMXF0122
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/10/2022
LAST TESTED: (mm/dd/yyyy)	01/11/2022
EXPIRY DATE: (mm/dd/yyyy)	01/11/2025
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXF is a solution/mixture of sodium dodecafluoro-3H-4,8-dioxanonanoate (NaDONA), the major and minor components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and GenX (HFPO-DA). The components and their concentrations are given in Table A.

The individual native components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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Table A: **PFAC-MXI; Components and Concentrations (µg/mL; ± 5% in methanol)**

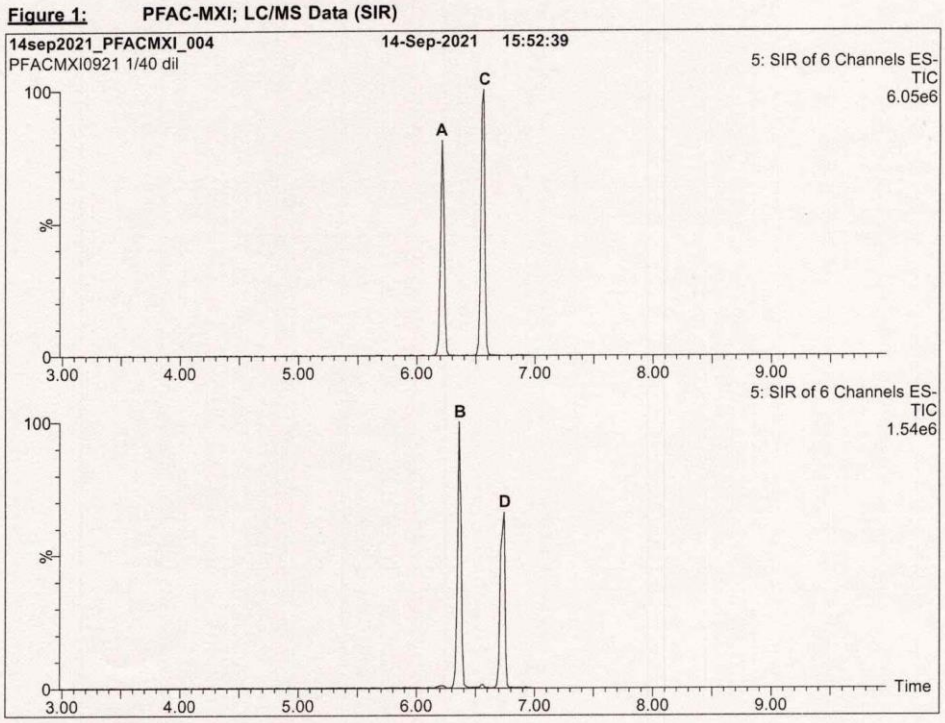
Compound	Acronym	Concentration (µg/mL)	Peak Assignment in Figure 1
N-methylperfluoro-1-octanesulfonamide	N-MeFOSA	1.00	B
N-ethylperfluoro-1-octanesulfonamide	N-EtFOSA	1.00	D
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	N-MeFOSE	10.0	A
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol	N-EtFOSE	10.0	C

Certified By: _____ **Date:** 09/23/2021
(mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (3 of 5)
rev0

Figure 1: **PFAC-MXI; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

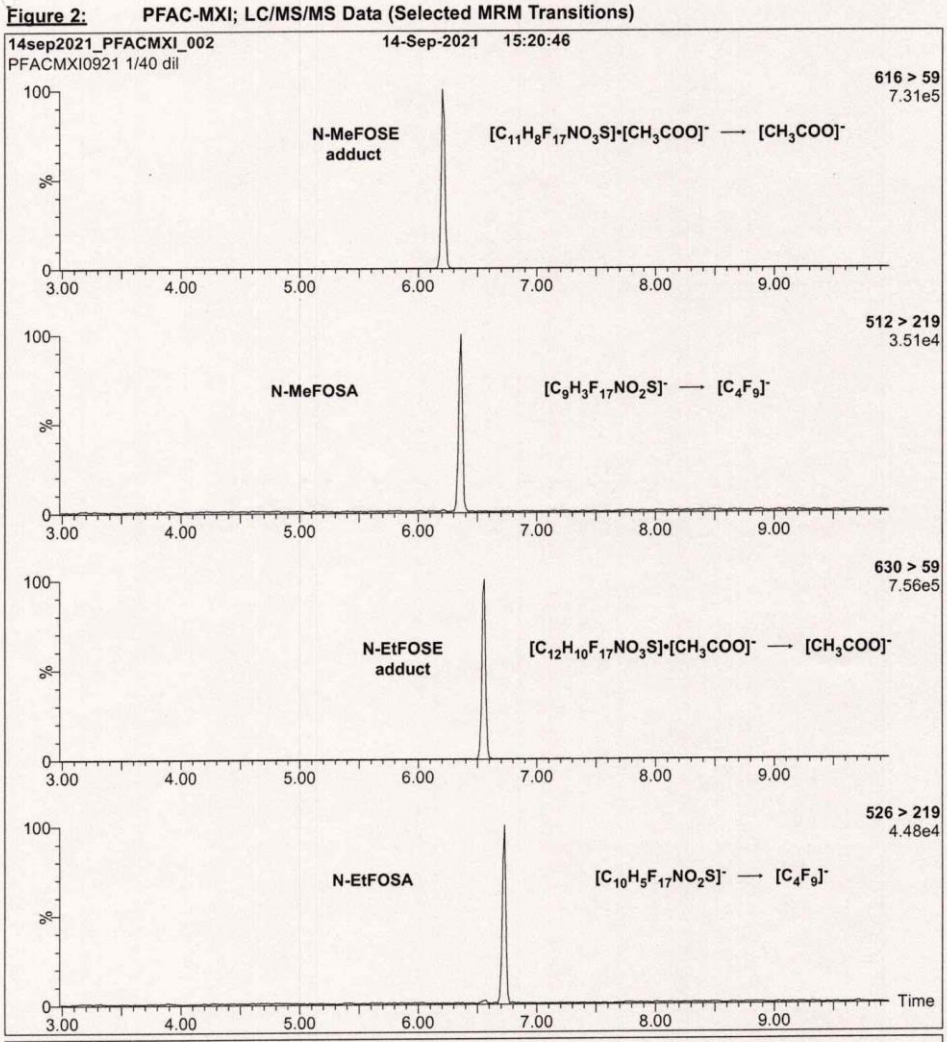
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (4 of 5)
rev0

Figure 2: **PFAC-MXI; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXI)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXI0921 (5 of 5)
rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B204**

Description:	PFAC-MXI-EPA 1633 Stock	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**02/17/2023**
Solvent:	Methanol	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXI0921
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
N-EtFOSA	4151-50-2	1	ug/mL
N-EtFOSE	1691-99-2	10	ug/mL
N-MeFOSA	31506-32-8	1	ug/mL
N-MeFOSE	24448-09-7	10	ug/mL

Reviewed By Date

Page 1 of 1

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXI

Native Perfluorooctanesulfonamide and Perfluorooctanesulfonamidoethanol Solution/Mixture

PRODUCT CODE:	PFAC-MXI
LOT NUMBER:	PFACMXI0921
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	09/08/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

PFAC-MXI is a solution/mixture of two native perfluorooctanesulfonamides (FOSAs) and two native perfluorooctanesulfonamidoethanols (FOSEs). The components and their concentrations are given in Table A.

The individual components have a chemical purity of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

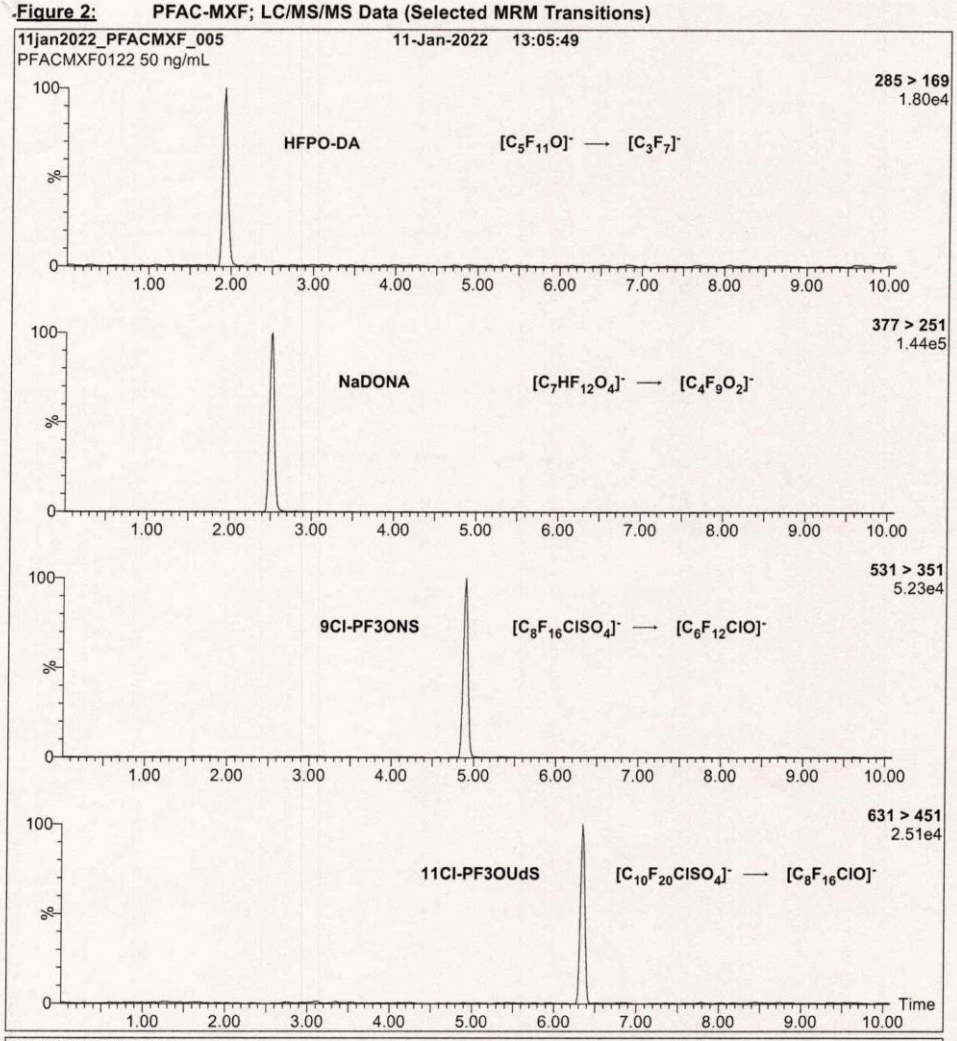
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 2: **PFAC-MXF; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXF)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
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rev0

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

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The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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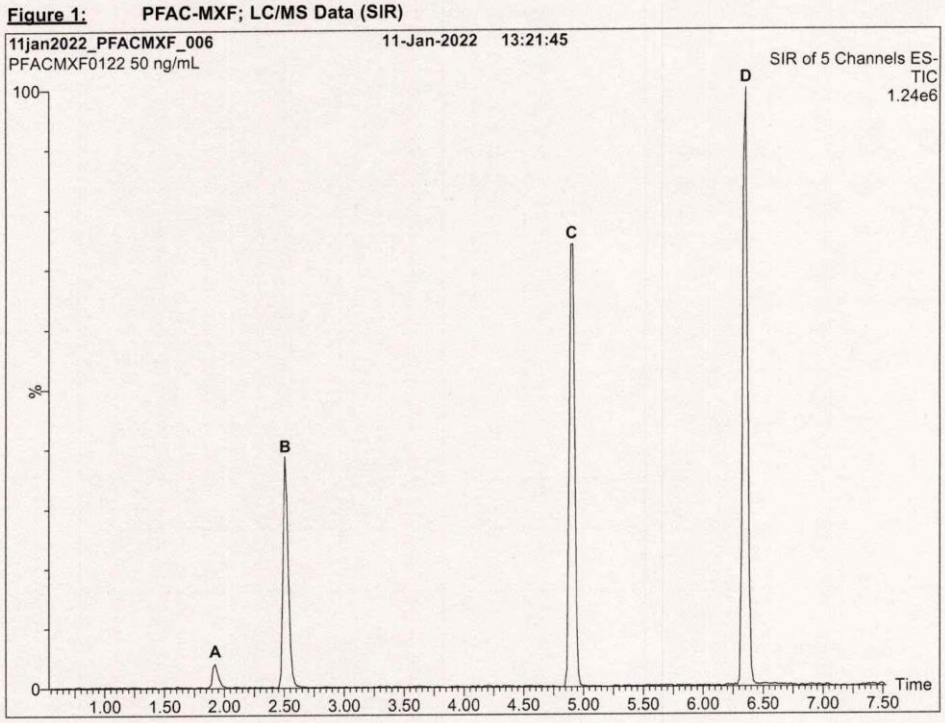
Table A: **PFAC-MXF; Components and Concentrations (ng/mL; ± 5% in Methanol/Water (<1%))**

Compound	Acronym	Concentration* (ng/ml)		Peak Assignment in Figure 1
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid	HFPO-DA	2000		A
Compound	**Acronym**	**Concentration* (ng/mL)**		**Peak Assignment in Figure 1**
		as the salt	**as the acid**	
Sodium dodecafluoro-3H-4,8-dioxanonanoate	NaDONA	2000	1890	B
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	9Cl-PF3ONS	2000	1870	C
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	11Cl-PF3OUdS	2000	1890	D

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 01/12/2022 (mm/dd/yyyy)
B.G. Chittim, General Manager

Figure 1: **PFAC-MXF; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% H_2O / 55% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min
before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µL/min

MS Parameters:

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = variable (15-74)
Desolvation Temperature (°C) = 325
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
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rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B199**

Description:	PFAC-MXF-Native Repl.STOCK EPA 1633 PFAS	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**01/11/2025**
Solvent:	MeOH/H20	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXF0122
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
11CL-PF3OUdS	763051-92-9	1.89	ug/mL
9CL-PF3ONS	756426-58-1	1.87	ug/mL
ADONA	919005-14-4	1.89	ug/mL
HFPO-DA (Gen-X)	13252-13-6	2	ug/mL

Reviewed By Date

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WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXF

Native Replacement PFAS Solution/Mixture

PRODUCT CODE:	PFAC-MXF
LOT NUMBER:	PFACMXF0122
SOLVENT(S):	Methanol / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/10/2022
LAST TESTED: (mm/dd/yyyy)	01/11/2022
EXPIRY DATE: (mm/dd/yyyy)	01/11/2025
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXF is a solution/mixture of sodium dodecafluoro-3H-4,8-dioxanonanoate (NaDONA), the major and minor components of F-53B (9Cl-PF3ONS and 11Cl-PF3OUdS), and GenX (HFPO-DA). The components and their concentrations are given in Table A.

The individual native components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

Table A: **PFAC-MXJ; Components and Concentrations (µg/mL; ± 5% in methanol)**

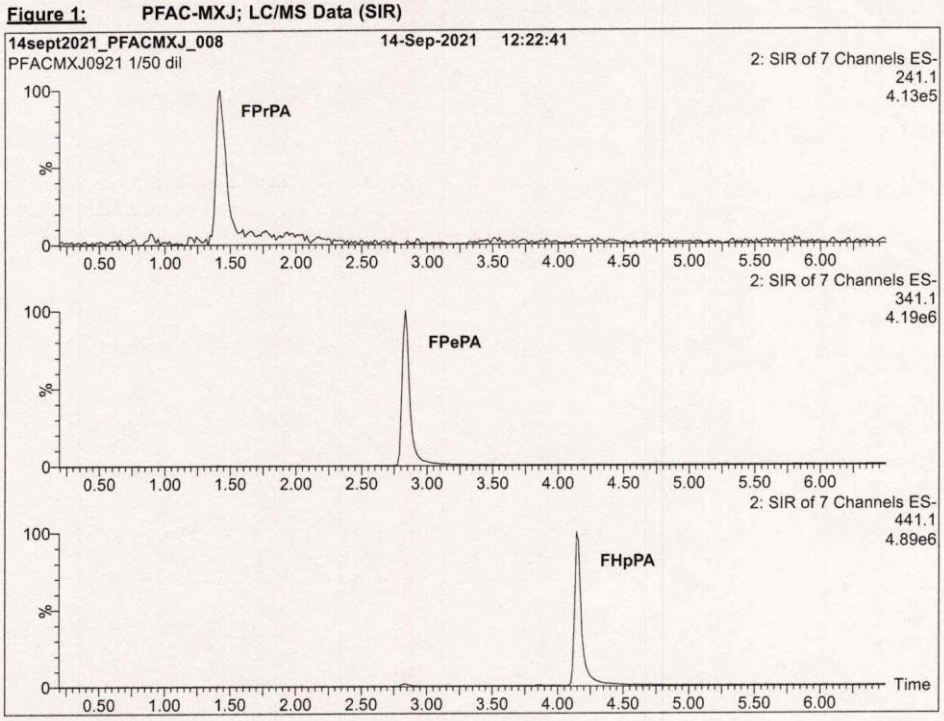
Compound	Acronym	Concentration (µg/mL)
3-Perfluoropropyl propanoic acid	FPrPA	4.00
3-Perfluoropentyl propanoic acid	FPePA	20.0
3-Perfluoroheptyl propanoic acid	FHpPA	20.0

Certified By: _____ **Date:** 10/02/2021
(mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

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rev1

Figure 1: **PFAC-MXJ; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

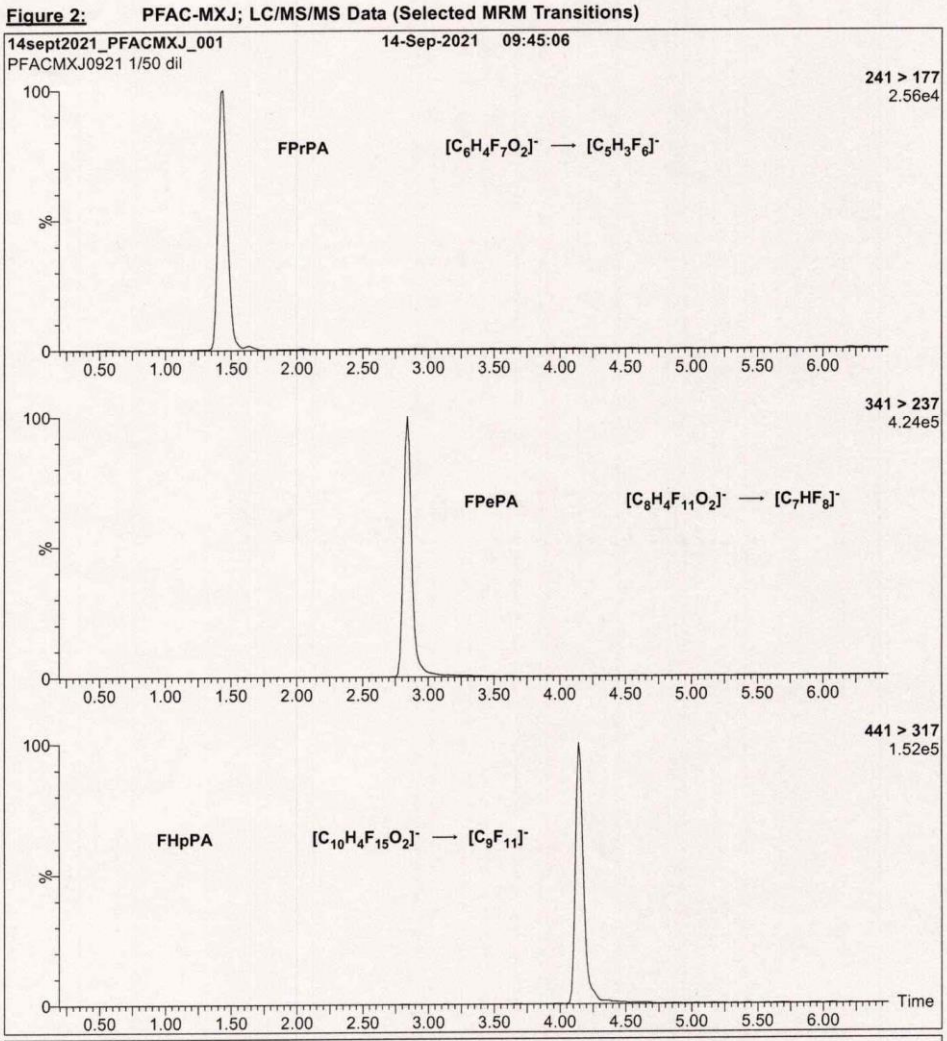
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
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rev1

Figure 2: **PFAC-MXJ; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXJ)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

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rev1

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B205**

Description:	PFAC-MXJ-EPA 1633 Stock mix	Prepared:	02/17/2022
Standard Type:	Other	Expires:	09/14/2026
Solvent:	Methanol	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXJ0921
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
3-Perfluoroheptyl propanoic acid (FHpPA	812-70-4	20	ug/mL
3-Perfluoropentyl propanoic acid (FPePA)	914637-49-3	20	ug/mL
3-Perfluoropropyl propanoic acid (FPrPA)	356-02-2	4	ug/mL

Reviewed By Date

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WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXJ

Native X:3 Fluorotelomer Carboxylic Acid Solution/Mixture

PRODUCT CODE:	PFAC-MXJ
LOT NUMBER:	PFACMXJ0921
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	09/08/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

PFAC-MXJ is a solution/mixture of three native X:3 fluorotelomer carboxylic acids. The components and their concentrations are given in Table A.

The individual components have a chemical purity of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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Form#:13, Issued 2004-11-10
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INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

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$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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CALA Testing Accreditation No. A1226

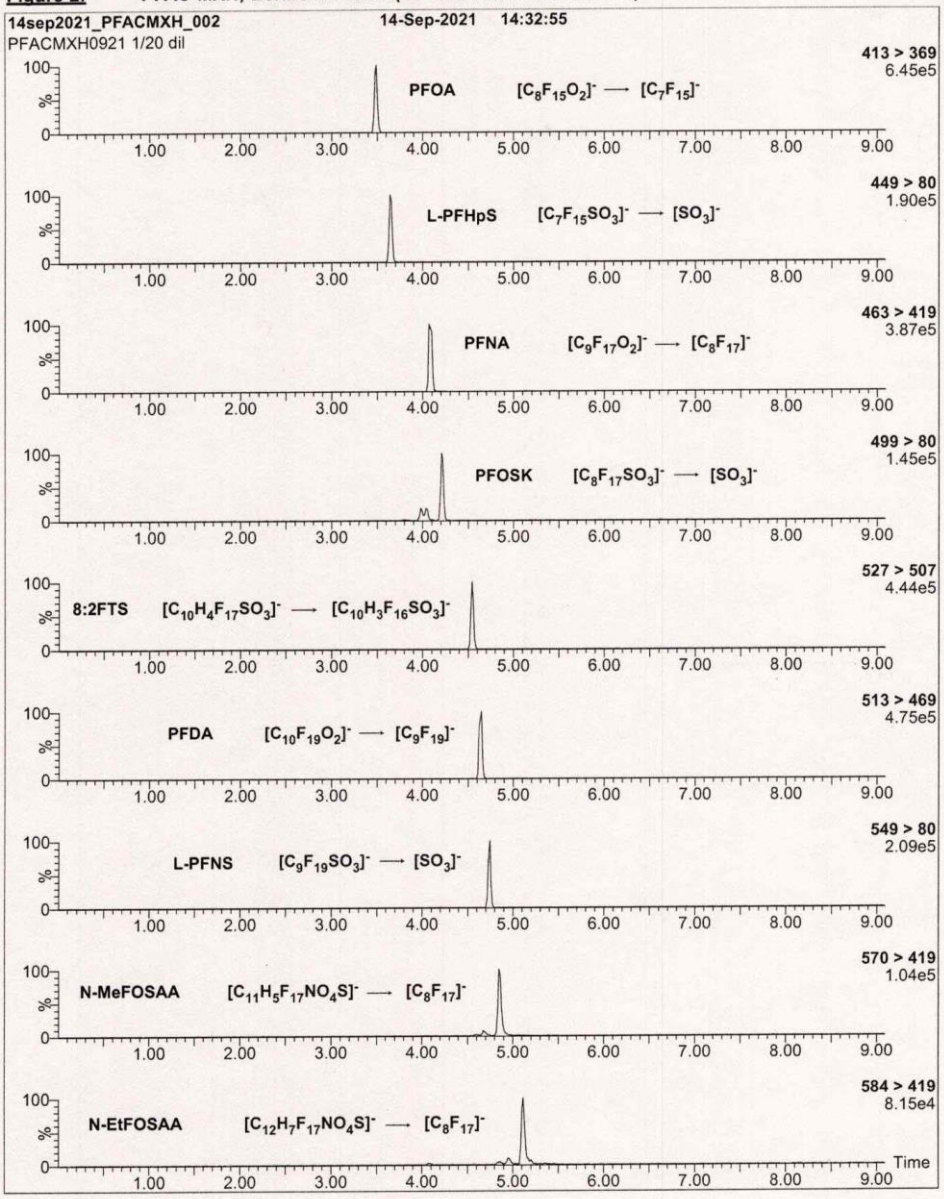
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rev1

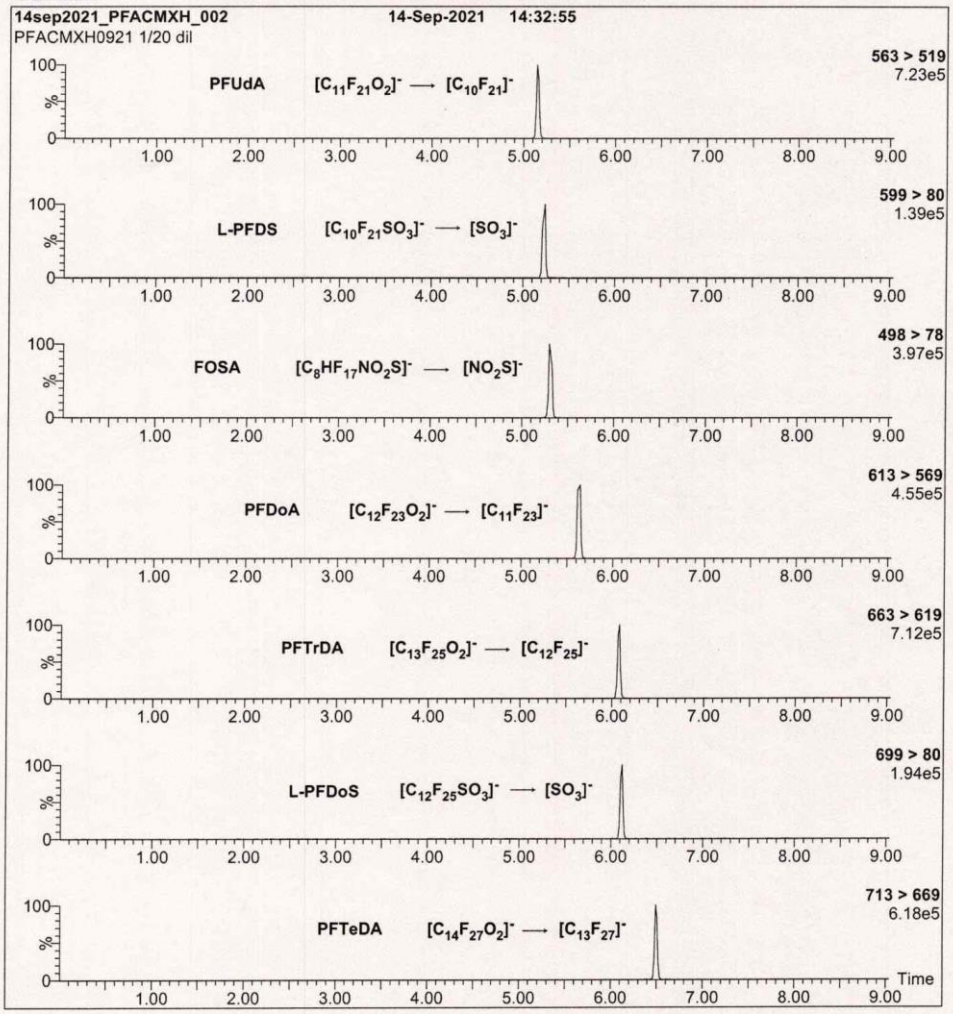
Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**



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rev0

Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-MXH)

Mobile phase: Same as Figure 1

Flow: 300 µL/min

MS Parameters:
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 6-60 (variable)

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Revision#:9, Revised 2020-12-23

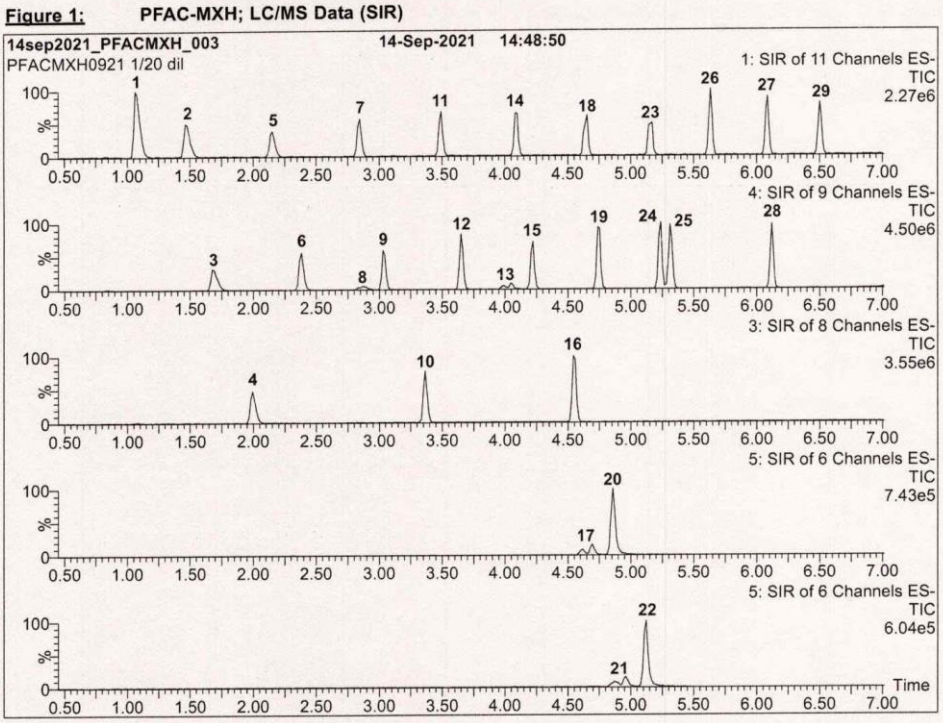
PFACMXH0921 (11 of 11)
rev0

Table E: **PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	1.2	21.1
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	0.6	
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	1.9	
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	2.2	
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	4.5	
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0	
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3C(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.2	
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2C(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.03	
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.4	
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.07	

* Percent of total perfluorooctanesulfonate isomers only.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Figure 1: **PFAC-MXH; LC/MS Data (SIR)**



Conditions for Figure 1:

Waters Acquity Ultra Performance LC
Waters Xevo TQ-S micro MS

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% H_2O / 50% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 9 min and hold for 2 min
before returning to initial conditions in 1 min.
Time: 15 min

Flow: 300 µL/min

MS Parameters:

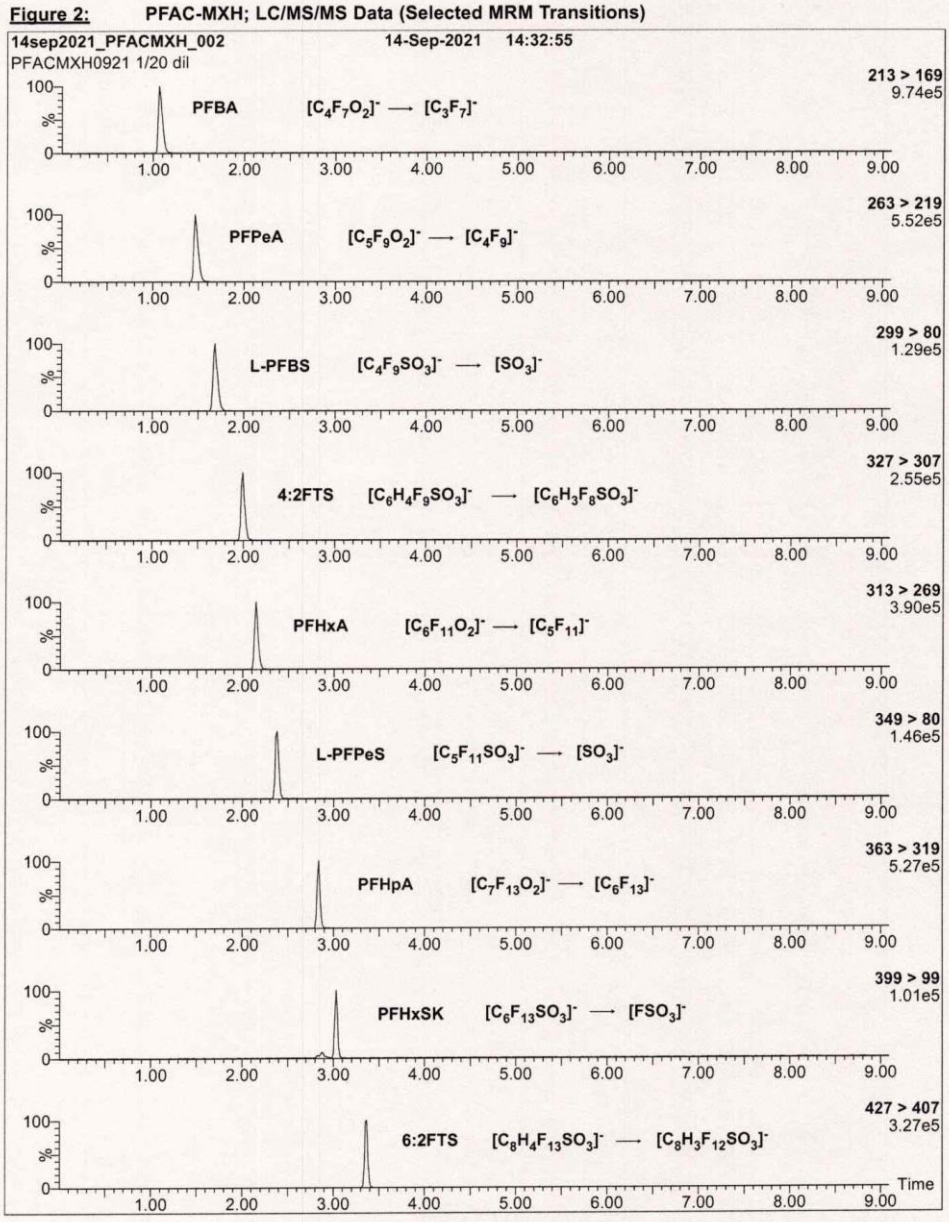
Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = variable (2-74)
Desolvation Temperature (°C) = 350
Desolvation Gas Flow (L/hr) = 1000

Form#:13, Issued 2004-11-10
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PFACMXH0921 (8 of 11)
rev0

Figure 2: **PFAC-MXH; LC/MS/MS Data (Selected MRM Transitions)**



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Table B: **br-NMeFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	N-methylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2N(CH_3)CH_2CO_2H$	76.0	76.0
2	N-methylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_3)(CF_2)_2SO_2N(CH_3)CH_2CO_2H$	0.7	24.0
3	N-methylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_3)(CF_2)_3SO_2N(CH_3)CH_2CO_2H$	2.0	
4	N-methylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_3)(CF_2)_4SO_2N(CH_3)CH_2CO_2H$	6.0	
5	N-methylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_3)(CF_2)_5SO_2N(CH_3)CH_2CO_2H$	14.0	
6	N-methylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	$CF_3C(CF_3)_2(CF_2)_4SO_2N(CH_3)CH_2CO_2H$	0.2	
7	Other Unidentified Isomers		1.1	

* Percent of total N-methylperfluorooctanesulfonamidoacetic acid isomers only.

Table C: **br-NEtFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	N-ethylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2N(C_2H_5)CH_2CO_2H$	77.5	77.5
2	N-ethylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_3)(CF_2)_2SO_2N(C_2H_5)CH_2CO_2H$	2.3	22.5
3	N-ethylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_3)(CF_2)_3SO_2N(C_2H_5)CH_2CO_2H$	2.2	
4	N-ethylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_3)(CF_2)_4SO_2N(C_2H_5)CH_2CO_2H$	5.4	
5	N-ethylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_3)(CF_2)_5SO_2N(C_2H_5)CH_2CO_2H$	10.4	
6	N-ethylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	$CF_3C(CF_3)_2(CF_2)_4SO_2N(C_2H_5)CH_2CO_2H$	0.3	
7	N-ethylperfluoro-4,5-dimethylhexanesulfonamidoacetic acid	$CF_3CF(CF_3)CF(CF_2)_3SO_2N(C_2H_5)CH_2CO_2H$	0.3	
8	N-ethylperfluoro-3,5-dimethylhexanesulfonamidoacetic acid	$CF_3CF(CF_3)CF_2CF(CF_2)_2SO_2N(C_2H_5)CH_2CO_2H$	0.3	
9	Other Unidentified Isomers		1.3	

* Percent of total N-ethylperfluorooctanesulfonamidoacetic acid isomers only.

Table D: **PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Compound	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	81.1	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	2.9	18.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	1.4	
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	5.0	
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	8.9	
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3C(CF_3)CF_2CF_2SO_3^-K^+$	0.2	
7	Other Unidentified Isomers		0.5	

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PFAC-MXH

Native Per- and Poly-fluoroalkyl Substance Solution/Mixture

PRODUCT CODE:	PFAC-MXH
LOT NUMBER:	PFACMXH0921
SOLVENT(S):	Methanol / Isopropanol (2%) / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	09/09/2021
LAST TESTED: (mm/dd/yyyy)	09/14/2021
EXPIRY DATE: (mm/dd/yyyy)	09/14/2026
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-MXH is a solution/mixture of eleven native linear perfluoroalkylcarboxylic acids (C_4-C_{14}), eight native perfluoroalkanesulfonates (C_4, C_5, C_7, C_9, C_{10} and C_{12} linear; C_6 and C_8 linear and branched), three native fluorotelomer sulfonates (4:2, 6:2, and 8:2), two native linear and branched perfluorooctanesulfonamidoacetic acids, and perfluoro-1-octanesulfonamide (FOSA). The components and their concentrations are given in Table A.

The individual components of this mixture all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Table B: Isomeric Components and Percent Composition of br-NMeFOSAA
Table C: Isomeric Components and Percent Composition of br-NEtFOSAA
Table D: Isomeric Components and Percent Composition of PFHxSK
Table E: Isomeric Components and Percent Composition of PFOSK
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HANDLING:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS, and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A1226), and ISO 17034 by ANSI National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ANSI National Accreditation Board ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Table A: **PFAC-MXH; Components and Concentrations (µg/mL, ± 5% in methanol / isopropanol (2%) / water (<1%))**

Compound	Acronym	Concentration* (µg/mL)	Peak Assignment in Figure 1
Perfluoro-n-butanoic acid	PFBA	4.00	1
Perfluoro-n-pentanoic acid	PFPeA	2.00	2
Perfluoro-n-hexanoic acid	PFHxA	1.00	5
Perfluoro-n-heptanoic acid	PFHpA	1.00	7
Perfluoro-n-octanoic acid	PFOA	1.00	11
Perfluoro-n-nonanoic acid	PFNA	1.00	14
Perfluoro-n-decanoic acid	PFDA	1.00	18
Perfluoro-n-undecanoic acid	PFUdA	1.00	23
Perfluoro-n-dodecanoic acid	PFDoA	1.00	26
Perfluoro-n-tridecanoic acid	PFTrDA	1.00	27
Perfluoro-n-tetradecanoic acid	PFTeDA	1.00	29
Perfluoro-1-octanesulfonamide	FOSA	1.00	25
N-methylperfluorooctanesulfonamidoacetic acid [a]	N-MeFOSAA: linear isomer	0.760	20
	N-MeFOSAA: ∑ branched isomers	0.240	17
N-ethylperfluorooctanesulfonamidoacetic acid [b]	N-EtFOSAA: linear isomer	0.775	22
	N-EtFOSAA: ∑ branched isomers	0.225	21

Compound	Acronym	Concentration* (µg/mL)		Peak Assignment in Figure 1
		as the salt	as the acid	
Potassium perfluoro-1-butanesulfonate	L-PFBS	1.00	0.887	3
Sodium perfluoro-1-pentanesulfonate	L-PFPeS	1.00	0.941	6
Potassium perfluorohexanesulfonate [c]	PFHxSK: linear isomer	0.811	0.741	9
	PFHxSK: ∑ branched isomers	0.189	0.173	8
Sodium perfluoro-1-heptanesulfonate	L-PFHpS	1.00	0.953	12
Potassium perfluorooctanesulfonate [d]	PFOSK: linear isomer	0.788	0.732	15
	PFOSK: ∑ branched isomers	0.211	0.196	13
Sodium perfluoro-1-nonanesulfonate	L-PFNS	1.00	0.962	19
Sodium perfluoro-1-decanesulfonate	L-PFDS	1.00	0.965	24
Sodium perfluoro-1-dodecanesulfonate	L-PFDoS	1.00	0.970	28
Sodium 1H,1H,2H,2H-perfluorohexanesulfonate	4:2FTS	4.00	3.75	4
Sodium 1H,1H,2H,2H-perfluorooctanesulfonate	6:2FTS	4.00	3.80	10
Sodium 1H,1H,2H,2H-perfluorodecanesulfonate	8:2FTS	4.00	3.84	16

[a] See Table B for percent composition of linear and branched N-MeFOSAA isomers.
[b] See Table C for percent composition of linear and branched N-EtFOSAA isomers.
[c] See Table D for percent composition of linear and branched PFHxSK isomers.
[d] See Table E for percent composition of linear and branched PFOSK isomers.

* Concentrations have been rounded to three significant figures.

Certified By: _____ **Date:** 09/23/2021 (mm/dd/yyyy)
B.G. Chittim, General Manager

Form#:13, Issued 2004-11-10
Revision#:9, Revised 2020-12-23

PFACMXH0921 (3 of 11)
rev0

YORK
ANALYTICAL LABORATORIES, INC.

Analytical Standard Record

Standard ID: **Y22B201**

Description:	PFAC-MXH STOCK PFAS EPA 1633	Prepared:	02/17/2022
Standard Type:	Other	**Expires:**	**09/14/2026**
Solvent:	MeOH/IPA/H2O	Prepared By:	Robert Q. Bradley
Final Volume (mls):	1	Department:	PFAS
Vials:	1	Lot No.:	PFACMXH0921
Vendor:	Wellington Laboratories		

Comments:

Analyte	CAS Number	Concentration	Units
1H,1H,2H,2H-Perfluorodecanesulfonic acid	39108-34-4	3.84	ug/mL
1H,1H,2H,2H-Perfluorohexanesulfonic acid	757124-72-4	3.75	ug/mL
1H,1H,2H,2H-Perfluorooctanesulfonic acid	27619-97-2	3.8	ug/mL
N-EtFOSAA	2991-50-6	1	ug/mL
N-MeFOSAA	2355-31-9	1	ug/mL
Perfluoro-1-decanesulfonic acid (PFDS)	335-77-3	0.965	ug/mL
Perfluoro-1-heptanesulfonic acid (PFHpS)	375-92-8	0.953	ug/mL
Perfluoro-1-nonanesulfonic acid (PFNS)	68259-12-1	0.962	ug/mL
Perfluoro-1-octanesulfonamide (FOSA)	754-91-6	1	ug/mL
Perfluoro-1-pentanesulfonate (PFPeS)	2706-91-4	0.941	ug/mL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	0.887	ug/mL
Perfluorodecanesulfonic acid(PFDS)	335-77-3	0.965	ug/mL
Perfluorodecanoic acid (PFDA)	335-76-2	1	ug/mL
Perfluorododecanoic acid (PFDoA)	307-55-1	1	ug/mL
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	ug/mL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.914	ug/mL
Perfluorohexanoic acid (PFHxA)	307-24-4	1	ug/mL
Perfluoro-n-butanoic acid (PFBA)	375-22-4	4	ug/mL
Perfluorononanoic acid (PFNA)	375-95-1	1	ug/mL
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.928	ug/mL
Perfluorooctanoic acid (PFOA)	335-67-1	1	ug/mL
Perfluoropentanoic acid (PFPeA)	2706-90-3	1	ug/mL
Perfluorotetradecanoic acid (PFTA)	376-06-7	1	ug/mL
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	1	ug/mL
Perfluoroundecanoic acid (PFUnA)	2058-94-8	1	ug/mL

Reviewed By Date

Page 1 of 1

Attachment 4 – Calibration Concentrations, nominal

Calibration Solutions (ng/mL) Compound CS1 (LOQ) CS2 Perfluoroalkyl carboxylic			CS3	CS4 (CV[1])	CS5	CS6	CS7[2]
acids							
PFBA	0.8	2	5	10	20	50	250
PFPeA	0.4	1	2.5	5	10	25	125
PFHxA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFUnA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTrDA	0.2	0.5	1.25	2.5	5	12.5	62.5
PFTeDA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluoroalkyl sulfonic acids							
PFBS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFPeS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHxS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFHpS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFOS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFNS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDS	0.2	0.5	1.25	2.5	5	12.5	62.5
PFDoS	0.2	0.5	1.25	2.5	5	12.5	62.5
Fluorotelomer sulfonic acids							
4:2FTS	0.8	2	5	10	20	50	NA
6:2FTS	0.8	2	5	10	20	50	NA
8:2FTS	0.8	2	5	10	20	50	NA
Perfluorooctane sulfonamides							
PFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NMeFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamidoacetic acids							
NMeFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
NEtFOSAA	0.2	0.5	1.25	2.5	5	12.5	62.5
Perfluorooctane sulfonamide ethanols							
NMeFOSE	2	5	12.5	25	50	125	625
NEtFOSE	2	5	12.5	25	50	125	625
Per- and polyfluoroether carboxylic acids							
HFPO-DA	0.8	2	5	10	20	50	250
ADONA	0.8	2	5	10	20	50	250
PFMPA	0.4	1	2.5	5	10	25	125
PFMBA	0.4	1	2.5	5	10	25	125
NFDHA	0.4	1	2.5	5	10	25	125
Ether sulfonic acids							
9Cl-PF3ONS	0.8	2	5	10	20	50	250
11Cl-PF3OUdS	0.8	2	5	10	20	50	250
PFEESA	0.4	1	2.5	5	10	25	125

Calibration Solutions (ng/mL) Compound							
CS1 (LOQ)	**CS2 Fluorotelomer carboxylic**		**CS3**	**CS4 (CV[1])**	**CS5**	**CS6**	**CS7[2]**
acids							
3:3FTCA	1.0	2.5	6.26	12.5	25	62.4	312
5:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
7:3FTCA	5.0	12.5	31.3	62.5	125	312	1560
Extracted Internal Standard (EIS) Analytes							
$^{13}C_4$-PFBA	10	10	10	10	10	10	10
$^{13}C_5$-PFPeA	5	5	5	5	5	5	5
$^{13}C_5$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFHpA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_9$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_6$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_7$-PFUnA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDoA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFTeDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_3$-PFBS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_3$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_8$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_2$-4:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-6:2FTS	5	5	5	5	5	5	5
$^{13}C_2$-8:2FTS	5	5	5	5	5	5	5
$^{13}C_8$-PFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_5-NEtFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D_3-NMeFOSAA	5	5	5	5	5	5	5
D_5-NEtFOSAA	5	5	5	5	5	5	5
D_7-NMeFOSE	25	25	25	25	25	25	25
D_9-NEtFOSE	25	25	25	25	25	25	25
$^{13}C_3$-HFPO-DA	10	10	10	10	10	10	10
Non-extracted Internal Standard (NIS) Analytes							
$^{13}C_3$-PFBA	5	5	5	5	5	5	5
$^{13}C_2$-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_5$-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{13}C_2$-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25
$^{18}O_2$-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5
$^{13}C_4$-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5

[1] This calibration point is used as the calibration verification (CV)

[2] A minimum of six contiguous calibrations standards are required for linear models and a minimum of seven calibration standards are required for second-order models.

Attachment 5 -HPLC Method Parameters

HPLC Acquisition Method Report

Stroke A
- **Automatic Stroke Calculation A**: Yes

Compress A
- **Compressibility Mode A**: Compressibility Value Set
- **Compressibility A**: 70 10e-6/bar

Compress B
- **Compressibility Mode B**: Compressibility Value Set
- **Compressibility B**: 90 10e-6/bar

Stop Time
- **Stoptime Mode**: Time set
- **Stoptime**: 10.00 min

Post Time
- **Posttime Mode**: Time set
- **Posttime**: 1.50 min

Injection
- Injection with needle wash
- 3.00 µL

Solvent Composition

	Channel	Name 1	Name 2	Selected	Used	Percent
1	A	Water 5mM ammonium acetate		Ch. 1	Yes	90.00 %
2	B	Methanol		Ch. 1	Yes	10.00 %

Timetable

	Time	A	B	Flow
1	3.50 min	50.00 %	50.00 %	0.400 mL/min
2	8.00 min	10.00 %	90.00 %	0.400 mL/min
3	8.50 min	90.00 %	10.00 %	0.400 mL/min

Name: **Column Comp.** Module: **G1316C**

Left Temperature Control
- **Temperature Control Mode**: Temperature Set
- **Temperature**: 50.0 °C

Enable Analysis Left Temperature
- **Enable Analysis Left Temperature On**: Yes
- **Enable Analysis Left Temperature Value**: 0.8 °C

Right Temperature Control
- **Right temperature Control Mode**: Temperature Set
- **Right temperature**: 50.0 °C

Enable Analysis Right Temperature
- **Enable Analysis Right Temperature On**: Yes
- **Enable Analysis Right Temperature Value**: 0.8 °C

Stop Time
- **Stoptime Mode**: As pump/injector

Post Time
- **Posttime Mode**: Off

Timetable

Valve Position: Position 1 (Port 1 -> 2)

Ready when front door open: Yes

Attachment 6 - Triple Quadrupole Acquisition Method

Acquisition Method Report

Agilent Technologies

Acquisition Method Info

Method Name PFAS1633_ACQ_092922.m

Method Path D:\MassHunter\methods\PFAS1633_ACQ_092922.m

Method Description EPA 1633_Target PFAS Isotope Dilution_Acquisition

Device List

HiP Sampler
Binary Pump
Column Comp.
QQQ

MS QQQ Mass Spectrometer

Ion Source	AJS ESI	**Tune File**	D:\MassHunter\Tune\QQQ\G6460C\atunes.TUNE.XML
Stop Mode	No Limit/As Pump	**Stop Time (min)**	1
Time Filter	On	**Time Filter Width (min)**	0.07
LC->Waste Pre Row	N/A	**LC->Waste Post Row**	N/A

Time Segments

Index	Start Time (min)	Scan Type	Ion Mode	Div Valve	Delta EMV	Store	Cycle Time (ms)	Triggered?	MRM Repeats
1	0	DynamicMRM	ESI+Agilent Jet Stream	To MS	350	Yes	550	Yes	3

Time Segment 1

Scan Segments

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
11-Cl-PF3OUdS	No	631	Unit/Enh (6490)	451	Unit/Enh (6490)	Yes	No	170	33	4	7.62	3	Negative
1H,1H,2H,2H-perfluoro-1-decanesulfonate (8 2F TS)	No	527	Unit/Enh (6490)	507	Unit/Enh (6490)	Yes	No	170	28	4	7.14	3	Negative
1H,1H,2H,2H-perfluoro-1-decanesulfonate (8 2F TS)	No	527	Unit/Enh (6490)	80.9	Unit/Enh (6490)	Yes	No	170	40	4	7.14	3	Negative
1H,1H,2H,2H-perfluoro-1-hexanesulfonate (4 2F TS)	No	327	Unit/Enh (6490)	307	Unit/Enh (6490)	Yes	No	162	20	4	4.788	3	Negative
1H,1H,2H,2H-perfluoro-1-hexanesulfonate (4 2F TS)	No	327	Unit/Enh (6490)	80.9	Unit/Enh (6490)	Yes	No	162	36	4	4.788	3	Negative
1H,1H,2H,2H-perfluoro-1-octanesulfonate (6 2F TS)	No	427	Unit/Enh (6490)	407	Unit/Enh (6490)	Yes	No	162	24	4	6.168	3	Negative
1H,1H,2H,2H-perfluoro-1-octanesulfonate (6 2F TS)	No	427	Unit/Enh (6490)	79.7	Unit/Enh (6490)	Yes	No	162	48	4	6.168	3	Negative
3:3FTCA	No	241	Unit/Enh (6490)	177	Unit/Enh (6490)	Yes	No	74	4	4	3.4	3	Negative
3-3FTCA	No	241	Unit/Enh (6490)	117	Unit/Enh (6490)	Yes	No	74	44	4	3.4	3	Negative

Report generation date: 18-Oct-2022 09:01:43 AM

Page 1 of 8

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
5-3FTCA	No	341	Unit/Enh (6490)	237	Unit/Enh (6490)	Yes	No	84	12	4	5.73	3	Negative
5-3FTCA	No	341	Unit/Enh (6490)	217	Unit/Enh (6490)	Yes	No	84	24	4	5.73	3	Negative
7-3FTCA	No	441	Unit/Enh (6490)	337	Unit/Enh (6490)	Yes	No	76	12	4	6.7	3	Negative
7-3FTCA	No	441	Unit/Enh (6490)	317	Unit/Enh (6490)	Yes	No	76	24	4	6.7	3	Negative
9-Cl-PF3ONS	No	531	Unit/Enh (6490)	351	Unit/Enh (6490)	Yes	No	175	29	4	6.89	3	Negative
ADONA	No	377	Unit/Enh (6490)	251	Unit/Enh (6490)	Yes	No	103	9	4	5.62	3	Negative
ADONA	No	377	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	103	37	4	5.62	3	Negative
d3-NMeFOSA	No	515	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	134	20	4	7.17	3	Negative
d3-N-MeFOSAA	No	572.99	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.17	3	Negative
d5-NEtFOSA	No	531	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	150	20	4	8.52	3	Negative
d5-NEtFOSA	No	531	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	150	20	4	8.52	3	Negative
d5-N-EtFOSAA	No	589.02	Unit/Enh (6490)	530.9	Unit/Enh (6490)	Yes	No	130	20	4	7.36	3	Negative
d5-N-EtFOSAA	No	589.02	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.36	3	Negative
d7-NMeFOSE	No	623	Unit/Enh (6490)	310	Unit/Enh (6490)	Yes	No	150	15	4	8.28	3	Negative
d7-NMeFOSE	No	623	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	88	15	4	8.28	3	Negative
d9-NEtFOSE	No	639	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	150	15	4	8.6	3	Negative
HFPO-DA	No	285	Unit/Enh (6490)	169.1	Unit/Enh (6490)	Yes	No	100	20	4	4.95	3	Negative
M2-4-2FTS	No	329	Unit/Enh (6490)	309	Unit/Enh (6490)	Yes	No	156	20	4	4.787	3	Negative
M2-4-2FTS	No	329	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	156	28	4	4.787	3	Negative
M2-6-2FTS	No	429	Unit/Enh (6490)	409	Unit/Enh (6490)	Yes	No	162	24	4	6.01	3	Negative
M2-6-2FTS	No	429	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	162	40	4	6.01	3	Negative
M2-8-2FTS	No	529	Unit/Enh (6490)	509	Unit/Enh (6490)	Yes	No	165	28	4	6.98	3	Negative
M2-8-2FTS	No	529	Unit/Enh (6490)	81	Unit/Enh (6490)	Yes	No	165	40	4	6.98	3	Negative
M2PFTeDA	No	715	Unit/Enh (6490)	670	Unit/Enh (6490)	Yes	No	62	12	4	8.25	3	Negative
M3-HFPO-DA	No	287	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	90	5	4	4.99	3	Negative
M3PFBA	Yes	216	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	90	5	4	1.2	2	Negative
M3PFBS	No	302	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	114	32	4	3.94	3	Negative
M3PFBS	No	302	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	114	40	4	3.94	3	Negative
M3PFHxS	No	402	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	165	40	4	5.55	3	Negative
M3PFHxS	No	402	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	165	48	4	5.55	3	Negative
M4PFHpA	No	367	Unit/Enh (6490)	322	Unit/Enh (6490)	Yes	No	124	8	4	5.601	3	Negative
M5PFHxA	No	318	Unit/Enh (6490)	273	Unit/Enh (6490)	Yes	No	70	4	4	5.47	3	Negative
M5PFHxA	No	318	Unit/Enh (6490)	120	Unit/Enh (6490)	Yes	No	70	4	4	5.47	3	Negative
M6PFDA	No	519	Unit/Enh (6490)	473.9	Unit/Enh (6490)	Yes	No	59	8	4	6.99	3	Negative
M7PFUdA	No	570	Unit/Enh (6490)	525	Unit/Enh (6490)	Yes	No	64	8	4	7.38	3	Negative
MPFDA	Yes	514.98	Unit/Enh (6490)	469.8	Unit/Enh (6490)	Yes	No	94	5	4	6.972	2	Negative
MPFHxA	Yes	314.99	Unit/Enh (6490)	269.8	Unit/Enh (6490)	Yes	No	86	4	4	4.705	2	Negative
MPFHxA	Yes	314.99	Unit/Enh (6490)	120	Unit/Enh (6490)	Yes	No	86	4	4	4.705	2	Negative
MPFHxS	Yes	403	Unit/Enh (6490)	103	Unit/Enh (6490)	Yes	No	110	37	4	5.63	2	Negative
MPFHxS	Yes	403	Unit/Enh (6490)	84	Unit/Enh (6490)	Yes	No	110	40	4	5.63	2	Negative
MPFNA	Yes	468	Unit/Enh (6490)	423	Unit/Enh (6490)	Yes	No	66	4	4	6.541	2	Negative
MPFOA	Yes	417	Unit/Enh (6490)	372	Unit/Enh (6490)	Yes	No	84	4	4	6.03	2	Negative
MPFOS	Yes	502.96	Unit/Enh (6490)	99	Unit/Enh (6490)	Yes	No	148	48	4	6.57	3	Negative

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
MPFOS	Yes	502.96	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	148	54	4	6.57	3	Negative
NEtFOSA	No	526	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	120	20	4	8.528	3	Negative
NEtFOSA	No	526	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	120	20	4	8.528	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	525.9	Unit/Enh (6490)	Yes	No	130	20	4	7.521	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	130	20	4	7.521	3	Negative
NEtFOSE	No	630	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	120	20	4	8.301	3	Negative
NFDHA	No	295	Unit/Enh (6490)	201.1	Unit/Enh (6490)	Yes	No	92	2	4	4.641	3	Negative
NFDHA	No	295	Unit/Enh (6490)	84.9	Unit/Enh (6490)	Yes	No	92	34	4	4.641	3	Negative
NMeFOSA	No	512	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	120	20	4	8.298	3	Negative
NMeFOSA	No	512	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	120	20	4	8.298	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	511.9	Unit/Enh (6490)	Yes	No	150	20	4	7.335	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	418.9	Unit/Enh (6490)	Yes	No	150	20	4	7.335	3	Negative
NMeFOSE	No	616	Unit/Enh (6490)	59	Unit/Enh (6490)	Yes	No	120	20	4	8.301	3	Negative
Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)	No	506	Unit/Enh (6490)	78	Unit/Enh (6490)	Yes	No	162	48	4	7.59	3	Negative
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)	No	507	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	174	48	4	6.59	3	Negative
Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)	No	507	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	174	54	4	6.59	3	Negative
Perfluoro-1-decanesulfonate (L-PFDS)	No	598.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	156	50	4	7.546	3	Negative
Perfluoro-1-decanesulfonate (L-PFDS)	No	598.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	100	60	4	7.546	3	Negative
Perfluoro-1-heptanesulfonate (L-PFHpS)	No	448.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	162	48	4	6.252	3	Negative
Perfluoro-1-heptanesulfonate (L-PFHpS)	No	448.9	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	162	48	4	6.252	3	Negative
Perfluoro-1-octanesulfonamide (FOSA)	No	497.9	Unit/Enh (6490)	478	Unit/Enh (6490)	Yes	No	156	100	4	7.651	3	Negative
Perfluoro-1-octanesulfonamide (FOSA)	No	497.9	Unit/Enh (6490)	78	Unit/Enh (6490)	Yes	No	156	40	4	7.651	3	Negative
Perfluoro-1-pentanesulfonate (L-PFPeS)	No	348.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	36	4	5.042	3	Negative
Perfluoro-1-pentanesulfonate (L-PFPeS)	No	348.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	40	4	5.042	3	Negative

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
Perfluorobutanesulfonic acid (PFBS)	No	298.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	32	4	4.042	3	Negative
Perfluorobutanesulfonic acid (PFBS)	No	298.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	36	4	4.042	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	468.8	Unit/Enh (6490)	Yes	No	90	8	4	7.158	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	268.8	Unit/Enh (6490)	Yes	No	90	16	4	7.158	3	Negative
Perfluorododecanesulfonic acid (PFDoS)	No	699	Unit/Enh (6490)	99	Unit/Enh (6490)	Yes	No	100	60	4	7.984	3	Negative
Perfluorododecanesulfonic acid (PFDoS)	No	699	Unit/Enh (6490)	80	Unit/Enh (6490)	Yes	No	156	50	4	7.984	3	Negative
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	568.8	Unit/Enh (6490)	Yes	No	90	12	4	7.876	3	Negative
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	168.7	Unit/Enh (6490)	Yes	No	90	28	4	7.876	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	318.8	Unit/Enh (6490)	Yes	No	90	8	4	5.601	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	168.9	Unit/Enh (6490)	Yes	No	90	16	4	5.601	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	40	4	5.685	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	44	4	5.685	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	268.9	Unit/Enh (6490)	Yes	No	70	4	4	4.856	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	119	Unit/Enh (6490)	Yes	No	70	20	4	4.856	3	Negative
Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)	No	615	Unit/Enh (6490)	570	Unit/Enh (6490)	Yes	No	53	8	4	7.71	3	Negative
Perfluoro-n-[13C4]butanoic acid (MPFBA)	No	217	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	59	4	4	1.22	3	Negative
Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)	No	268	Unit/Enh (6490)	223	Unit/Enh (6490)	Yes	No	62	4	4	3.44	3	Negative
Perfluoro-n-[13C8]octanoic acid (M8PFOA)	No	421	Unit/Enh (6490)	376	Unit/Enh (6490)	Yes	No	59	4	4	6.05	3	Negative
Perfluoro-n-[13C8]octanoic acid (M8PFOA)	No	421	Unit/Enh (6490)	172	Unit/Enh (6490)	Yes	No	59	16	4	6.05	3	Negative

Acquisition Method Report

Agilent Technologies

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Primary	Trigger	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)	No	472	Unit/Enh (6490)	427	Unit/Enh (6490)	Yes	No	59	8	4	6.56	3	Negative
Perfluoro-n-[13C9]nonanoic acid (M9PFNA)	No	472	Unit/Enh (6490)	223	Unit/Enh (6490)	Yes	No	59	16	4	6.56	3	Negative
Perfluoro-n-butanoic acid (PFBA)	No	213	Unit/Enh (6490)	169.9	Unit/Enh (6490)	Yes	No	70	4	4	1.246	3	Negative
Perfluorononanesulfonate (L-PFNS)	No	548.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	159	48	4	7.174	3	Negative
Perfluorononanesulfonate (L-PFNS)	No	548.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	159	48	4	7.174	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	418.8	Unit/Enh (6490)	Yes	No	90	8	4	6.718	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	218.8	Unit/Enh (6490)	Yes	No	90	16	4	6.718	3	Negative
Perfluoro-n-pentanoic acid (PFPeA)	No	263	Unit/Enh (6490)	219	Unit/Enh (6490)	Yes	No	62	4	4	3.526	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	Yes	No	150	44	4	6.743	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	Yes	No	150	84	4	6.743	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	368.8	Unit/Enh (6490)	Yes	No	90	8	4	6.202	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	168.9	Unit/Enh (6490)	Yes	No	90	16	4	6.202	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	669	Unit/Enh (6490)	Yes	No	110	12	4	8.414	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	168.8	Unit/Enh (6490)	Yes	No	110	28	4	8.414	3	Negative
Perfluorotridecanoic acid (PFTrDA)	No	663	Unit/Enh (6490)	618.8	Unit/Enh (6490)	Yes	No	90	12	4	8.164	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	519	Unit/Enh (6490)	Yes	No	90	8	4	7.538	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	169	Unit/Enh (6490)	Yes	No	90	24	4	7.538	3	Negative
PFEESA	No	315	Unit/Enh (6490)	135	Unit/Enh (6490)	Yes	No	112	26	4	4.464	3	Negative
PFEESA	No	315	Unit/Enh (6490)	83	Unit/Enh (6490)	Yes	No	112	14	4	4.464	3	Negative
PFMBA	No	279	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	75	18	4	4.011	3	Negative
PFMPA	No	229	Unit/Enh (6490)	85	Unit/Enh (6490)	Yes	No	59	6	4	2.15	3	Negative

Scan Parameters

Data Stg	Threshold
Centroid	0

Acquisition Method Report

Agilent Technologies

Source Parameters

Parameter	Value (+)	Value (-)
Gas Temp (°C)	230	230
Gas Flow (l/min)	5	5
Nebulizer (psi)	15	15
SheathGasHeater	350	350
SheathGasFlow	12	12
Capillary (V)	3500	2500
VCharging	500	0

Chromatograms

Chrom Type	Label	Offset	Y-Range
TIC	TIC	0	10000000

Instrument Curves

Actual

Name: HiP Sampler **Module: G4226A**

Auxiliary	
Draw Speed	100.0 µL/min
Eject Speed	400.0 µL/min
Draw Position Offset	1.5 mm
Wait Time After Drawing	1.2 s
Sample Flush Out Factor	5.0
Vial/Well bottom sensing	Yes
Injection	
Injection Mode	Injection with needle wash
Injection Volume	3.00 µL
Needle Wash	
Needle Wash Location	Flush Port
Wash Time	10.0 s
High throughput	
Automatic Delay Volume Reduction	No
Overlapped Injection	
Enable Overlapped Injection	No
Valve Switching	
Valve Movements	0
Valve Switch Time 1	
Switch Time 1 Enabled	No
Valve Switch Time 2	
Switch Time 2 Enabled	No
Valve Switch Time 3	
Switch Time 3 Enabled	No
Valve Switch Time 4	
Switch Time 4 Enabled	No
Stop Time	
Stoptime Mode	As pump/No limit
Post Time	
Posttime Mode	Off

Name: Binary Pump **Module: G4220A**

Flow	0.400 mL/min
Use Solvent Types	No
Stroke Mode	Synchronized
Low Pressure Limit	0.00 bar
High Pressure Limit	600.00 bar
Max. Flow Ramp Up	100.000 mL/min²
Max. Flow Ramp Down	100.000 mL/min²
Expected Mixer	No check

Report generation date: 18-Oct-2022 09:01:44 AM Page 6 of 8

ATTACHMENT F

ELAP Certifications

LANGAN

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF QUALITY ASSURANCE
401 East State Street
P.O. Box 420, Mail Code 401-02D
Trenton, New Jersey 08626-0420
Tel. (609) 292-3950 • Fax (609) 777-1774
https://dep.nj.gov/dsr/oqa

PHILIP D. MURPHY
Governor

TAHESHA L. WAY
Lt. Governor

SHAWN M. LATOURETTE
Commissioner

June 3, 2025

Dear Laboratory Manager:

Your fiscal year 2026 (FY26) laboratory certification renewal application has been processed and a Certificate and Annual Certified Parameter List (ACPL) that reflects the current status of your facility are enclosed. If there are any discrepancies, please contact your Laboratory Certification Officer to verify information and make arrangements for a new ACPL. If the Office of Quality Assurance (OQA) does not receive documentation of any discrepancies before July 11, 2025 this ACPL will be considered final and any changes received thereafter will be treated as a modification application.

Effective with receipt of this letter, your facility's ACPL is valid through June 30, 2026. Both the Certificate and ACPL shall be conspicuously displayed at your facility in a location on the premises that is visible to the public.

As always, we are available to discuss any comments or questions. Please do not hesitate to contact your laboratory certification officer or me.

Sincerely,

Michele M. Potter
Manager

Enclosure: ACPL; Certificate

NELAP ACCREDITED LABORATORY USE OF ITS CERTIFICATE

Laboratory compliance with the applicable TNI standards is required for the maintenance of NELAP accreditation. In addition, the laboratory is required to comply with the following and the New Jersey statutes:

1. NELAP accredited laboratories shall conspicuously display their most recent NELAP accreditation Certificate with the Annual Certified Parameter List (ACPL) in a location on the premises visible to the public;
2. NELAP accredited laboratories shall make accurate statements concerning their NELAP accreditation ACPL and NELAP accreditation status and shall claim accreditation only to the scope for which it has been granted accreditation;
3. NELAP accredited laboratories shall accompany the accreditation body's name and/or the NELAP logo with at least the phrase "NELAP accredited" and the laboratory's accreditation number or other identifier when the accreditation body's name is used on general literature such as catalogs, advertising, business solicitations, proposals, quotations, laboratory analytical reports or other materials;
4. NELAP accredited laboratories shall not use their NELAP certificate, NELAP accreditation status and/or NELAP logo to imply endorsements by the accreditation body;
5. The NELAP accredited laboratories choosing to use the accreditation body's name, making reference to its NELAP accreditation status and/or using the NELAP logo in any catalogs, advertising, business solicitations, proposals, quotations, laboratory analytical reports or other materials, the NELAP accredited laboratory shall;
   a. Distinguish between proposed testing for which the NELAP accredited laboratory is accredited and the proposed testing for which the NELAP accredited laboratory is not accredited;
   b. Include the NELAP accredited laboratory's accreditation number or other identifier;
6. The NELAP accredited laboratories upon suspension, revocation or withdrawal of their NELAP accreditation shall;
   a. Discontinue use of all catalogs, advertising, business solicitations, proposals, quotations, laboratory analytical reports or other materials that contain reference to their past NELAP accreditation status and/or display the NELAP logo, and,
   b. Return any certificates and ACPL for NELAP accreditation to the accreditation body.

The accreditation body shall take suitable actions, including legal action, when incorrect reference to the accreditation body's NELAP accreditation, misleading use of the laboratory's NELAP accreditation status and/or unauthorized use of the NELAP logo is found in catalogs, advertising, business solicitations, proposals, quotations, laboratory analytical reports or other materials.

New Jersey Department of Environmental Protection
Environmental Laboratory Certification Program

LABORATORY PERSONNEL LIST

Effective as of: 07/01/2025

Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC250001
120 RESEARCH DR
STRATFORD, CT 06615

Position: Lab Manager

Employee	Category/Instrument	Start Date	End Date	Documentation Status	Complete Date	Comments
CASSIE MOSHER		7/1/2023		Complete/Qualified	6/20/2023	

Position: QA Officer

Employee	Category/Instrument	Start Date	End Date	Documentation Status	Complete Date	Comments
ZACH SCOTT		5/29/2025		Complete/Qualified	5/29/2025	

Position: Supervisor/Tech Dir

Employee	Category/Instrument	Start Date	End Date	Documentation Status	Complete Date	Comments
CASSIE MOSHER	CHEMICAL TESTING - INORGANIC NON-METALS	11/1/2023		Complete/Qualified	11/1/2023	
CASSIE MOSHER	CHEMICAL TESTING - METALS	11/1/2023		Complete/Qualified	11/1/2023	
CASSIE MOSHER	CHEMICAL TESTING - ORGANIC	11/1/2023		Complete/Qualified	11/1/2023	

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 07/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: DW03 --Inorganic Parameters

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW03.00200	Alkalinity	Titrimetric Indicator	SM 2320 B	NY
Certified	Yes	DW03.01800	Chloride	Ion Chromatography	EPA 300.0	NY
Certified	Yes	DW03.02550	Color	Platinum-Cobalt	SM 2120 B	NY
Certified	Yes	DW03.03750	Fluoride	Ion Chromatography	EPA 300.0	NY
Certified	Yes	DW03.05950	Orthophosphate	Colorimetric	SM 4500-P E	NY
Certified	Yes	DW03.06300	Orthophosphate	Ion Chromatography	EPA 300.0	NY
Certified	Yes	DW03.06900	Sulfate	Ion Chromatography	EPA 300.0	NY
Certified	Yes	DW03.07150	Total dissolved solids (TDS)	Gravimetric At 180	SM 2540 C	NY
Certified	Yes	DW03.07800	Turbidity	Nephelometric	EPA 180.1	NY

Category: DW06 --Metals

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW06.01500	Mercury	Manual Cold Vapor	EPA 245.1	NY

Category: DW07 --Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW07.00950	Aluminum	ICP	EPA 200.7	NY
Certified	Yes	DW07.01000	Barium	ICP	EPA 200.7	NY
Certified	Yes	DW07.01050	Beryllium	ICP	EPA 200.7	NY
Certified	Yes	DW07.01150	Cadmium	ICP	EPA 200.7	NY
Certified	Yes	DW07.01200	Calcium	ICP	EPA 200.7	NY

Annual Certified Parameter List and Current Status

Effective as of 07/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: DW07 --Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW07.01250	Chromium	ICP	EPA 200.7	NY
Certified	Yes	DW07.01350	Copper	ICP	EPA 200.7	NY
Certified	Yes	DW07.01400	Iron	ICP	EPA 200.7	NY
Certified	Yes	DW07.01500	Magnesium	ICP	EPA 200.7	NY
Certified	Yes	DW07.01550	Manganese	ICP	EPA 200.7	NY
Certified	Yes	DW07.01650	Nickel	ICP	EPA 200.7	NY
Certified	Yes	DW07.01700	Potassium	ICP	EPA 200.7	NY
Certified	Yes	DW07.01800	Silver	ICP	EPA 200.7	NY
Certified	Yes	DW07.01850	Sodium	ICP	EPA 200.7	NY
Certified	Yes	DW07.02050	Vanadium	ICP	EPA 200.7	NY
Certified	Yes	DW07.02100	Zinc	ICP	EPA 200.7	NY
Certified	Yes	DW07.02150	Aluminum	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02200	Antimony	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02250	Arsenic	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02300	Barium	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02350	Beryllium	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02400	Cadmium	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02450	Chromium	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02550	Copper	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02600	Lead	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02650	Manganese	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02750	Molybdenum	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02800	Nickel	ICP/MS	EPA 200.8	NY
Dropped	No	DW07.02850	Selenium	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02900	Silver	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.02950	Thallium	ICP/MS	EPA 200.8	NY
Certified	Yes	DW07.03050	Vanadium	ICP/MS	EPA 200.8	NY

New Jersey Department of Environment Protection
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Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: DW07 --Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW07.03100	Zinc	ICP/MS	EPA 200.8	NY
Dropped	No	DW07.03150	Calcium-hardness	Ca as Carbonate, ICP	SM 2340 B	NY

Category: DW09 --Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW09.11400	Dioxane (1,4-)	SPE, GC/MS/SIM	EPA 522	NY
Certified	Yes	DW09.11600	Benzene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.11650	Bromobenzene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.11700	Bromochloromethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.11750	Bromodichloromethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.11800	Bromoform	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.11850	Bromomethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.11950	Butylbenzene (n-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12050	Carbon tetrachloride	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12150	Chlorobenzene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12250	Chloroethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12300	Chloroform	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12350	Chloromethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12400	Chlorotoluene (2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12450	Chlorotoluene (4-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12550	Dibromochloromethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12650	Dibromomethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12750	Dichlorobenzene (1,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12800	Dichlorobenzene (1,3-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12850	Dichlorobenzene (1,4-)	GC/MS, P & T	EPA 524.2	NY

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Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: DW09 --Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW09.12900	Dichlorodifluoromethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.12950	Dichloroethane (1,1-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13000	Dichloroethane (1,2-)	GC/MS, P & T	EPA 524.2	NY
Dropped	No	DW09.13050	Dichloroethene (1,1-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13100	Dichloroethene (cis-1,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13150	Dichloroethene (trans-1,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13200	Dichloropropane (1,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13250	Dichloropropane (1,3-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13300	Dichloropropane (2,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13400	Dichloropropene (1,1-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13450	Dichloropropene (cis-1,3-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13500	Dichloropropene (trans-1,3-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13700	Ethylbenzene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.13800	Hexachlorobutadiene (1,3-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14000	Isopropylbenzene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14050	Isopropyltoluene (4-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14300	Methyl tert-butyl ether	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14350	Methylene chloride (Dichloromethane)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14400	Naphthalene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14700	Propylbenzene (n-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14750	Sec-butylbenzene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14800	Styrene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.14950	Tert-butylbenzene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15000	Tetrachloroethane (1,1,1,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15050	Tetrachloroethane (1,1,2,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15100	Tetrachloroethene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15200	Toluene	GC/MS, P & T	EPA 524.2	NY

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Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: DW09 --Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW09.15250	Trichlorobenzene (1,2,3-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15300	Trichlorobenzene (1,2,4-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15400	Trichloroethane (1,1,1-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15450	Trichloroethane (1,1,2-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15500	Trichloroethene	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.15550	Trichlorofluoromethane	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.16000	Trichloropropane (1,2,3-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.16050	Trimethylbenzene (1,2,4-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.16100	Trimethylbenzene (1,3,5-)	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.16150	Vinyl chloride	GC/MS, P & T	EPA 524.2	NY
Certified	Yes	DW09.16300	Xylenes (total)	GC/MS, P & T	EPA 524.2	NY

Category: NPW03--Inorganic Parameters

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW03.00350	Alkalinity as CaCO3	Electrometric Titration	SM 2320 B-21	NY
Certified	Yes	NPW03.00360	Alkalinity as CaCO3	Titrimetric Indicator	SM 2320 B-21	NY
Applied	No	NPW03.00850	Ammonia	Distillation, Electrode	SM 4500-NH3 B plus D-21	NY
Applied	No	NPW03.00900	Ammonia	Distillation, Electrode	SM 4500-NH3 B plus E-21	NY
Certified	Yes	NPW03.01550	Biochemical oxygen demand	Dissolved Oxygen Depletion - Membrane Electrode	SM 5210 B-16	NY
Certified	Yes	NPW03.02400	Bromide	Ion Chromatography	EPA 300.0	NY
Certified	Yes	NPW03.02900	Carbonaceous BOD (CBOD)	Diss. Oxygen Depl., Nitrif. Inhib. - Membrane Electrode	SM 5210 B-16	NY
Certified	Yes	NPW03.03600	Chemical oxygen demand	Spectrophotometric Manual/Auto	SM 5220 D-11	NY
Certified	Yes	NPW03.04900	Chloride	Ion Chromatography	EPA 300.0	NY
Certified	Yes	NPW03.06000	Color	Colorimetric (Platinum-Cobalt)	SM 2120 B-21	NY
Certified	Yes	NPW03.06400	Cyanide	Distillation, Spectrophotometric (Manual)	SM 4500-CN B plus E-21	NY

Annual Certified Parameter List and Current Status

Effective as of 07/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: NPW03--Inorganic Parameters

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW03.06450	Cyanide	Distillation, Spectrophotometric (Manual)	SM 4500-CN C plus E-21	NY
Certified	Yes	NPW03.08500	Fluoride	Ion Chromatography	EPA 300.0	NY
Certified	Yes	NPW03.10000	Kjeldahl nitrogen - total	Digestion, Distillation, Electrode	SM 4500-N Org B plus NH3 B plus NH3 D-21	NY
Certified	Yes	NPW03.10050	Kjeldahl nitrogen - total	Digestion, Distillation, Electrode	SM 4500-N Org B plus NH3 B plus NH3 E-21	NY
Certified	Yes	NPW03.10100	Kjeldahl nitrogen - total	Digestion, Distillation, Electrode	SM 4500-N Org C plus NH3 B plus NH3 D-21	NY
Certified	Yes	NPW03.10150	Kjeldahl nitrogen - total	Digestion, Distillation, Electrode	SM 4500-N Org C plus NH3 B plus NH3 E-21	NY
Certified	Yes	NPW03.11050	Nitrate	Ion Chromatography	EPA 300.0	NY
Certified	Yes	NPW03.12450	Nitrate - nitrite	Ion Chromatography	EPA 300.0	NY
Certified	Yes	NPW03.13650	Nitrite	Ion Chromatography	EPA 300.0	NY
Dropped	No	NPW03.14250	Oil & grease - hem-SPE	Gravimetric, Hexane Extractable Material-SPE	EPA 1664A	NY
Certified	Yes	NPW03.15350	Orthophosphate	Ascorbic Acid, Manual Single Reagent	SM 4500-P E-21	NY
Certified	Yes	NPW03.15550	Orthophosphate	Ion Chromatography	EPA 300.0	NY
Certified	Yes	NPW03.16600	Phenols	Manual Distillation, Colorimetric 4AAP, Manual	EPA 420.1	NY
Applied	No	NPW03.17150	Phosphorus (total)	Persulfate Digestion + Manual	SM 4500-P B5 plus E-21	NY
Certified	Yes	NPW03.17850	Residue - filterable (TDS)	Gravimetric, 180 Degrees C	SM 2540 C-20	NY
Certified	Yes	NPW03.18000	Residue - nonfilterable (TSS)	Gravimetric, 103-105 Degrees C, Post Washing	SM 2540 D-20	NY
Certified	Yes	NPW03.18100	Residue - settleable	Volumetric (Imhoff Cone) or Gravimetric	SM 2540 F-20	NY
Certified	Yes	NPW03.18150	Residue - total	Gravimetric, 103-105 Degrees C	SM 2540 B-20	NY
Certified	Yes	NPW03.18750	Specific conductance	Wheatstone Bridge	EPA 120.1	NY
Certified	Yes	NPW03.19850	Sulfate	Ion Chromatography	EPA 300.0	NY
Certified	Yes	NPW03.20450	Sulfides	Titrimetric, Iodine	SM 4500-S2 B, C plus F-21	NY
Certified	Yes	NPW03.20750	Surfactants	Colorimetric (Methylene Blue)	SM 5540 C-21	NY
Applied	No	NPW03.21300	Total organic carbon (TOC)	Heated or UV	SM 5310 C-14	NY
Certified	Yes	NPW03.22100	Turbidity	Nephelometric	EPA 180.1	NY

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 07/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: NPW06--Metals - NPW Preparation Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW06.00200	Metals, Total Rec and Dissolved	Acid Digestion/Surface and Groundwater	SW-846 3005A	NY
Certified	Yes	NPW06.00250	Metals, Total	Acid Digestion/Aqueous Samples	SW-846 3010A	NY
Certified	Yes	NPW06.00300	Metals	Microwave Acid Digestion/Aqueous	SW-846 3015A	NY

Category: NPW07--Metals

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Dropped	No	NPW07.03350	Mercury	Manual Cold Vapor	EPA 245.1	NY
Certified	Yes	NPW07.08650	Chromium (VI)	0.45u Filter, Colorimetric DPC	SM 3500-Cr B-20	NY
Certified	Yes	NPW07.11950	Chromium (VI)	Colorimetric	SW-846 7196A	NY
Dropped	No	NPW07.12150	Mercury - liquid waste	AA, Manual Cold Vapor	SW-846 7470A	NY

Category: NPW08--Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW08.04150	Aluminum	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04200	Antimony	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04250	Arsenic	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04300	Barium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04350	Beryllium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04450	Cadmium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04500	Calcium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04550	Chromium	Digestion, ICP	EPA 200.7	NY

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Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: NPW08--Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW08.04600	Cobalt	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04650	Copper	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04700	Iron	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04750	Lead	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04850	Magnesium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.04900	Manganese	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05000	Nickel	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05100	Potassium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05150	Selenium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05250	Silver	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05300	Sodium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05400	Thallium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05550	Vanadium	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05600	Zinc	Digestion, ICP	EPA 200.7	NY
Certified	Yes	NPW08.05650	Aluminum	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.05700	Antimony	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.05750	Arsenic	Digestion, ICP/MS	EPA 200.8	NY
Dropped	No	NPW08.05800	Barium	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.05850	Beryllium	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.05900	Boron	ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.05950	Cadmium	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06050	Chromium	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06100	Cobalt	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06150	Copper	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06250	Iron	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06300	Lead	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06400	Manganese	Digestion, ICP/MS	EPA 200.8	NY

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Category: NPW08--Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW08.06450	Molybdenum	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06500	Nickel	Digestion, ICP/MS	EPA 200.8	NY
Dropped	No	NPW08.06600	Selenium	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06700	Silver	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06850	Thallium	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.06950	Tin	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.07000	Titanium	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.07150	Vanadium	Digestion, ICP/MS	EPA 200.8	NY
Dropped	No	NPW08.07200	Zinc	Digestion, ICP/MS	EPA 200.8	NY
Certified	Yes	NPW08.09800	Hardness - total as CaCO3	Ca + Mg Carbonates, ICP	SM 2340 B-21	NY
Certified	Yes	NPW08.12800	Aluminum	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.12850	Antimony	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.12900	Arsenic	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.12950	Barium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13000	Beryllium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13100	Cadmium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13150	Calcium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13200	Chromium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13250	Cobalt	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13300	Copper	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13350	Iron	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13400	Lead	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13500	Magnesium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13550	Manganese	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13650	Nickel	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13750	Potassium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13800	Selenium	ICP	SW-846 6010D	NY

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Category: NPW08--Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW08.13850	Silver	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.13900	Sodium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.14000	Thallium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.14250	Vanadium	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.14300	Zinc	ICP	SW-846 6010D	NY
Certified	Yes	NPW08.14400	Aluminum	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14450	Antimony	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14500	Arsenic	ICP/MS	SW-846 6020B	NY
Dropped	No	NPW08.14550	Barium	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14600	Beryllium	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14700	Cadmium	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14800	Chromium	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14850	Cobalt	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14900	Copper	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.14950	Iron	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.15000	Lead	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.15100	Manganese	ICP/MS	SW-846 6020B	NY
Dropped	No	NPW08.15150	Molybdenum	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.15200	Nickel	ICP/MS	SW-846 6020B	NY
Dropped	No	NPW08.15300	Selenium	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.15400	Silver	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.15550	Thallium	ICP/MS	SW-846 6020B	NY
Dropped	No	NPW08.15650	Tin	ICP/MS	SW-846 6020B	NY
Dropped	No	NPW08.15700	Titanium	ICP/MS	SW-846 6020B	NY
Certified	Yes	NPW08.15850	Vanadium	ICP/MS	SW-846 6020B	NY
Dropped	No	NPW08.15900	Zinc	ICP/MS	SW-846 6020B	NY

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Category: NPW09--Organics - NPW Preparation Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW09.00500	Semivolatile organics	Separatory Funnel Extraction	SW-846 3510C	NY
Certified	Yes	NPW09.01550	Volatile organics	Purge & Trap Aqueous	SW-846 5030C	NY

Category: NPW10--Organic Parameters - Chromatography

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW10.19150	Aldrin	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.19200	Alpha BHC	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.19300	Beta BHC	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.19650	Chlordane	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20050	DDD (4,4'-)	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20100	DDE (4,4'-)	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20150	DDT (4,4'-)	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20200	Delta BHC	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20350	Dieldrin	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20400	Endosulfan I	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20450	Endosulfan II	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20500	Endosulfan sulfate	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20550	Endrin	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20600	Endrin aldehyde	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20800	Heptachlor	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.20850	Heptachlor epoxide	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.21000	Lindane (gamma BHC)	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.21050	Methoxychlor	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.21800	Toxaphene	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.21900	PCB 1016	Extract/GC (ECD)	EPA 608.3	NY

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Category: NPW10--Organic Parameters - Chromatography

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW10.21950	PCB 1221	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.22000	PCB 1232	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.22050	PCB 1242	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.22100	PCB 1248	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.22150	PCB 1254	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.22200	PCB 1260	Extract/GC (ECD)	EPA 608.3	NY
Certified	Yes	NPW10.31650	Extractable Petroleum Hydrocarbons	Extraction, GC, FID	Other NJDEP EPH 10/08, Rev. 3	NJ
Certified	Yes	NPW10.39250	Dibromo-3-chloropropane (1,2-)	Extract/GC (ECD)	SW-846 8011	NY
Certified	Yes	NPW10.39300	Dibromoethane (1,2-) (EDB)	Extract/GC (ECD)	SW-846 8011	NY
Certified	Yes	NPW10.39350	Trichloropropane (1,2,3-)	Extract/GC (ECD)	SW-846 8011	NY
Certified	Yes	NPW10.39800	Diesel range organic	Extraction, GC, FID	SW-846 8015D	NY
Certified	Yes	NPW10.40200	Gasoline range organic	GC P&T, FID	SW-846 8015D	NY
Certified	Yes	NPW10.44600	Aldrin	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.44650	Alpha BHC	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.44750	Beta BHC	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.44800	Chlordane (alpha) (cis-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.44850	Chlordane (gamma) (trans-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.44900	Chlordane (technical)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45250	DDD (4,4'-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45300	DDE (4,4'-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45350	DDT (4,4'-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45400	Delta BHC	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45450	Dieldrin	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45500	Endosulfan I	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45550	Endosulfan II	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45600	Endosulfan sulfate	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45650	Endrin	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY

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Category: NPW10--Organic Parameters - Chromatography

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW10.45700	Endrin aldehyde	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45750	Endrin ketone	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45850	Heptachlor	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.45900	Heptachlor epoxide	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.46050	Lindane (gamma BHC)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.46100	Methoxychlor	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.46250	Mirex	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.46450	Toxaphene	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	NPW10.47600	PCB 1016	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.47650	PCB 1221	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.47700	PCB 1232	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.47750	PCB 1242	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.47800	PCB 1248	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.47850	PCB 1254	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.47900	PCB 1260	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.47950	PCB 1262	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.48000	PCB 1268	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	NPW10.55350	D (2,4-)	GC, Extraction, ECD, Capillary	SW-846 8151A	NY
Certified	Yes	NPW10.55550	Dicamba	GC, Extraction, ECD, Capillary	SW-846 8151A	NY
Certified	Yes	NPW10.56050	T (2,4,5-)	GC, Extraction, ECD, Capillary	SW-846 8151A	NY
Certified	Yes	NPW10.56100	TP (2,4,5-) (Silvex)	GC, Extraction, ECD, Capillary	SW-846 8151A	NY

Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Applied	No	NPW11.38500	Acrolein	GC/MS, P & T, Capillary Column	EPA 624.1	NY

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Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Applied	No	NPW11.38550	Acrylonitrile	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.38750	Benzene	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.38900	Bromodichloromethane	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39000	Bromoform	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39050	Bromomethane	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39500	Carbon tetrachloride	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39550	Chlorobenzene	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39600	Chloroethane	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39650	Chloroethyl vinyl ether (2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39700	Chloroform	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.39750	Chloromethane	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40100	Dibromochloromethane	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40350	Dichlorobenzene (1,2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40400	Dichlorobenzene (1,3-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40450	Dichlorobenzene (1,4-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40500	Dichlorodifluoromethane	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40550	Dichloroethane (1,1-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40600	Dichloroethane (1,2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40650	Dichloroethene (1,1-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40700	Dichloroethene (cis-1,2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40750	Dichloroethene (trans-1,2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.40800	Dichloropropane (1,2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.41000	Dichloropropene (cis-1,3-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.41050	Dichloropropene (trans-1,3-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.41450	Ethylbenzene	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.42550	Methylene chloride (Dichloromethane)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.43000	Styrene	GC/MS, P & T, Capillary Column	EPA 624.1	NY

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Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.43300	Tetrachloroethane (1,1,2,2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.43350	Tetrachloroethene	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.43450	Toluene	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.43650	Trichloroethane (1,1,1-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.43700	Trichloroethane (1,1,2-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.43750	Trichloroethene	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.43800	Trichlorofluoromethane	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.44100	Vinyl chloride	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.44150	Xylene (m- + p-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.44250	Xylene (o-)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.44350	Xylenes (total)	GC/MS, P & T, Capillary Column	EPA 624.1	NY
Certified	Yes	NPW11.44400	Acenaphthene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.44450	Acenaphthylene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.44650	Alpha - terpineol	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.44800	Aniline	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.44850	Anthracene	Extract, GC/MS	EPA 625.1	NY
Applied	No	NPW11.45200	Benzidine	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45250	Benzo(a)anthracene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45300	Benzo(a)pyrene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45350	Benzo(b)fluoranthene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45400	Benzo(ghi)perylene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45500	Benzo(k)fluoranthene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45700	Bis (2-chloroethoxy) methane	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45750	Bis (2-chloroethyl) ether	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45800	Bis(2-chloroisopropyl)ether|2,2'-oxybis(1-chloropropane)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.45850	Bis (2-ethylhexyl) phthalate	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.46000	Bromophenyl-phenyl ether (4-)	Extract, GC/MS	EPA 625.1	NY

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Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.46050	Butylbenzylphthalate	Extract, GC/MS	EPA 625.1	NY
Applied	No	NPW11.46250	Carbazole	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.46550	Chloronaphthalene (2-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.46650	Chlorophenol (2-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.46700	Chlorophenyl-phenyl ether (4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.46900	Chrysene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.47500	Dibenzo(a,h)anthracene	Extract, GC/MS	EPA 625.1	NY
Applied	No	NPW11.47750	Dichlorobenzidine (3,3'-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.47800	Dichlorophenol (2,4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.47950	Diethyl phthalate	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48100	Dimethyl phthalate	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48250	Dimethylphenol (2,4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48300	Di-n-butyl phthalate	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48400	Dinitrophenol (2,4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48450	Dinitrophenol (2-methyl-4,6-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48500	Dinitrotoluene (2,4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48550	Dinitrotoluene (2,6-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.48600	Di-n-octyl phthalate	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.49250	Fluoranthene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.49300	Fluorene	Extract, GC/MS	EPA 625.1	NY
Dropped	No	NPW11.49350	Hexachlorobenzene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.49400	Hexachlorobutadiene (1,3-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.49450	Hexachlorocyclopentadiene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.49500	Hexachloroethane	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.49700	Indeno(1,2,3-cd)pyrene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.49800	Isophorone	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.50350	Methyl phenol (4-chloro-3-)	Extract, GC/MS	EPA 625.1	NY

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Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.50550	Methylphenol (2-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.50650	Methylphenol (4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.50950	Naphthalene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.51300	Nitrobenzene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.51350	Nitrophenol (2-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.51400	Nitrophenol (4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.51500	N-Nitrosodimethylamine	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.51550	N-Nitroso-di-n-propylamine	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.51600	N-Nitrosodiphenylamine / Diphenylamine	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.52550	Pentachlorophenol	Extract, GC/MS	EPA 625.1	NY
Dropped	No	NPW11.52700	Phenanthrene	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.52750	Phenol	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.53400	Pyrene	Extract, GC/MS	EPA 625.1	NY
Applied	No	NPW11.53450	Pyridine	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.55400	Trichlorobenzene (1,2,4-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.55500	Trichlorophenol (2,4,5-)	Extract, GC/MS	EPA 625.1	NY
Certified	Yes	NPW11.55550	Trichlorophenol (2,4,6-)	Extract, GC/MS	EPA 625.1	NY
Dropped	No	NPW11.68750	Acetone	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.68850	Acrolein	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.68900	Acrylonitrile	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69050	Amyl alcohol (t-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69100	Benzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.69200	Bromobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69250	Bromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69300	Bromodichloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69400	Bromoform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69450	Bromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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Certified	Yes	NPW11.69650	Butanone (2-) (Methyl ethyl ketone)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.69850	Butylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.69900	Carbon disulfide	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69950	Carbon tetrachloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70000	Chlorobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70050	Chloroethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70100	Chloroethyl vinyl ether (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70150	Chloroform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70200	Chloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.70250	Chlorotoluene (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.70300	Chlorotoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70400	Cyclohexane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70500	Dibromo-3-chloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70550	Dibromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70600	Dibromoethane (1,2-) (EDB)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70650	Dibromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70750	Dichloro-2-butene (trans-1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70800	Dichlorobenzene (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70850	Dichlorobenzene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70900	Dichlorobenzene (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70950	Dichlorodifluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71000	Dichloroethane (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71050	Dichloroethane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71100	Dichloroethene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71150	Dichloroethene (cis-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71200	Dichloroethene (trans-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71250	Dichloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.71300	Dichloropropane (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71350	Dichloropropane (2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71400	Dichloropropene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71450	Dichloropropene (cis-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71500	Dichloropropene (trans-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71600	Diisopropyl Ether (DIPE)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71650	Dioxane (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71700	Ethanol	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71900	Ethylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71950	Ethyl-tert-butyl Ether (ETBE)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.72050	Hexachlorobutadiene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72200	Hexanone (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.72400	Isopropylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.72450	Isopropyltoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72550	Methyl acetate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72700	Methyl methacrylate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Dropped	No	NPW11.72750	Methyl tert-butyl ether	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72800	Methylcyclohexane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72850	Methylene chloride (Dichloromethane)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Dropped	No	NPW11.73000	Naphthalene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73350	Pentanone (4-methyl-2-) (MIBK)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73450	Propylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73500	Sec-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73550	Styrene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.73600	tert-Amylmethyl ether (TAME)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73700	Tert-butyl alcohol	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	NPW11.73750	Tert-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.73800	Tetrachloroethane (1,1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73850	Tetrachloroethane (1,1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Dropped	No	NPW11.73900	Tetrachloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74000	Toluene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74100	Trichloro (1,1,2-) trifluoroethane (1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74150	Trichlorobenzene (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74200	Trichlorobenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74250	Trichloroethane (1,1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74300	Trichloroethane (1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74350	Trichloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74400	Trichlorofluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74450	Trichloropropane (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74550	Trimethylbenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74600	Trimethylbenzene (1,3,5-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74700	Vinyl acetate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74750	Vinyl chloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74800	Xylene (m-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74850	Xylene (o-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74900	Xylene (p-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74950	Xylenes (total)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.75150	Acenaphthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.75200	Acenaphthylene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.75250	Acetophenone	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.75600	Aniline	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.75650	Anthracene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.75750	Atrazine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.75850	Benzaldehyde	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY

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Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Applied	No	NPW11.75950	Benzidine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76000	Benzo(a)anthracene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76050	Benzo(a)pyrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76100	Benzo(b)fluoranthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76150	Benzo(ghi)perylene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76250	Benzo(k)fluoranthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76300	Benzoic acid	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76400	Benzyl alcohol	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76550	Biphenyl (1,1'-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76600	Bis (2-chloroethoxy) methane	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76650	Bis (2-chloroethyl) ether	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76700	Bis(2-chloroisopropyl)ether|2,2'-oxybis(1-chloropropane)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76750	Bis (2-ethylhexyl) phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76800	Bromophenyl-phenyl ether (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76850	Butylbenzylphthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.76900	Caprolactam	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	NPW11.76950	Carbazole	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	NPW11.77150	Chloroaniline (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.77300	Chloronaphthalene (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.77350	Chlorophenol (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.77400	Chlorophenyl-phenyl ether (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.77450	Chrysene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78000	Dibenzo(a,h)anthracene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78200	Dibenzofuran	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78250	Dichlorobenzene (1,2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78300	Dichlorobenzene (1,3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78350	Dichlorobenzene (1,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY

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Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Applied	No	NPW11.78400	Dichlorobenzidine (3,3'-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78450	Dichlorophenol (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78600	Diethyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.78750	Dimethyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79100	Dimethylphenol (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79150	Di-n-butyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79300	Dinitrophenol (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79350	Dinitrophenol (2-methyl-4,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79400	Dinitrotoluene (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79450	Dinitrotoluene (2,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79500	Di-n-octyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.79650	Diphenylhydrazine / Azobenzene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80150	Fluoranthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80200	Fluorene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80350	Hexachlorobenzene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80400	Hexachlorobutadiene (1,3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80450	Hexachlorocyclopentadiene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80500	Hexachloroethane	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80750	Indeno(1,2,3-cd)pyrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.80850	Isophorone	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.81300	Methyl phenol (4-chloro-3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.81450	Methylnaphthalene (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.81500	Methylphenol (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.81600	Methylphenol (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.81650	Naphthalene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	NPW11.81850	Nitroaniline (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	NPW11.81900	Nitroaniline (3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY

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Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Applied	No	NPW11.81950	Nitroaniline (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.82000	Nitrobenzene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.82100	Nitrophenol (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.82150	Nitrophenol (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.82250	N-Nitrosodimethylamine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.82350	N-Nitroso-di-n-propylamine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.82400	N-Nitrosodiphenylamine / Diphenylamine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.82700	Parathion	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.83150	Pentachlorobenzene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.83300	Pentachlorophenol	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.83400	Phenanthrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.83450	Phenol	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.83850	Pyrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	NPW11.83900	Pyridine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	NPW11.84350	Tetrachlorobenzene (1,2,4,5-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	NPW11.84400	Tetrachlorophenol (2,3,4,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.84650	Trichlorobenzene (1,2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.84700	Trichlorophenol (2,4,5-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.84750	Trichlorophenol (2,4,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.84900	Acenaphthene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.84950	Acenaphthylene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85000	Anthracene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85050	Benzo(a)anthracene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85100	Benzo(a)pyrene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85150	Benzo(b)fluoranthene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85200	Benzo(ghi)perylene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85250	Benzo(k)fluoranthene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY

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Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.85300	Chrysene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85350	Dibenzo(a,h)anthracene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85550	Dioxane (1,4-)	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85600	Fluoranthene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85650	Fluorene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.85850	Indeno(1,2,3-cd)pyrene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.86050	Naphthalene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.86200	Phenanthrene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	NPW11.86250	Pyrene	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY

Category: SCM02--Characteristics of Hazardous Waste

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM02.00450	Free liquid	Flow-Through Paint Filter, Observation	SW-846 9095B	NY
Dropped	No	SCM02.00560	Flash Point	Pensky-Martens	SW-846 1010B	NY
Certified	Yes	SCM02.00800	pH - soil and waste	Mix with Water or Calcium Chlorides	SW-846 9045D	NY

Category: SCM03--Inorganic Parameters and Preparation

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM03.01150	Cyanide	Distillation	SW-846 9010C	NY
Certified	Yes	SCM03.01500	Cyanide	Titrimetric/Manual Spectrophotometric	SW-846 9014	NY
Certified	Yes	SCM03.01750	Extractable organic halides (EOX)	Extraction	SW-846 9023	NY

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Category: SCM05--Metals - SCM Preparation Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM05.00050	Metals	Acid Digestion, Soil Sediment & Sludge	SW-846 3050B	NY
Applied	No	SCM05.00100	Metals	Chromium VI Digestion	SW-846 3060A	NY
Certified	Yes	SCM05.00550	Metals	Synthetic PPT Leachate Procedure	SW-846 1312	NY
Certified	Yes	SCM05.00600	Metals	TCLP, Toxicity Procedure, Shaker	SW-846 1311	NY

Category: SCM06--Metals

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM06.02600	Chromium (VI)	Colorimetric	SW-846 7196A	NY
Certified	Yes	SCM06.02800	Mercury - solid waste	AA, Manual Cold Vapor	SW-846 7471B	NY
Certified	Yes	SCM06.02850	Mercury - solid waste	AA, Thermal Decomposition, Amalgamation	SW-846 7473	NY

Category: SCM07--Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM07.00001	Aluminum	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00050	Antimony	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00100	Arsenic	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00150	Barium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00200	Beryllium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00300	Cadmium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00350	Calcium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00400	Chromium	ICP	SW-846 6010D	NY

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Category: SCM07--Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM07.00450	Cobalt	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00500	Copper	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00550	Iron	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00600	Lead	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00700	Magnesium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00750	Manganese	ICP	SW-846 6010D	NY
Dropped	No	SCM07.00800	Molybdenum	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00850	Nickel	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.00950	Potassium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.01000	Selenium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.01050	Silver	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.01100	Sodium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.01200	Thallium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.01450	Vanadium	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.01500	Zinc	ICP	SW-846 6010D	NY
Certified	Yes	SCM07.01600	Aluminum	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.01650	Antimony	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.01700	Arsenic	ICP/MS	SW-846 6020B	NY
Dropped	No	SCM07.01750	Barium	ICP/MS	SW-846 6020B	NY
Dropped	No	SCM07.01800	Beryllium	ICP/MS	SW-846 6020B	NY
Dropped	No	SCM07.01850	Boron	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.01900	Cadmium	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02000	Chromium	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02050	Cobalt	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02100	Copper	ICP/MS	SW-846 6020B	NY
Dropped	No	SCM07.02200	Lead	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02300	Manganese	ICP/MS	SW-846 6020B	NY

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Category: SCM07--Metals - ICP, ICP/MS and DCP

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Dropped	No	SCM07.02350	Molybdenum	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02400	Nickel	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02500	Selenium	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02600	Silver	ICP/MS	SW-846 6020B	NY
Dropped	No	SCM07.02750	Thallium	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.02850	Tin	ICP/MS	SW-846 6020B	NY
Dropped	No	SCM07.02900	Titanium	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.03050	Vanadium	ICP/MS	SW-846 6020B	NY
Certified	Yes	SCM07.03100	Zinc	ICP/MS	SW-846 6020B	NY

Category: SCM08--Organics - SCM Prep. / Screening Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM08.00400	Organics	Synthetic PPT Leachate Procedure	SW-846 1312	NY
Certified	Yes	SCM08.00500	Organics	Waste Dilution	SW-846 3580A	NY
Certified	Yes	SCM08.00700	Semivolatile organics	TCLP, Toxicity Procedure, Shaker	SW-846 1311	NY
Certified	Yes	SCM08.00850	Semivolatile organics	Pressurized Fluid Extraction	SW-846 3545A	NY
Certified	Yes	SCM08.00900	Semivolatile organics	Microwave Extraction	SW-846 3546	NY
Certified	Yes	SCM08.00950	Semivolatile organics	Ultrasonic Extraction	SW-846 3550C	NY
Certified	Yes	SCM08.01850	Volatile organics	TCLP, Toxicity Procedure, ZHE	SW-846 1311	NY
Certified	Yes	SCM08.02050	Volatile organics - high conc.	Methanol Extract, Closed System P & T	SW-846 5035A	NY
Certified	Yes	SCM08.02100	Volatile organics - low conc.	Closed System Purge & Trap	SW-846 5035A	NY

Category: SCM09--Organic Parameters - Chromatography

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Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Applied	No	SCM09.00150	Extractable Petroleum Hydrocarbons	Extraction, GC, FID	Other NJDEP EPH 10/08, Rev. 3	NJ
Certified	Yes	SCM09.00450	Diesel range organic	Extraction, GC, FID	SW-846 8015D	NY
Certified	Yes	SCM09.00500	Gasoline range organic	GC P&T, FID	SW-846 8015D	NY
Certified	Yes	SCM09.05650	Aldrin	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.05700	Alpha BHC	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.05800	Beta BHC	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.05850	Chlordane (alpha) (cis-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.05900	Chlordane (gamma) (trans-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.05950	Chlordane (technical)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06300	DDD (4,4'-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06350	DDE (4,4'-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06400	DDT (4,4'-)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06450	Delta BHC	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06500	Dieldrin	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06550	Endosulfan I	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06600	Endosulfan II	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06650	Endosulfan sulfate	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06700	Endrin	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06750	Endrin aldehyde	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06800	Endrin ketone	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06900	Heptachlor	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.06950	Heptachlor epoxide	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.07100	Lindane (gamma BHC)	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.07150	Methoxychlor	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.07300	Mirex	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.07500	Toxaphene	GC, Extraction, ECD or HECD, Capillary	SW-846 8081B	NY
Certified	Yes	SCM09.08700	PCB 1016	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.08750	PCB 1221	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.08800	PCB 1232	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY

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Category: SCM09--Organic Parameters - Chromatography

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM09.08850	PCB 1242	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.08900	PCB 1248	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.08950	PCB 1254	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.09000	PCB 1260	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.09050	PCB 1262	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.09100	PCB 1268	GC, Extraction, ECD or HECD, Capillary	SW-846 8082A	NY
Certified	Yes	SCM09.15400	D (2,4-)	GC, Extraction, ECD, Capillary	SW-846 8151A	NY
Certified	Yes	SCM09.16000	Dicamba	GC, Extraction, ECD, Capillary	SW-846 8151A	NY
Certified	Yes	SCM09.16500	T (2,4,5-)	GC, Extraction, ECD, Capillary	SW-846 8151A	NY
Certified	Yes	SCM09.16550	TP (2,4,5-) (Silvex)	GC, Extraction, ECD, Capillary	SW-846 8151A	NY

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.22900	Acetone	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.23000	Acrolein	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23050	Acrylonitrile	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23200	Benzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.23300	Bromobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.23350	Bromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23400	Bromodichloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23500	Bromoform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.23550	Bromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23650	Butanone (2-) (Methyl ethyl ketone)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.23800	Butylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.23850	Carbon disulfide	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.23900	Carbon tetrachloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23950	Chlorobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.24000	Chloroethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.24050	Chloroethyl vinyl ether (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24100	Chloroform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.24150	Chloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.24200	Chlorotoluene (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.24250	Chlorotoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24330	Cyclohexane	GC/MS, P & T, or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24400	Dibromo-3-chloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24450	Dibromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24500	Dibromoethane (1,2-) (EDB)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.24550	Dibromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24700	Dichlorobenzene (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24750	Dichlorobenzene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24800	Dichlorobenzene (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.24850	Dichlorodifluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24900	Dichloroethane (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24950	Dichloroethane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25000	Dichloroethene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25050	Dichloroethene (cis-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25100	Dichloroethene (trans-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25150	Dichloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25200	Dichloropropane (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25250	Dichloropropane (2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25300	Dichloropropene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25350	Dichloropropene (cis-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 07/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.25400	Dichloropropene (trans-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25550	Dioxane (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25750	Ethylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.25850	Hexachlorobutadiene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25950	Hexanone (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.26150	Isopropylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26200	Isopropyltoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26280	Methyl acetate	GC/MS, P & T, or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26330	Methylcyclohexane	GC/MS, P & T, or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26400	Methyl methacrylate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26450	Methyl tert-butyl ether	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26500	Methylene chloride (Dichloromethane)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26650	Naphthalene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26850	Pentanone (4-methyl-2-) (MIBK)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.26950	Propylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.27000	Sec-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27050	Styrene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27200	Tert-butyl alcohol	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.27250	Tert-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27300	Tetrachloroethane (1,1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.27350	Tetrachloroethane (1,1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27400	Tetrachloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27500	Toluene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27600	Trichloro (1,1,2-) trifluoroethane (1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27650	Trichlorobenzene (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27700	Trichlorobenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27750	Trichloroethane (1,1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.27800	Trichloroethane (1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27850	Trichloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.27900	Trichlorofluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.27950	Trichloropropane (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.28000	Trimethylbenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.28050	Trimethylbenzene (1,3,5-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.28150	Vinyl acetate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Applied	No	SCM10.28200	Vinyl chloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28250	Xylene (m-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28300	Xylene (o-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28350	Xylene (p-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28400	Xylenes (total)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28900	Acenaphthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.28950	Acenaphthylene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.29000	Acetophenone	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.29350	Aniline	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.29450	Anthracene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.29550	Atrazine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.29650	Benzaldehyde	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.29750	Benzidine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.29800	Benzo(a)anthracene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.29850	Benzo(a)pyrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.29900	Benzo(b)fluoranthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.29950	Benzo(ghi)perylene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30050	Benzo(k)fluoranthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.30100	Benzoic acid	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30200	Benzyl alcohol	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY

New Jersey Department of Environment Protection
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120 RESEARCH DR
STRATFORD CT 06615

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.30350	Biphenyl (1,1'-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30400	Bis (2-chloroethoxy) methane	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30450	Bis (2-chloroethyl) ether	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30500	Bis(2-chloroisopropyl)ether|2,2'-oxybis(1-chloropropane)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30550	Bis (2-ethylhexyl) phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30600	Bromophenyl-phenyl ether (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30650	Butylbenzylphthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.30700	Caprolactam	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.30750	Carbazole	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.30950	Chloroaniline (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.31100	Chloronaphthalene (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.31150	Chlorophenol (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.31200	Chlorophenyl-phenyl ether (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.31250	Chrysene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.31800	Dibenzo(a,h)anthracene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32000	Dibenzofuran	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32050	Dichlorobenzene (1,2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32100	Dichlorobenzene (1,3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32150	Dichlorobenzene (1,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.32200	Dichlorobenzidine (3,3'-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32250	Dichlorophenol (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32400	Diethyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32550	Dimethyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.32900	Dimethylphenol (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.32950	Di-n-butyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.33100	Dinitrophenol (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.33150	Dinitrophenol (2-methyl-4,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY

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Laboratory Name: YORK ANALYTICAL LABORATORIES INC Laboratory Number: CT005 Activity ID: NLC 250001
120 RESEARCH DR
STRATFORD CT 06615

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.33200	Dinitrotoluene (2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.33250	Dinitrotoluene (2,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.33300	Di-n-octyl phthalate	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.33450	Diphenylhydrazine / Azobenzene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.33950	Fluoranthene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.34000	Fluorene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.34150	Hexachlorobenzene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.34200	Hexachlorobutadiene (1,3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.34250	Hexachlorocyclopentadiene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.34300	Hexachloroethane	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.34550	Indeno(1,2,3-cd)pyrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.34650	Isophorone	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35100	Methyl phenol (4-chloro-3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35250	Methylnaphthalene (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35300	Methylphenol (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35400	Methylphenol (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35450	Naphthalene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.35650	Nitroaniline (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.35700	Nitroaniline (3-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.35750	Nitroaniline (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35800	Nitrobenzene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35900	Nitrophenol (2-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.35950	Nitrophenol (4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.36050	N-Nitrosodimethylamine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.36150	N-Nitroso-di-n-propylamine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.36200	N-Nitrosodiphenylamine / Diphenylamine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.36500	Parathion	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY

New Jersey Department of Environment Protection
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120 RESEARCH DR
STRATFORD CT 06615

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.37100	Pentachlorophenol	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.37200	Phenanthrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.37250	Phenol	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.37650	Pyrene	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.37700	Pyridine	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.38150	Tetrachlorobenzene (1,2,4,5-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Applied	No	SCM10.38200	Tetrachlorophenol (2,3,4,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.38450	Trichlorobenzene (1,2,4-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.38500	Trichlorophenol (2,4,5-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.38550	Trichlorophenol (2,4,6-)	GC/MS, Extract or Dir Inj, Capillary	SW-846 8270E	NY
Certified	Yes	SCM10.39250	Dioxane (1,4-)	GC/MS/SIM, Extract or Dir Inj, Capillary	SW-846 8270E	NY

Michele M. Potter, Manager

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised July 09, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrylates

Acrolein (Propenal)	EPA 8260D
	EPA 8260C
	EPA 624.1
Acrylonitrile	EPA 8260D
	EPA 8260C
	EPA 624.1
Methyl methacrylate	EPA 8260D
	EPA 8260C

Amines

1,2-Diphenylhydrazine	EPA 8270D
	EPA 8270E
2-Nitroaniline	EPA 8270D
	EPA 8270E
3-Nitroaniline	EPA 8270D
	EPA 8270E
4-Chloroaniline	EPA 8270D
	EPA 8270E
4-Nitroaniline	EPA 8270D
	EPA 8270E
Aniline	EPA 625.1
	EPA 8270D
	EPA 8270E
Carbazole	EPA 625.1
	EPA 8270D
	EPA 8270E
Diphenylamine	EPA 8270D
	EPA 8270E

Serial No.: 71155

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

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All approved analytes are listed below:

Amines

Pyridine	EPA 625.1
	EPA 8270D
	EPA 8270E

Benzidines

3,3'-Dichlorobenzidine	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzidine	EPA 625.1
	EPA 8270D
	EPA 8270E

Chlorinated Hydrocarbon Pesticides

4,4'-DDD	EPA 8081B
	EPA 608.3
4,4'-DDE	EPA 8081B
	EPA 608.3
4,4'-DDT	EPA 8081B
	EPA 608.3
Aldrin	EPA 8081B
	EPA 608.3
alpha-BHC	EPA 8081B
	EPA 608.3
alpha-Chlordane	EPA 8081B
beta-BHC	EPA 8081B
	EPA 608.3
Chlordane Total	EPA 8081B
	EPA 608.3

Serial No.: 71155

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Chlorinated Hydrocarbon Pesticides

delta-BHC	EPA 8081B
	EPA 608.3
Dieldrin	EPA 8081B
	EPA 608.3
Endosulfan I	EPA 8081B
	EPA 608.3
Endosulfan II	EPA 8081B
	EPA 608.3
Endosulfan sulfate	EPA 8081B
	EPA 608.3
Endrin	EPA 8081B
	EPA 608.3
Endrin aldehyde	EPA 8081B
	EPA 608.3
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
	EPA 608.3
Heptachlor epoxide	EPA 8081B
	EPA 608.3
Lindane	EPA 8081B
	EPA 608.3
Methoxychlor	EPA 8081B
	EPA 608.3
Mirex	EPA 8081B
Toxaphene	EPA 8081B
	EPA 608.3

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WADSWORTH CENTER

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Revised July 09, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
	EPA 8270E
1,2,4-Trichlorobenzene	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Chloronaphthalene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachlorobenzene	EPA 8270D
	EPA 8270E
Hexachlorobutadiene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachlorocyclopentadiene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachloroethane	EPA 625.1
	EPA 8270D
	EPA 8270E
Pentachlorobenzene	EPA 8270D
	EPA 8270E

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
	SM 6640B-2006

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Chlorophenoxy Acid Pesticides

2,4-D	EPA 8151A
Dicamba	EPA 8151A

Demand

Biochemical Oxygen Demand	SM 5210B-2016
Carbonaceous BOD	SM 5210B-2016
Chemical Oxygen Demand	SM 5220D-2011

Fuel Oxygenates

Di-isopropyl ether	EPA 8260D
	EPA 8260C
Ethanol	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-amyl alcohol	EPA 8260D
	EPA 8260C
tert-amyl methyl ether (TAME)	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
tert-butyl ethyl ether (ETBE)	EPA 8260D
	EPA 8260C

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Bromophenylphenyl ether	EPA 625.1

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Haloethers

4-Bromophenylphenyl ether	EPA 8270D
	EPA 8270E
4-Chlorophenylphenyl ether	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-chloroethyl)ether	EPA 625.1
	EPA 8270D
	EPA 8270E

Low Level Halocarbons

1,2,3-Trichloropropane, Low Level	EPA 8011
1,2-Dibromo-3-chloropropane, Low Le	EPA 8011
1,2-Dibromoethane, Low Level	EPA 8011

Low Level Polynuclear Aromatics

Acenaphthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Acenaphthylene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Anthracene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(a)anthracene Low Level	EPA 8270D

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Low Level Polynuclear Aromatics

Benzo(a)anthracene Low Level	EPA 8270E
	EPA 8270E SIM
Benzo(a)pyrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(b)fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(g,h,i)perylene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(k)fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Chrysene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Fluorene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270D

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Low Level Polynuclear Aromatics

Indeno(1,2,3-cd)pyrene Low Level	EPA 8270E
	EPA 8270E SIM
Naphthalene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Phenanthrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Pyrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM

Metals I

Barium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Cadmium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Calcium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Chromium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

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Metals I

Chromium, Total	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Copper, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Iron, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Lead, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Magnesium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Manganese, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

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Metals I

Manganese, Total	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Nickel, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Potassium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Silver, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Sodium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

Metals II

Aluminum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B

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Metals II

Aluminum, Total	EPA 200.8, Rev. 5.4 (1994)
Antimony, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Arsenic, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Beryllium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Chromium VI	EPA 7196A
	SM 3500-Cr B-2011
Mercury, Total	EPA 245.1, Rev. 3.0 (1994)
	EPA 245.2 (Issued 1974, Rev. 1983)
	EPA 7470A
	EPA 7473
Selenium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C

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Metals II

Selenium, Total	EPA 6010D
Vanadium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Zinc, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D

Metals III

Cobalt, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Molybdenum, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Thallium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Tin, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)

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Metals III

Titanium, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)

Mineral

Alkalinity	SM 2320B-2011
Calcium Hardness	EPA 200.7, Rev. 4.4 (1994)
Chloride	EPA 300.0, Rev. 2.1 (1993)
Fluoride, Total	EPA 300.0, Rev. 2.1 (1993)
Hardness, Total	SM 2340B-2011
Sulfate (as SO4)	EPA 300.0, Rev. 2.1 (1993)

Miscellaneous

Boron, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Bromide	EPA 300.0, Rev. 2.1 (1993)
Color	SM 2120B-2011
Cyanide, Total	SM 4500-CN E-2016
non-Polar Extractable Material (TPH)	EPA 1664A
Phenols	EPA 420.1 (Rev. 1978)
Specific Conductance	EPA 120.1 (Rev. 1982)
Sulfide (as S)	SM 4500-S2- F-2011
Surfactant (MBAS)	SM 5540C-2011
Turbidity	EPA 180.1, Rev. 2.0 (1993)

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	EPA 625.1
	EPA 8270D
	EPA 8270E
2,6-Dinitrotoluene	EPA 625.1

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Nitroaromatics and Isophorone

2,6-Dinitrotoluene	EPA 8270D
	EPA 8270E
Isophorone	EPA 625.1
	EPA 8270D
	EPA 8270E
Nitrobenzene	EPA 625.1
	EPA 8270D
	EPA 8270E

Nitrosoamines

N-Nitrosodimethylamine	EPA 625.1
	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 625.1
	EPA 8270D
	EPA 8270E
N-Nitrosodiphenylamine	EPA 625.1
	EPA 8270D
	EPA 8270E

Nutrient

Ammonia (as N)	SM 4500-NH3 D-2011 or E-2011
Kjeldahl Nitrogen, Total	SM 4500-N Org D-2011
	SM 4500-NH3 D-2011 or E-2011
Nitrate (as N)	EPA 300.0, Rev. 2.1 (1993)
Nitrate-Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
Orthophosphate (as P)	EPA 300.0, Rev. 2.1 (1993)

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Nutrient	
Orthophosphate (as P)	SM 4500-P E-2011
Organophosphate Pesticides	
Atrazine	EPA 8270D
	EPA 8270E
Parathion ethyl	EPA 8270D
	EPA 8270E
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Diethyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Dimethyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Di-n-butyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Di-n-octyl phthalate	EPA 625.1

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120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Phthalate Esters	
Di-n-octyl phthalate	EPA 8270D
	EPA 8270E
Polychlorinated Biphenyls	
Aroclor 1016 (PCB-1016)	EPA 8082A
	EPA 608.3
Aroclor 1221 (PCB-1221)	EPA 8082A
	EPA 608.3
Aroclor 1232 (PCB-1232)	EPA 8082A
	EPA 608.3
Aroclor 1242 (PCB-1242)	EPA 8082A
	EPA 608.3
Aroclor 1248 (PCB-1248)	EPA 8082A
	EPA 608.3
Aroclor 1254 (PCB-1254)	EPA 8082A
	EPA 608.3
Aroclor 1260 (PCB-1260)	EPA 8082A
	EPA 608.3
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
Polynuclear Aromatics	
Acenaphthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Acenaphthylene	EPA 625.1
	EPA 8270D
	EPA 8270E

Serial No.: 71155

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised July 09, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

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Polynuclear Aromatics

Anthracene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(a)anthracene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(a)pyrene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(b)fluoranthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(g,h,i)perylene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(k)fluoranthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Chrysene	EPA 625.1
	EPA 8270D
	EPA 8270E
Dibenzo(a,h)anthracene	EPA 625.1
	EPA 8270D
	EPA 8270E
Fluoranthene	EPA 625.1
	EPA 8270D
	EPA 8270E

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Polynuclear Aromatics

Fluorene	EPA 625.1
	EPA 8270D
	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 625.1
	EPA 8270D
	EPA 8270E
Naphthalene	EPA 625.1
	EPA 8270D
	EPA 8270E
Phenanthrene	EPA 8270E
Pyrene	EPA 625.1
	EPA 8270D
	EPA 8270E

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270D
	EPA 8270E
2,4,5-Trichlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2,4,6-Trichlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2,4-Dichlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2,4-Dimethylphenol	EPA 625.1
	EPA 8270D

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Priority Pollutant Phenols

2,4-Dimethylphenol	EPA 8270E
2,4-Dinitrophenol	EPA 8270E
2-Chlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Nitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Chloro-3-methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Nitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
Cresols, Total	EPA 8270D
	EPA 8270E
Pentachlorophenol	EPA 625.1
	EPA 8270D

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Priority Pollutant Phenols	
Pentachlorophenol	EPA 8270E
Phenol	EPA 625.1
	EPA 8270D
	EPA 8270E
Residue	
Settleable Solids	SM 2540 F-2015
Solids, Total	SM 2540 B-2015
Solids, Total Dissolved	SM 2540 C-2015
Solids, Total Suspended	SM 2540 D-2015
Semi-Volatile Organics	
1,1'-Biphenyl	EPA 8270D
	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
2-Methylnaphthalene	EPA 8270D
	EPA 8270E
Acetophenone	EPA 8270D
	EPA 8270E
alpha-Terpineol	EPA 625.1
	EPA 8270E
Benzaldehyde	EPA 8270D
	EPA 8270E

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Semi-Volatile Organics

Benzoic Acid	EPA 8270D
	EPA 8270E
Benzyl alcohol	EPA 8270D
	EPA 8270E
Caprolactam	EPA 8270D
	EPA 8270E
Dibenzofuran	EPA 8270D
	EPA 8270E

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D

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Volatile Aromatics

4-Chlorotoluene	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
Ethyl benzene	EPA 8260D
	EPA 8260C
	EPA 624.1
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C
	EPA 624.1
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
	EPA 624.1
p-Isopropyltoluene (P-Cymene)	EPA 8260D

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Volatile Aromatics

p-Isopropyltoluene (P-Cymene)	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
	EPA 624.1
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
	EPA 624.1
Total Xylenes	EPA 8260D
	EPA 8260C
	EPA 624.1

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C

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Volatile Halocarbons

1,1,2-Trichloroethane	EPA 624.1
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C

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Volatile Halocarbons

2-Chloroethylvinyl ether	EPA 624.1
Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromoform	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromomethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Carbon tetrachloride	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloroform	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1

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Volatile Halocarbons

cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
	EPA 624.1
Dibromochloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
	EPA 624.1
Tetrachloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,4-Dichloro-2-butene	EPA 8260D
	EPA 8260C

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Volatile Halocarbons

Trichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Vinyl chloride	EPA 8260D
	EPA 8260C
	EPA 624.1

Volatiles Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
	EPA 8270D SIM
	EPA 8270E
	EPA 8270E SIM
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C

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Volatiles Organics

Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

SM 4500-P B(5)-2011
EPA 5030C
SM 4500-CN B-2016 and C-2016
EPA 3015A
EPA 3010A
EPA 3005A
EPA 3510C
SM 4500-N Org B-2011 or C-2011

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All approved analytes are listed below:

Fuel Additives

Methyl tert-butyl ether	EPA 524.2
Naphthalene	EPA 524.2

Metals I

Arsenic, Total	EPA 200.8 Rev. 5.4
Barium, Total	EPA 200.7 Rev. 4.4
Cadmium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Chromium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Copper, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Iron, Total	EPA 200.7 Rev. 4.4
Lead, Total	EPA 200.8 Rev. 5.4
Manganese, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Mercury, Total	EPA 245.1 Rev. 3.0
Silver, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Zinc, Total	EPA 200.7 Rev. 4.4

Metals II

Aluminum, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Antimony, Total	EPA 200.8 Rev. 5.4
Beryllium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Molybdenum, Total	EPA 200.8 Rev. 5.4

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WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised June 26, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Metals II

Nickel, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Thallium, Total	EPA 200.8 Rev. 5.4
Vanadium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals III

Calcium, Total	EPA 200.7 Rev. 4.4
Magnesium, Total	EPA 200.7 Rev. 4.4
Potassium, Total	EPA 200.7 Rev. 4.4
Sodium, Total	EPA 200.7 Rev. 4.4

Miscellaneous

1,4-Dioxane	EPA 522
Turbidity	EPA 180.1 Rev. 2.0

Non-Metals

Alkalinity	SM 21-23 2320B (-97)
Calcium Hardness	EPA 200.7 Rev. 4.4
Chloride	EPA 300.0 Rev. 2.1
Color	SM 21-23 2120B (-01)
Fluoride, Total	EPA 300.0 Rev. 2.1
Orthophosphate (as P)	EPA 300.0 Rev. 2.1
	SM 19, 21-23 4500-P E (-99)
Solids, Total Dissolved	SM 21-23 2540C (-97)
Specific Conductance	EPA 120.1 Rev. 1982
Sulfate (as SO4)	EPA 300.0 Rev. 2.1

Trihalomethanes

Bromodichloromethane	EPA 524.2

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Trihalomethanes

Bromoform	EPA 524.2
Chloroform	EPA 524.2
Dibromochloromethane	EPA 524.2

Volatile Aromatics

1,2,3-Trichlorobenzene	EPA 524.2
1,2,4-Trichlorobenzene	EPA 524.2
1,2,4-Trimethylbenzene	EPA 524.2
1,2-Dichlorobenzene	EPA 524.2
1,3,5-Trimethylbenzene	EPA 524.2
1,3-Dichlorobenzene	EPA 524.2
1,4-Dichlorobenzene	EPA 524.2
2-Chlorotoluene	EPA 524.2
4-Chlorotoluene	EPA 524.2
Benzene	EPA 524.2
Bromobenzene	EPA 524.2
Chlorobenzene	EPA 524.2
Ethyl benzene	EPA 524.2
Hexachlorobutadiene	EPA 524.2
Isopropylbenzene	EPA 524.2
n-Butylbenzene	EPA 524.2
n-Propylbenzene	EPA 524.2
p-Isopropyltoluene (P-Cymene)	EPA 524.2
sec-Butylbenzene	EPA 524.2
Styrene	EPA 524.2
tert-Butylbenzene	EPA 524.2
Toluene	EPA 524.2
Total Xylenes	EPA 524.2

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Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 524.2
1,1,1-Trichloroethane	EPA 524.2
1,1,2,2-Tetrachloroethane	EPA 524.2
1,1,2-Trichloroethane	EPA 524.2
1,1-Dichloroethane	EPA 524.2
1,1-Dichloroethene	EPA 524.2
1,1-Dichloropropene	EPA 524.2
1,2,3-Trichloropropane	EPA 524.2
1,2-Dichloroethane	EPA 524.2
1,2-Dichloropropane	EPA 524.2
1,3-Dichloropropane	EPA 524.2
2,2-Dichloropropane	EPA 524.2
Bromochloromethane	EPA 524.2
Bromomethane	EPA 524.2
Carbon tetrachloride	EPA 524.2
Chloroethane	EPA 524.2
Chloromethane	EPA 524.2
cis-1,2-Dichloroethene	EPA 524.2
cis-1,3-Dichloropropene	EPA 524.2
Dibromomethane	EPA 524.2
Dichlorodifluoromethane	EPA 524.2
Methylene chloride	EPA 524.2
Tetrachloroethene	EPA 524.2
trans-1,2-Dichloroethene	EPA 524.2
trans-1,3-Dichloropropene	EPA 524.2
Trichloroethene	EPA 524.2
Trichlorofluoromethane	EPA 524.2

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Volatile Halocarbons

Vinyl chloride	EPA 524.2

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Acrylates

Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C

Amines

1,2-Diphenylhydrazine	EPA 8270D
	EPA 8270E
2-Nitroaniline	EPA 8270D
	EPA 8270E
3-Nitroaniline	EPA 8270D
	EPA 8270E
4-Chloroaniline	EPA 8270D
	EPA 8270E
4-Nitroaniline	EPA 8270D
	EPA 8270E
Aniline	EPA 8270D
	EPA 8270E
Carbazole	EPA 8270D
	EPA 8270E
Diphenylamine	EPA 8270D
	EPA 8270E

Benzidines

3,3'-Dichlorobenzidine	EPA 8270D
	EPA 8270E

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Benzidines

Benzidine	EPA 8270D
	EPA 8270E

Characteristic Testing

Corrosivity (pH)	EPA 9045D
Free Liquids	EPA 9095B
Ignitability	EPA 1010A
Synthetic Precipitation Leaching Proc.	EPA 1312
TCLP	EPA 1311

Chlorinated Hydrocarbon Pesticides

4,4'-DDD	EPA 8081B
4,4'-DDE	EPA 8081B
4,4'-DDT	EPA 8081B
Aldrin	EPA 8081B
alpha-BHC	EPA 8081B
alpha-Chlordane	EPA 8081B
Atrazine	EPA 8270D
	EPA 8270E
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B
delta-BHC	EPA 8081B
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B
Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B
Endrin	EPA 8081B
Endrin aldehyde	EPA 8081B

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Chlorinated Hydrocarbon Pesticides

Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
Heptachlor epoxide	EPA 8081B
Lindane	EPA 8081B
Methoxychlor	EPA 8081B
Mirex	EPA 8081B
Toxaphene	EPA 8081B

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
	EPA 8270E
1,2,4-Trichlorobenzene	EPA 8270D
	EPA 8270E
2-Chloronaphthalene	EPA 8270D
	EPA 8270E
Hexachlorobenzene	EPA 8270D
	EPA 8270E
Hexachlorobutadiene	EPA 8270D
	EPA 8270E
Hexachlorocyclopentadiene	EPA 8270D
	EPA 8270E
Hexachloroethane	EPA 8270D
	EPA 8270E

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Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
Dicamba	EPA 8151A

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 8270D
	EPA 8270E
4-Bromophenylphenyl ether	EPA 8270D
	EPA 8270E
4-Chlorophenylphenyl ether	EPA 8270D
	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 8270D
	EPA 8270E
Bis(2-chloroethyl)ether	EPA 8270D
	EPA 8270E

Metals I

Barium, Total	EPA 6010C
	EPA 6010D
Cadmium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Calcium, Total	EPA 6010C
	EPA 6010D
Chromium, Total	EPA 6010C
	EPA 6010D

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Metals I

Chromium, Total	EPA 6020A
	EPA 6020B
Copper, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Iron, Total	EPA 6010C
	EPA 6010D
Lead, Total	EPA 6010C
	EPA 6010D
Magnesium, Total	EPA 6010C
	EPA 6010D
Manganese, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Nickel, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Potassium, Total	EPA 6010C
	EPA 6010D
Silver, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Sodium, Total	EPA 6010C

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Metals I

Sodium, Total	EPA 6010D

Metals II

Aluminum, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Antimony, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Arsenic, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Beryllium, Total	EPA 6010C
	EPA 6010D
Chromium VI	EPA 7196A
Mercury, Total	EPA 7471B
	EPA 7473
Selenium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Vanadium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B

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Metals II

Zinc, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B

Metals III

Cobalt, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Thallium, Total	EPA 6010C
	EPA 6010D
Tin, Total	EPA 6020A
	EPA 6020B
Titanium, Total	EPA 6020A

Miscellaneous

Cyanide, Total	EPA 9014

Nitroaromatics and Isophorone

2,4-Dinitrotoluene	EPA 8270D
	EPA 8270E
2,6-Dinitrotoluene	EPA 8270D
	EPA 8270E
Isophorone	EPA 8270D
	EPA 8270E
Nitrobenzene	EPA 8270D
	EPA 8270E
Pyridine	EPA 8270D

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Nitroaromatics and Isophorone	
Pyridine	EPA 8270E
Nitrosoamines	
N-Nitrosodimethylamine	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 8270D
	EPA 8270E
N-Nitrosodiphenylamine	EPA 8270D
	EPA 8270E
Organophosphate Pesticides	
Parathion ethyl	EPA 8270D
	EPA 8270E
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 8270D
	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 8270D
	EPA 8270E
Diethyl phthalate	EPA 8270D
	EPA 8270E
Dimethyl phthalate	EPA 8270D
	EPA 8270E
Di-n-butyl phthalate	EPA 8270D
	EPA 8270E
Di-n-octyl phthalate	EPA 8270D

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Phthalate Esters

Di-n-octyl phthalate	EPA 8270E

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A
Aroclor 1016 (PCB-1016) in Oil	EPA 8082A
Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1221 (PCB-1221) in Oil	EPA 8082A
Aroclor 1232 (PCB-1232)	EPA 8082A
Aroclor 1232 (PCB-1232) in Oil	EPA 8082A
Aroclor 1242 (PCB-1242)	EPA 8082A
Aroclor 1242 (PCB-1242) in Oil	EPA 8082A
Aroclor 1248 (PCB-1248)	EPA 8082A
Aroclor 1248 (PCB-1248) in Oil	EPA 8082A
Aroclor 1254 (PCB-1254)	EPA 8082A
Aroclor 1254 (PCB-1254) in Oil	EPA 8082A
Aroclor 1260 (PCB-1260)	EPA 8082A
Aroclor 1260 (PCB-1260) in Oil	EPA 8082A
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1262 (PCB-1262) in Oil	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
Aroclor 1268 (PCB-1268) in Oil	EPA 8082A

Polynuclear Aromatic Hydrocarbons

Acenaphthene	EPA 8270D
	EPA 8270E
Acenaphthylene	EPA 8270D
	EPA 8270E
Anthracene	EPA 8270D

Serial No.: 71102

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised June 13, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CATHERINE L. MOSHER
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Polynuclear Aromatic Hydrocarbons

Anthracene	EPA 8270E
Benzo(a)anthracene	EPA 8270D
	EPA 8270E
Benzo(a)pyrene	EPA 8270D
	EPA 8270E
Benzo(b)fluoranthene	EPA 8270D
	EPA 8270E
Benzo(g,h,i)perylene	EPA 8270D
	EPA 8270E
Benzo(k)fluoranthene	EPA 8270D
	EPA 8270E
Chrysene	EPA 8270D
	EPA 8270E
Dibenzo(a,h)anthracene	EPA 8270D
	EPA 8270E
Fluoranthene	EPA 8270D
	EPA 8270E
Fluorene	EPA 8270D
	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 8270D
	EPA 8270E
Naphthalene	EPA 8270D
	EPA 8270E
Phenanthrene	EPA 8270D
	EPA 8270E
Pyrene	EPA 8270D
	EPA 8270E

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All approved analytes are listed below:

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270D
	EPA 8270E
2,4,5-Trichlorophenol	EPA 8270D
	EPA 8270E
2,4,6-Trichlorophenol	EPA 8270D
	EPA 8270E
2,4-Dichlorophenol	EPA 8270D
	EPA 8270E
2,4-Dimethylphenol	EPA 8270D
	EPA 8270E
2,4-Dinitrophenol	EPA 8270D
	EPA 8270E
2-Chlorophenol	EPA 8270D
	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 8270D
	EPA 8270E
2-Methylphenol	EPA 8270D
	EPA 8270E
2-Nitrophenol	EPA 8270D
	EPA 8270E
4-Chloro-3-methylphenol	EPA 8270D
	EPA 8270E
4-Methylphenol	EPA 8270D
	EPA 8270E
4-Nitrophenol	EPA 8270D
	EPA 8270E
Pentachlorophenol	EPA 8270D

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All approved analytes are listed below:

Priority Pollutant Phenols

Pentachlorophenol	EPA 8270E
Phenol	EPA 8270D
	EPA 8270E

Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270D
	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
2-Methylnaphthalene	EPA 8270D
	EPA 8270E
Acetophenone	EPA 8270D
	EPA 8270E
Benzaldehyde	EPA 8270D
	EPA 8270E
Benzoic Acid	EPA 8270D
	EPA 8270E
Benzyl alcohol	EPA 8270D
	EPA 8270E
Caprolactam	EPA 8270D
	EPA 8270E
Dibenzofuran	EPA 8270D
	EPA 8270E

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All approved analytes are listed below:

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D

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Volatile Aromatics

m/p-Xylenes	EPA 8260C
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D
	EPA 8260C

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D

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Volatile Halocarbons

1,1,2,2-Tetrachloroethane	EPA 8260C
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C

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Volatile Halocarbons

Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D
	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D

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Volatile Halocarbons

Hexachlorobutadiene, Volatile	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C

Volatile Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
	EPA 8270D SIM
	EPA 8270E
	EPA 8270E SIM
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C

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All approved analytes are listed below:

Volatile Organics

Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

EPA 5035A-L
EPA 5035A-H
EPA 3580A
EPA 3010A
EPA 3050B
EPA 3550C
EPA 3546
EPA 3545A
EPA 3060A
EPA 9010C

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State of New Jersey

Department of Environmental Protection

Certifies That

YORK ANALYTICAL LABORATORIES INC (II)

Laboratory Certification ID # NY037

is hereby approved as a

Nationally Accredited Environmental Laboratory

to perform the analyses as indicated on the Annual Certified Parameter List which must accompany this certificate to be valid

having duly met the requirements of the

Regulations Governing the Certification of Laboratories and Environmental Measurements N.J.A.C. 7:18 et. seq.

and

having been found compliant with the 2016 TNI Standard approved by the

The NELAC Institute

Expires June 30, 2026

Michele M. Potter
Manager

NJDEP is a NELAP Recognized Accreditation Body

This certificate is to be conspicuously displayed at the laboratory with the annual certified parameter list in a location on the premises visible to the public. Consumers are urged to verify the laboratory's current accreditation status with the State of NJ, NELAP.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF QUALITY ASSURANCE
401 East State Street
P.O. Box 420, Mail Code 401-02D
Trenton, New Jersey 08625-0420
Tel. (609) 292-3950 • Fax (609) 777-1774
https://dep.nj.gov/dsr/oqa

PHILIP D. MURPHY
Governor

TAHESHA L. WAY
Lt. Governor

SHAWN M. LaTOURETTE
Commissioner

July 2, 2025

James Dodsworth
General Contact
York Analytical Laboratories Inc (II)
132-02 89th Ave, STE 217
Richmond Hill, NY 11418

Dear Mr. Dodsworth:

Re: Updated Renewal ACPL
Laboratory Certification ID: 20044

The Fiscal Year 2026 (FY26) Annual Certified Parameter List (ACPL) has been corrected as per the request received July 1, 2025. If there are any discrepancies, please contact your Laboratory Certification Officer to verify information and make arrangements for a new ACPL. Please find enclosed an updated ACPL.

If this office can be of any further assistance, please contact your certification officer or me at (609) 292-3950.

Sincerely,

Michele M. Potter
Manager

Enclosure: FY26 ACPL

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 7/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC (II) Laboratory Number: NY037 Activity ID: NLC 250001
132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: AE04 --Organics Analysis

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	AE04.17950	Acetone	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18250	Acrylonitrile	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18300	Allyl chloride	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18400	Benzene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18450	Benzyl chloride	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18600	Bromodichloromethane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18650	Bromoform	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18700	Bromomethane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18750	Butadiene (1,3-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.18900	Carbon disulfide	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19000	Carbon tetrachloride	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19150	Chlorobenzene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19200	Chloroethane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19250	Chloroform	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19300	Chloromethane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19500	Cyclohexane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19650	Dibromochloromethane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19700	Dibromoethane (1,2-) (EDB)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19750	Dichlorobenzene (1,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19800	Dichlorobenzene (1,3-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19850	Dichlorobenzene (1,4-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19900	Dichlorodifluoromethane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.19950	Dichloroethane (1,1-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20000	Dichloroethane (1,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20050	Dichloroethene (1,1-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20100	Dichloroethene (cis-1,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20150	Dichloroethene (trans-1,2-)	GC/MS, Canisters	EPA TO-15	NY

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 7/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC (II) Laboratory Number: NY037 Activity ID: NLC 250001
132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: AE04 --Organics Analysis

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	AE04.20250	Dichloropropane (1,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20300	Dichloropropene (cis-1,3-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20350	Dichloropropene (trans-1,3-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20400	Dichlorotetrafluoroethane (1,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.20750	Dioxane (1,4-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21100	Ethylbenzene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21400	Heptane (n-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21450	Hexachlorobutadiene (1,3-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21500	Hexachloroethane	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21550	Hexane (n-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21700	Isopropanol	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21750	Isopropylbenzene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21850	Methyl ethyl ketone (MEK)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.21950	Methyl isobutyl ketone (MIBK)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.22050	Methyl methacrylate	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.22100	Methyl tert-butyl ether	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.22150	Methylene chloride (Dichloromethane)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23150	Styrene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23350	Tetrachloroethane (1,1,2,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23400	Tetrachloroethene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23500	Toluene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23550	Trichloro (1,1,2-) trifluoroethane (1,2,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23600	Trichlorobenzene (1,2,4-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23650	Trichloroethane (1,1,1-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23700	Trichloroethane (1,1,2-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23750	Trichloroethene	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.23800	Trichlorofluoromethane	GC/MS, Canisters	EPA TO-15	NY

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132-02 89TH AVE STE 217
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Category: AE04 --Organics Analysis

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	AE04.24050	Trimethylbenzene (1,2,4-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24100	Trimethylbenzene (1,3,5-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24200	Vinyl acetate	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24250	Vinyl bromide	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24300	Vinyl chloride	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24350	Xylene (m-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24400	Xylene (o-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24450	Xylene (p-)	GC/MS, Canisters	EPA TO-15	NY
Certified	Yes	AE04.24500	Xylenes (total)	GC/MS, Canisters	EPA TO-15	NY

Category: DW09 --Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW09.28900	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.28950	1H, 1H, 2H, 2H-Perfluorodecanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29000	1H, 1H, 2H, 2H-Perfluorohexanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29050	1H, 1H, 2H, 2H-Perfluorooctanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29100	4,8-dioxa-3H-perfluorononanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29150	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29200	Hexafluoropropylene oxide dimer acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29250	Nonafluoro-3,6-dioxaheptanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29300	Perfluoro(2-ethoxyethane)sulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29350	Perfluoro-3-methoxypropanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY

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Category: DW09 --Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW09.29400	Perfluoro-4-methoxybutanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29450	Perfluorobutanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29500	Perfluorobutanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29550	Perfluorodecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29600	Perfluorododecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29650	Perfluoroheptanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29700	Perfluoroheptanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29750	Perfluorohexanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29800	Perfluorohexanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29850	Perfluorononanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29900	Perfluorooctanesulfonic acid (PFOS)	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.29950	Perfluorooctanoic acid (PFOA)	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.30000	Perfluoropentanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.30050	Perfluoropentanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.30100	Perfluoroundecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	EPA 533	NY
Certified	Yes	DW09.30850	N-ethylperfluorooctanesulfonamidoacetic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.30900	N-methylperfluorooctanesulfonamidoacetic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.30950	Perfluorobutanesulfonic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31000	Perfluorodecanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31050	Perfluorododecanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31100	Perfluoroheptanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31200	Perfluorohexanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31250	Perfluorononanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31300	Perfluorooctanesulfonic acid (PFOS)	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31350	Perfluorooctanoic acid (PFOA)	LC MS/MS, Electrospray Ionization	EPA 537.1	NY

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Category: DW09 --Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	DW09.31400	Perfluorotetradecanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31450	Perfluorotridecanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31500	Perfluoroundecanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31550	Perfluorohexanesulfonic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31600	Hexafluoropropylene oxide dimer acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31650	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31700	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY
Certified	Yes	DW09.31750	4,8-dioxa-3H-perfluorononanoic acid	LC MS/MS, Electrospray Ionization	EPA 537.1	NY

Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.68750	Acetone	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.68850	Acrolein	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.68900	Acrylonitrile	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69050	Amyl alcohol (t-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69100	Benzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69200	Bromobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69250	Bromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69300	Bromodichloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69400	Bromoform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69450	Bromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69650	Butanone (2-) (Methyl ethyl ketone)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69850	Butylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.69900	Carbon disulfide	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.69950	Carbon tetrachloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70000	Chlorobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70050	Chloroethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70100	Chloroethyl vinyl ether (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70150	Chloroform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70200	Chloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70250	Chlorotoluene (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70300	Chlorotoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70400	Cyclohexane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70500	Dibromo-3-chloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70550	Dibromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70600	Dibromoethane (1,2-) (EDB)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70650	Dibromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70750	Dichloro-2-butene (trans-1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70800	Dichlorobenzene (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70850	Dichlorobenzene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70900	Dichlorobenzene (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.70950	Dichlorodifluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71000	Dichloroethane (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71050	Dichloroethane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71100	Dichloroethene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71150	Dichloroethene (cis-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71200	Dichloroethene (trans-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71250	Dichloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71300	Dichloropropane (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71350	Dichloropropane (2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.71400	Dichloropropene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71450	Dichloropropene (cis-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71500	Dichloropropene (trans-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71600	Diisopropyl Ether (DIPE)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71650	Dioxane (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71700	Ethanol	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71900	Ethylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.71950	Ethyl-tert-butyl Ether (ETBE)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72050	Hexachlorobutadiene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72200	Hexanone (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72400	Isopropylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72450	Isopropyltoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72550	Methyl acetate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72700	Methyl methacrylate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72750	Methyl tert-butyl ether	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72800	Methylcyclohexane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.72850	Methylene chloride (Dichloromethane)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73000	Naphthalene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73350	Pentanone (4-methyl-2-) (MIBK)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73450	Propylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73500	Sec-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73550	Styrene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73600	tert-Amylmethyl ether (TAME)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73700	Tert-butyl alcohol	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73750	Tert-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73800	Tetrachloroethane (1,1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.73850	Tetrachloroethane (1,1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

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Category: NPW11--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW11.73900	Tetrachloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74000	Toluene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74100	Trichloro (1,1,2-) trifluoroethane (1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74150	Trichlorobenzene (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74200	Trichlorobenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74250	Trichloroethane (1,1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74300	Trichloroethane (1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74350	Trichloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74400	Trichlorofluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74450	Trichloropropane (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74550	Trimethylbenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74600	Trimethylbenzene (1,3,5-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74700	Vinyl acetate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74750	Vinyl chloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74800	Xylene (m-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74850	Xylene (o-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74900	Xylene (p-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	NPW11.74950	Xylenes (total)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

Category: NPW16--NPW - Lab Developed/Non-Std Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW16.05000	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05050	1H, 1H, 2H, 2H-Perfluorodecanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH

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Category: NPW16--NPW - Lab Developed/Non-Std Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW16.05100	1H, 1H, 2H, 2H-Perfluorohexanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05150	1H, 1H, 2H, 2H-Perfluorooctanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05200	4,8-dioxa-3H-perfluorononanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05250	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05300	Hexafluoropropylene oxide dimer acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05350	Perfluorobutanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05400	Perfluorobutanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05450	Perfluorodecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05500	Perfluorododecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05550	Perfluorodecanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05600	Perfluoroheptanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05650	Perfluoroheptanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05700	Perfluorohexanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05750	Perfluorohexanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05800	Perfluorooctanesulfonic acid (PFOS)	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05850	Perfluorononanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05900	Perfluorononanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.05950	Perfluorooctanoic acid (PFOA)	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.06000	Perfluorooctanesulfonamide	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.06050	Perfluoropentanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.06100	Perfluoropentanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.06150	Perfluoroundecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.06200	Perfluorotetradecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.06250	Perfluorotridecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	NPW16.06300	N-ethylperfluorooctanesulfonamidoacetic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH

Annual Certified Parameter List and Current Status

Effective as of 7/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC (II) Laboratory Number: NY037 Activity ID: NLC 250001
132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: NPW16--NPW - Lab Developed/Non-Std Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	NPW16.06350	N-methylperfluorooctanesulfonamidoacetic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.22900	Acetone	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23000	Acrolein	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23050	Acrylonitrile	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23200	Benzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23300	Bromobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23350	Bromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23400	Bromodichloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23500	Bromoform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23550	Bromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23650	Butanone (2-) (Methyl ethyl ketone)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23800	Butylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23850	Carbon disulfide	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23900	Carbon tetrachloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.23950	Chlorobenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24000	Chloroethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24050	Chloroethyl vinyl ether (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24100	Chloroform	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24150	Chloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24200	Chlorotoluene (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 7/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC (II) Laboratory Number: NY037 Activity ID: NLC 250001
132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.24250	Chlorotoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24330	Cyclohexane	GC/MS, P & T, or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24400	Dibromo-3-chloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24450	Dibromochloromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24500	Dibromoethane (1,2-) (EDB)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24550	Dibromomethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24700	Dichlorobenzene (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24750	Dichlorobenzene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24800	Dichlorobenzene (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24850	Dichlorodifluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24900	Dichloroethane (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.24950	Dichloroethane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25000	Dichloroethene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25050	Dichloroethene (cis-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25100	Dichloroethene (trans-1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25150	Dichloropropane (1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25200	Dichloropropane (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25250	Dichloropropane (2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25300	Dichloropropene (1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25350	Dichloropropene (cis-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25400	Dichloropropene (trans-1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25550	Dioxane (1,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25750	Ethylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25850	Hexachlorobutadiene (1,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.25950	Hexanone (2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26150	Isopropylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26200	Isopropyltoluene (4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 7/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC (II) Laboratory Number: NY037 Activity ID: NLC 250001
132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.26280	Methyl acetate	GC/MS, P & T, or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26330	Methylcyclohexane	GC/MS, P & T, or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26400	Methyl methacrylate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26450	Methyl tert-butyl ether	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26500	Methylene chloride (Dichloromethane)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26650	Naphthalene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26850	Pentanone (4-methyl-2-) (MIBK)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.26950	Propylbenzene (n-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27000	Sec-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27050	Styrene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27200	Tert-butyl alcohol	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27250	Tert-butylbenzene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27300	Tetrachloroethane (1,1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27350	Tetrachloroethane (1,1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27400	Tetrachloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27500	Toluene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27600	Trichloro (1,1,2-) trifluoroethane (1,2,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27650	Trichlorobenzene (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27700	Trichlorobenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27750	Trichloroethane (1,1,1-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27800	Trichloroethane (1,1,2-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27850	Trichloroethene	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27900	Trichlorofluoromethane	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.27950	Trichloropropane (1,2,3-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28000	Trimethylbenzene (1,2,4-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28050	Trimethylbenzene (1,3,5-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28150	Vinyl acetate	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

Effective as of 7/01/2025 until 6/30/2026

Laboratory Name: YORK ANALYTICAL LABORATORIES INC (II) Laboratory Number: NY037 Activity ID: NLC 250001
132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: SCM10--Organic Parameters - Chromatography/MS

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM10.28200	Vinyl chloride	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28250	Xylene (m-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28300	Xylene (o-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28350	Xylene (p-)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY
Certified	Yes	SCM10.28400	Xylenes (total)	GC/MS, P & T or Direct Injection, Capillary	SW-846 8260D	NY

Category: SCM14--SCM - Lab Developed/Non-Std Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM14.02650	Perfluorobutanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.02700	Perfluorobutanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.02750	Perfluorodecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.02800	Perfluorododecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.02850	Perfluoroheptanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.02900	Perfluorohexanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.02950	Perfluorohexanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03000	Perfluorononanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03050	Perfluorooctanesulfonic acid (PFOS)	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03100	Perfluorooctanoic acid (PFOA)	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03150	Perfluoropentanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03200	Perfluorotetradecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03250	Perfluorotridecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03300	Perfluoroundecanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03350	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH

New Jersey Department of Environment Protection
Environmental Laboratory Certification Program

Annual Certified Parameter List and Current Status

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Laboratory Name: YORK ANALYTICAL LABORATORIES INC (II) Laboratory Number: NY037 Activity ID: NLC 250001
132-02 89TH AVE STE 217
RICHMOND HILL NY 11418

Category: SCM14--SCM - Lab Developed/Non-Std Methods

Status	Eligible to Report NJ Data	Code	Parameter	Technique	Approved Methods	Primary State
Certified	Yes	SCM14.03400	1H, 1H, 2H, 2H-Perfluorodecanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03450	1H, 1H, 2H, 2H-Perfluorohexanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03500	1H, 1H, 2H, 2H-Perfluorooctanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03550	4,8-dioxa-3H-perfluorononanoic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03600	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03650	Hexafluoropropylene oxide dimer acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03700	N-ethylperfluorooctanesulfonamidoacetic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03750	N-methylperfluorooctanesulfonamidoacetic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03800	Perfluorodecanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03850	Perfluoropentanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03900	Perfluoroheptanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.03950	Perfluorononanesulfonic acid	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH
Certified	Yes	SCM14.04000	Perfluorooctanesulfonamide	LC MS/MS, Electrospray Ionization, Isotope Dilution	User Defined EPA 1633	NH

Michele M. Potter, Manager

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised April 16, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

JAMES DODSWORTH
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Acrylates

Acrylonitrile	EPA TO-15
Methyl methacrylate	EPA TO-15

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	EPA TO-15
Hexachlorobutadiene	EPA TO-15
Hexachloroethane	EPA TO-15

Purgeable Aromatics

1,2,4-Trimethylbenzene	EPA TO-15
1,2-Dichlorobenzene	EPA TO-15
1,3,5-Trimethylbenzene	EPA TO-15
1,3-Dichlorobenzene	EPA TO-15
1,4-Dichlorobenzene	EPA TO-15
Benzene	EPA TO-15
Chlorobenzene	EPA TO-15
Ethyl benzene	EPA TO-15
Isopropylbenzene	EPA TO-15
m/p-Xylenes	EPA TO-15
o-Xylene	EPA TO-15
Styrene	EPA TO-15
Toluene	EPA TO-15
Total Xylenes	EPA TO-15

Purgeable Halocarbons

1,1,1-Trichloroethane	EPA TO-15
1,1,2,2-Tetrachloroethane	EPA TO-15
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA TO-15
1,1,2-Trichloroethane	EPA TO-15

Serial No.: 70994

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/, by phone (518) 485-5570 or by email to elap@health.ny.gov.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised April 16, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

JAMES DODSWORTH *NY Lab Id No: 12058*
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Purgeable Halocarbons

1,1-Dichloroethane	EPA TO-15
1,1-Dichloroethene	EPA TO-15
1,2-Dibromoethane	EPA TO-15
1,2-Dichloroethane	EPA TO-15
1,2-Dichloropropane	EPA TO-15
3-Chloropropene (Allyl chloride)	EPA TO-15
Bromodichloromethane	EPA TO-15
Bromoform	EPA TO-15
Bromomethane	EPA TO-15
Carbon tetrachloride	EPA TO-15
Chloroethane	EPA TO-15
Chloroform	EPA TO-15
Chloromethane	EPA TO-15
cis-1,2-Dichloroethene	EPA TO-15
cis-1,3-Dichloropropene	EPA TO-15
Dibromochloromethane	EPA TO-15
Dichlorodifluoromethane	EPA TO-15
Methylene chloride	EPA TO-15
Tetrachloroethene	EPA TO-15
trans-1,2-Dichloroethene	EPA TO-15
trans-1,3-Dichloropropene	EPA TO-15
Trichloroethene	EPA TO-15
Trichlorofluoromethane	EPA TO-15
Vinyl bromide	EPA TO-15
Vinyl chloride	EPA TO-15

Volatile Chlorinated Organics

Benzyl chloride	EPA TO-15

Serial No.: 70994

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NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2026
Issued April 01, 2025
Revised April 16, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

JAMES DODSWORTH *NY Lab Id No: 12058*
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Volatile Organics

1,2-Dichlorotetrafluoroethane	EPA TO-15
1,3-Butadiene	EPA TO-15
1,4-Dioxane	EPA TO-15
2-Butanone (Methylethyl ketone)	EPA TO-15
4-Methyl-2-Pentanone	EPA TO-15
Acetone	EPA TO-15
Carbon Disulfide	EPA TO-15
Cyclohexane	EPA TO-15
Hexane	EPA TO-15
Isopropanol	EPA TO-15
Methyl tert-butyl ether	EPA TO-15
n-Heptane	EPA TO-15
Vinyl acetate	EPA TO-15

NEW YORK STATE Department of Health

Serial No.: 70994

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RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C
Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
Fuel Oxygenates	
Di-isopropyl ether	EPA 8260D
	EPA 8260C
Ethanol	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-amyl alcohol	EPA 8260D
	EPA 8260C
tert-amyl methyl ether (TAME)	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
tert-butyl ethyl ether (ETBE)	EPA 8260D
	EPA 8260C
Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D

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All approved analytes are listed below:

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C

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All approved analytes are listed below:

Volatile Aromatics

Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D
	EPA 8260C

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C

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Volatile Halocarbons

1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
Bromochloromethane	EPA 8260D

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All approved analytes are listed below:

Volatile Halocarbons

Bromochloromethane	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D
	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C

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All approved analytes are listed below:

Volatile Halocarbons

Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
trans-1,4-Dichloro-2-butene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C

Volatiles Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C

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All approved analytes are listed below:

Volatiles Organics

Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

	EPA 5030C

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is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

11Cl-PF3OUdS	EPA 1633 (Draft)
4:2FTS	EPA 1633 (Draft)
6:2FTS	EPA 1633 (Draft)
8:2FTS	EPA 1633 (Draft)
9Cl-PF3ONS	EPA 1633 (Draft)
ADONA	EPA 1633 (Draft)
HFPO-DA (GenX)	EPA 1633 (Draft)
NEtFOSAA	EPA 1633 (Draft)
NFDHA	EPA 1633 (Draft)
NMeFOSAA	EPA 1633 (Draft)
Perflourotridecanoic Acid (PFTrDA)	EPA 1633 (Draft)
Perfluordecanoic Acid (PFDA)	EPA 1633 (Draft)
Perfluoro-3-Methoxypropanoic Acid (F	EPA 1633 (Draft)
Perfluoro-4-Methoxybutanoic Acid (PF	EPA 1633 (Draft)
Perfluorobutanesulfonic Acid (PFBS)	EPA 1633 (Draft)
Perfluorobutanoic Acid (PFBA)	EPA 1633 (Draft)
Perfluorododecanoic Acid (PFDoA)	EPA 1633 (Draft)
Perfluoroheptanesulfonic Acid (PFHpS	EPA 1633 (Draft)
Perfluoroheptanoic Acid (PFHpA)	EPA 1633 (Draft)
Perfluorohexanesulfonic Acid (PFHxS	EPA 1633 (Draft)
Perfluorohexanoic Acid (PFHxA)	EPA 1633 (Draft)
Perfluorononanoic Acid (PFNA)	EPA 1633 (Draft)
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633 (Draft)
Perfluorooctanoic Acid (PFOA)	EPA 1633 (Draft)
Perfluoropentanesulfonic Acid (PFPeS	EPA 1633 (Draft)
Perfluoropentanoic Acid (PFPeA)	EPA 1633 (Draft)
Perfluoroundecanoic Acid (PFUnA)	EPA 1633 (Draft)

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ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved subcategories and/or analytes are listed below:

Perfluorinated Alkyl Acids

PFEESA	EPA 1633 (Draft)

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All approved analytes are listed below:

Perfluorinated Alkyl Acids

11Cl-PF3OUdS	EPA 533
	EPA 537.1, Version 2
4:2FTS	EPA 533
6:2FTS	EPA 533
8:2FTS	EPA 533
9Cl-PF3ONS	EPA 533
	EPA 537.1, Version 2
ADONA	EPA 533
	EPA 537.1, Version 2
HFPO-DA (GenX)	EPA 533
	EPA 537.1, Version 2
NEtFOSAA	EPA 537.1, Version 2
NFDHA	EPA 533
NMeFOSAA	EPA 537.1, Version 2
Perflourotridecanoic Acid (PFTrDA)	EPA 537.1, Version 2
Perfluordecanoic Acid (PFDA)	EPA 533
	EPA 537.1, Version 2
Perfluoro-3-Methoxypropanoic Acid (F	EPA 533
Perfluoro-4-Methoxybutanoic Acid (PF	EPA 533
Perfluorobutanesulfonic Acid (PFBS)	EPA 533
	EPA 537.1, Version 2
Perfluorobutanoic Acid (PFBA)	EPA 533
Perfluorododecanoic Acid (PFDoA)	EPA 533
	EPA 537.1, Version 2
Perfluoroheptanesulfonic Acid (PFHpS	EPA 533
Perfluoroheptanoic Acid (PFHpA)	EPA 533
	EPA 537.1, Version 2

Serial No.: 70989

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All approved analytes are listed below:

Perfluorinated Alkyl Acids

Perfluorohexanesulfonic Acid (PFHxS	EPA 533
	EPA 537.1, Version 2
Perfluorohexanoic Acid (PFHxA)	EPA 533
	EPA 537.1, Version 2
Perfluorononanoic Acid (PFNA)	EPA 533
	EPA 537.1, Version 2
Perfluorooctanesulfonic Acid (PFOS)	EPA 533
	EPA 537.1, Version 2
Perfluorooctanoic Acid (PFOA)	EPA 533
	EPA 537.1, Version 2
Perfluoropentanesulfonic Acid (PFPeS	EPA 533
Perfluoropentanoic Acid (PFPeA)	EPA 533
Perfluorotetradecanoic Acid (PFTeDA)	EPA 537.1, Version 2
Perfluoroundecanoic Acid (PFUnA)	EPA 533
	EPA 537.1, Version 2
PFEESA	EPA 533

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All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C
Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C

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Revised April 16, 2025

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

JAMES DODSWORTH
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Volatile Aromatics

Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
tert-Butylbenzene	EPA 8260D

Serial No.: 70992

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Volatile Aromatics

tert-Butylbenzene	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D
	EPA 8260C

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D

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Volatile Halocarbons

1,2-Dibromoethane	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D
	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C

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Volatile Halocarbons

cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C

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Volatile Organics

1,4-Dioxane	EPA 8260D
	EPA 8260C
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

	EPA 5035A-L
	EPA 5035A-H

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Perfluorinated Alkyl Acids

8:2FTS	EPA 1633 (Draft)
NEtFOSAA	EPA 1633 (Draft)
NMeFOSAA	EPA 1633 (Draft)
Perflourotridecanoic Acid (PFTrDA)	EPA 1633 (Draft)
Perfluordecanoic Acid (PFDA)	EPA 1633 (Draft)
Perfluorobutanoic Acid (PFBA)	EPA 1633 (Draft)
Perfluorododecanoic Acid (PFDoA)	EPA 1633 (Draft)
Perfluoroheptanoic Acid (PFHpA)	EPA 1633 (Draft)
Perfluorohexanoic Acid (PFHxA)	EPA 1633 (Draft)
Perfluorononanoic Acid (PFNA)	EPA 1633 (Draft)
Perfluorooctanesulfonic Acid (PFOS)	EPA 1633 (Draft)
Perfluorooctanoic Acid (PFOA)	EPA 1633 (Draft)
Perfluoropentanoic Acid (PFPeA)	EPA 1633 (Draft)
Perfluorotetradecanoic Acid (PFTeDA)	EPA 1633 (Draft)
Perfluoroundecanoic Acid (PFUnA)	EPA 1633 (Draft)

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APPENDIX C

Previous Reports