

**50 NEVINS STREET**

**BROOKYN, NEW YORK**

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# **Remedial Action Work Plan**

**OER Project Numbers 18TMP1470K, 18EHAN493K**

**Prepared For:**

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## LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C&D	Construction and Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYS DEC	New York State Department of Environmental Conservation
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCRR	New York Codes Rules and Regulations
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan

<b>Acronym</b>	<b>Definition</b>
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

## CERTIFICATION

I, Stephen M. Kline, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the 50 Nevins Street site, Site Number 18EHAN493K. I certify to the following:

- I have reviewed this document and the Stipulation List, to which my signature and seal are affixed.
- Engineering Controls developed for this remedial action were designed by me or a person under my direct supervision and designed to achieve the goals established in this Remedial Action Work Plan for this site.
- The Engineering Controls to be constructed during this remedial action are accurately reflected in the text and drawings of the Remedial Action Work Plan and are of sufficient detail to enable proper construction.
- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil/fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Stephen M. Kline

Name

080431

PE License Number

Signature

February 25, 2019

Date



I, Benjamin Alter, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 50 Nevins Street site, Site Number 18EHAN493K. I certify to the following:

- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Benjamin Alter

QEP Name

QEP Signature

February 25, 2019

Date

## **EXECUTIVE SUMMARY**

The Institute of Community Living is working with the NYC Office of Environmental Remediation (OER) in the “E” Designation Program to investigate and remediate a 12,740-square foot site located at 50 Nevins Street in Brooklyn, New York. A remedial investigation (RI) and a supplemental RI were performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

### **Site Location and Background**

The Site is located at 50 Nevins Street in the Boerum Hill section in Brooklyn, New York and is identified as Block 172 and Lot 37 on the New York City Tax Map. The Site is 12,740 square feet in area and is bounded by Schermerhorn Street to the north, State Street to the south, Nevins Street to the east, and a Holiday Inn Hotel and residential properties to the west. The Site is currently vacant and undergoing interior renovation.

The Site contains one 7-story (southern portion) to 9-story (northern portion) building fronting Nevins Street and has a full cellar that extends beyond the existing building footprint (the top of the cellar slab is approximately 16 feet below ground surface [bgs]). The Site also contains an asphalt paved parking area on the northwestern portion fronting Schermerhorn Street.

### **Summary of Redevelopment Plan**

The development project consists of the renovation of the existing 7-story to 9-story building (with full cellar and sub-cellar levels) and the construction of a new 10-story building addition (with full cellar and sub-cellar levels) on the northwestern portion of the Site (i.e., the current parking area). The proposed approximately 12,150 square-foot building footprint will cover 95% of the lot. The upper three stories of the new building addition will be connected to, and extended above, the northern portion of the existing building. The approximately 126-foot high mixed-use building will feature commercial space on the first floor and residential units on upper levels. The

cellar uses will consist of retail, storage, fitness, detention tank, cycle parking, laundry room, electric room, compactor room, etc. The sub-cellar, open to cellar floor on the western portions, will be used for office, computer lab/after-school program, conference room, pantry/lunch room, RPZ room, refuse, etc. A paved courtyard will be located southwest of the new building, adjacent to the adjoining existing 4-story residential properties (Block 172 Lots 43, 44 and 45). The proposed cellar excavation for the new building will be limited to the existing parking area (i.e. approximately 4,000 square feet of the new building footprint) down to approximately 20 feet bgs. This will generate an estimated 3,500 cubic yards (CY) of excavated material. Groundwater is anticipated at a depth of 35 feet bgs or deeper (i.e. deeper than the development depth) due to the Site's proximity to the New York City Transit (NYCT) subway tunnels and therefore will not be encountered during excavation activities. The proposed development comprises 129 units, of which 78 are supporting housing units and 51 are affordable housing units. The total internal gross square footage (as reported to the Department of Buildings) is 88,793 square feet.

The current zoning designation is within high bulk commercial district (C6-4) as well as a Mandatory Inclusionary Housing (MIH) area. The proposed use is consistent with existing zoning for the property.

## **Summary of Surrounding Property**

The Site vicinity is primarily zoned as residential (R6B) with commercial properties (C6-2, C6-4). Residences are generally multi-story buildings west and southwest of the Site. Commercial establishments such as hotels, restaurants, and general stores are mostly located along Schermerhorn Street and Nevins Street, to the north and east respectively. State Street is located to the south and several townhouses are located to the west of the Site. Several daycare facilities were identified within a 500-foot radius of the Site. These include the Strong Place for Hope Day Care Center/DBA – Atlantic, located 475 feet southeast of the Site; Hanover Place Child Care, LLC, and Milestone School for Child Development, located 475 feet northeast of the Site. No other sensitive receptors such as hospitals or schools were identified within the 500-foot radius.

## Summary of Past Site Uses and Areas of Concern

Based upon review of the Sanborn maps and historical documents, the Site consisted of dwellings with coal and wood yards in the late 1880s. It was part of the dense urban neighborhood of South Brooklyn. In the early 1900s, the Site was subdivided into several lots. The Site contained a 7-story to 9-story building with basement level in the main lot and three-story dwellings on the northwestern portion of the Site. The dwelling units on the northwestern portions were demolished around the 1950s and the area has been vacant and used as a parking lot since then. Harriet Judson Memorial Young Women's Christian Association (YWCA) occupied the building until around the 1960s. The Brooklyn Psychosocial Rehab Institute Inc, Brooklyn Vocational Rehabilitation Institute, Cobble Hill Rehabilitation Institute occupied the property until the late 1980s. ICL Real Property Holding Corporation has occupied the property since 1995.

Based on the previous investigations, the Areas of Concern (AOCs) identified for this site include:

- A 3,000-gallon underground storage tank (UST) is located underneath the sidewalk vault along Nevins Street. Access to the vault is through an elevated crawl space in the building cellar. The vault appears old with some unused piping observed.
- 250-gallon fuel oil aboveground storage tank (AST) in the cellar of the 7-story building.
- Prior closed spills #0209832 due to tank test failure (closed on September 30, 2003) and #0104574 due to tank test failure (closed on November 26, 2008)

In addition, Phase I ESAs identified the following construction-related concerns:

- Several unused pipes were observed inside the sidewalk vault. Old utility lines should be properly decommissioned.
- Surface soil to be excavated for property development purposes could be impacted due to long-term exposure to the urban environment. Such impacted material that is excavated from a construction site for off-Site disposal is a regulated material and should be managed in accordance with applicable regulations.
- Although groundwater is not anticipated to be encountered, groundwater sampling and testing in conformance with New York City Department of Environmental Protection (NYCDEP) sewer discharge permit/approval requirements will be required should groundwater be encountered and dewatering be implemented for construction.

## **Summary of Work Performed under the Remedial Investigation**

A Remedial Investigation was performed by GZA in August 2018. The following scope of services was performed during the RI:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Completed a geophysical survey event in the parking lot, basement, and the sidewalk along Schermerhorn Street and Nevins Street to assist in the possible identification of utilities, underground storage tanks and other substructures;
3. Installed six soil borings spaced evenly across the Site (i.e. three in existing building area [SB-1, SB-2, and SB-6] and three in parking lot [SB-3, SB-4, and SB-5]) and collected 10 soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed six evenly spaced soil vapor probes on the Site (i.e. three in existing building area [SV-1, SV-2, and SV-6] and three in parking lot [SV-3, SV-4, and SV-5]) and collected six soil vapor samples for chemical analysis.
5. Groundwater was not encountered during the RI (due to the Site's proximity to the NYCT tunnels) and therefore groundwater samples were not collected analyzed.

A Supplemental Remedial Investigation was performed by GZA in February 7, 2019. The objective of the supplemental investigation was to verify the anomalous laboratory result received from soil vapor sample SV-5 as described above. SV-5, which was collected on August 27, 2018 at a depth of 20 feet bgs, contained hexane at a concentration of 19,500 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). GZA installed two soil vapor probes to 20 feet bgs, one near SV-5 (designated as SV-7) and one approximately 20 feet north of SV-5 (designated as SV-8).

## **Summary of Findings of Remedial Investigation**

A remedial investigation was performed, and the results are documented in a document called "Remedial Investigation Report, 50 Nevins Street," revised February 25, 2019 (RIR).

The Remedial Investigation Findings are summarized below.

1. The property is at an approximate elevation of 40 feet above mean sea level (MSL).



2. Groundwater was not encountered due to dewatering performed by the MTA and thus not sampled as part of this investigation.
3. Depth to bedrock is anticipated to be greater than 150 feet below ground surface. Bedrock was not encountered during this investigation.
4. The stratigraphy of the Site beneath the existing building concrete slab consists of a fill layer that extends 2 feet (approximately 18 feet bgs). The fill consisted mainly of brown, fine to coarse or fine to medium sand, with up to 35 percent gravel and varying amounts of brick fragments. The stratigraphy of the Site beneath the parking space asphalt pavement consists of a fill layer that extended to approximately 17 feet bgs. The fill consisted mainly of light brown, brown, or black, fine to coarse sand, with up to 35 percent gravel and varying amounts of debris such as concrete and brick fragments. The fill layer is underlain by a sand layer to more than 20 feet bgs.
5. Soil/fill samples collected during the Remedial Investigation were compared to the New York State Department of Environmental Conservation (NYSDEC) 6NYCRR Part 375 Section 6.8 Unrestricted Use and Restricted Residential Use Soil Cleanup Objectives (SCOs). The results are as follows:
  - No volatile organic compounds (VOCs) or polychlorinated biphenyls (PCBs) were detected exceeding SCOs with the exception of one VOC. Methylene chloride was detected at 0.32 milligrams per kilogram (mg/kg), a concentration exceeding Unrestricted Use SCOs in one shallow (0-2') sample.
  - Several SVOCs including benzo(a)anthracene (maximum 23 mg/kg), benzo(a)pyrene (maximum 20 mg/kg), benzo(b)fluoranthene (maximum 29 mg/kg), benzo(k)fluoranthene (maximum 4 mg/kg), chrysene (maximum 21 mg/kg), dibenzo(a,h)anthracene (maximum 2.9 mg/kg) and indeno(1,2,3-cd)pyrene (maximum 13 mg/kg), were detected in shallow and deep samples at concentrations exceeding Restricted Residential SCOs.
  - Several metals including barium (maximum 730 mg/kg), copper (maximum 118 mg/kg), lead (maximum 2,490 mg/kg), mercury (maximum 10.1 mg/kg), nickel (maximum 47.5 mg/kg), and zinc (maximum 1,190 mg/kg) were detected at concentrations exceeding Unrestricted Use SCOs. Barium, lead, and mercury exceeded Restricted Residential SCOs.

- Three pesticides including 4-4'-DDE (maximum 0.011 mg/kg), 4-4'-DDT (maximum 0.0107 mg/kg), and dieldrin (maximum 0.00855 mg/kg) were detected at concentrations exceeding Unrestricted Use SCOs in shallow and deep samples.
  - Overall, soil chemistry is consistent with sites containing historic urban fill material in New York City.
6. Soil vapor samples collected during the Remedial Investigation were compared to New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (revised May 2017) Matrix A, B, and C guidance values. Soil gas samples showed petroleum-related VOCs and chlorinated VOCs present at low concentrations. The total concentration of petroleum-related VOCs (BTEX) ranged from 156  $\mu\text{g}/\text{m}^3$  to 469.1  $\mu\text{g}/\text{m}^3$ . Overall, the highest reported concentration was for n-hexane at 19,500  $\mu\text{g}/\text{m}^3$ . The chlorinated VOC, tetrachloroethene (PCE) was detected in two of the six samples at concentrations ranging from 2.64  $\mu\text{g}/\text{m}^3$  to 4.08  $\mu\text{g}/\text{m}^3$ . Trichloroethene (TCE) was detected in one sample at a concentration of 1.24  $\mu\text{g}/\text{m}^3$ . The chlorinated VOCs methylene chloride, 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, carbon tetrachloride, and vinyl chloride were not detected in any of the samples. Concentrations of PCE and TCE are within the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.
  7. Supplemental soil vapor sample analytical results were compared to NYSDOH Final Guidance on Soil Vapor Intrusion (revised May 2017) Matrix A, B, and C guidance values. Sample SV-7, installed at the former location of SV-5, contained hexane at a concentration of 35.2  $\mu\text{g}/\text{m}^3$ , which is three orders of magnitude lower than the concentration detected in SV-5. Sample SV-8, installed approximately 20 feet north of SV-7, contained hexane at an even lower concentration (2.28  $\mu\text{g}/\text{m}^3$ ). No other compounds were detected at concentrations within an order of magnitude of hexane in SV-5 during the August 2018 RI. The total concentration of benzene, toluene, ethylbenzene, and total xylenes (BTEX) ranged from 41.33  $\mu\text{g}/\text{m}^3$  to 83.77  $\mu\text{g}/\text{m}^3$ . Overall, the highest reported concentration was for acetone (a common lab decontamination product) at 1,700  $\mu\text{g}/\text{m}^3$ . The chlorinated VOCs methylene chloride, 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, carbon tetrachloride, and vinyl chloride were not detected in the samples.

## Summary of the Remedial Action

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program (CAMP) for particulates and volatile organic compounds.
3. Establishment of Track 4 Site-specific SCOs.
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs, and marking/staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs for lead, mercury, barium and SVOC hotspot removal, approximately 25 square feet of area in the parking lot will be excavated to 22 feet below grade (SB-5 area). The rest of the parking lot area (approximately 4775 square feet) will be excavated to a depth of approximately 20 feet below grade for development purposes. Approximately 5,500 tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.

9. Permanently close one 3,000-gallon UST underneath the sidewalk vault along Nevins Street and removal of all USTs that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with USTs and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of five end-point sample and one at the base of the hot-spot excavation to determine the performance of the remedy with respect to attainment of Track 4 Site-Specific SCOs.
12. Import of materials to be used for backfilling and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. For the new building construction, the installation of an engineered composite cover consisting of a minimum of six-inch thick concrete building mat slab with a 6-inch clean granular sub-base. For the existing building, construction of an engineered composite cover consisting of an additional 2-inch topping concrete layer (poured on top of the existing 2- to 8-inch thick concrete slab that will remain in place) and the construction of a minimum of 4-inch poured concrete layer on a 6-inch sub-base in courtyard areas.
14. For the new building construction, the installation of a vapor barrier system consisting of vapor barrier beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor intrusion into the building. The vapor barrier system will consist of a nominal 46-mil Grace Preprufe 300R (or approved equivalent) below the slab and a 31-mil Grace Preprufe 160R, or 60-mil Bituthene 4000 (or approved equivalent) outside the sub-grade foundation sidewalls within the new building area. All welds, seams and penetrations will be properly sealed with Bituthene (or approved equivalent) per manufacturer instructions to prevent preferential pathways for vapor migration. For the existing building renovation (which includes the existing cellar that occupies portions of Lot 43, 44, and 45), the installation of a vapor barrier system and foundation sidewalls consisting of a CETCO Liquid Boot system (or approved equivalent), consisting of Liquid Boot® Ultrashield G-

1000, 60-dry mil Liquid Boot®, Liquid Boot® base fabric, and Liquid Boot® Ultrashield G-1000, 60-dry mil Liquid Boot® (or approved equivalent) applied on the existing cellar slab and then subsequently topped with a 2-inch thick concrete slab. The two types of vapor barriers will be applied in different sections of the proposed development which will be separated by building walls and are not anticipated to overlap or seam together.

15. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
18. Submission of an approved Site Management Plan (SMP) in the Remedial Action Plan (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
19. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER approval.

## COMMUNITY PROTECTION STATEMENT

The NYC Office of Environmental Remediation (OER) provides governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies, shows the location of identified contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities and also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

### **Project Information:**

- Site Name: 50 Nevins Street
- Site Address: 50 Nevins Street, Brooklyn, New York
- NYC Project Number: 18EHAN493K

### **Project Contacts:**

- OER Project Manager: Myrna Hanna, (212)788-8841
- Site Project Manager: Nikant Ohri, (212) 385-3030
- Safety Officer: Paul Medovoy (Mega Contracting) 347.231.0461
- Online Document Repository: <https://a002-pic.nyc.gov/app/workspace/pma/7047/docrepository>

**Remedial Investigation and Cleanup Plan:** Under the oversight of the NYC OER, a thorough study of this property (called a remedial investigation) has been performed to identify past property

usage, to sample and test soils, groundwater and soil vapor, and to identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

**Identification of Sensitive Land Uses:** Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

**Qualitative Human Health Exposure Assessment:** An important part of the cleanup planning for the Site is a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

**Health and Safety Plan:** This cleanup plan includes a Construction Health and Safety Plan (CHASP) that is designed to protect community residents and on-Site workers. The elements of this RAWP are in compliance with applicable safety requirements of the United States Occupational Safety and Health Administration (OSHA). This RAWP includes many protective elements including those discussed below.

**Site Safety Coordinator:** This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of this Community Protection Statement.

**Worker Training:** Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operator training course and to take annual

refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

**Community Air Monitoring Plan:** Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a ‘Contingency Plan’).

**Odor, Dust and Noise Control:** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with applicable NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

**Quality Assurance:** This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

**Stormwater Management:** To limit the potential for soil erosion and discharge, this cleanup plan has provisions for stormwater management. The main elements of the stormwater management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.



**Hours of Operation:** The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation will conform to requirements of the NYC Department of Buildings.

**Signage:** While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet and provides project contact names and numbers, and a link to the document repository where project documents can be viewed.

**Complaint Management:** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager or the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document or call 311.

**Utility Mark-outs:** To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

**Soil and Liquid Disposal:** All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations, and required permits will be obtained.

**Soil Chemical Testing and Screening:** All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

**Stockpile Management:** Soil stockpiles will be kept covered with tarps to prevent dust, odor and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced.

Stockpiles will be protected with silt fences. Hay bales will be used, as needed, to protect storm water catch basins and other discharge points.

**Trucks and Covers:** Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with applicable laws and regulations.

**Imported Material:** All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on the Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

**Equipment Decontamination:** All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

**Housekeeping:** Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

**Truck Routing:** Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

**Final Report:** The results of all cleanup work will be fully documented in a final report (called the Remedial Action Report) that will be available for public review online. A link to the online

document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document.

**Long-Term Site Management:** If long-term protection is needed after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined either in the property's deed or established through a city environmental designation registered with the Department of Buildings. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

# REMEDIAL ACTION WORK PLAN

## 1.0 Project Background

The Institute of Community Living is working with the NYC Office of Environmental Remediation (OER) in the “E” Designation Program to investigate and remediate a property located at 50 Nevins Street in the Boerum Hill section of Brooklyn, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

## 1.1 Site Location and Background

The Site is located at 50 Nevins Street in the Boerum Hill section in Brooklyn, New York and is identified as Block 172 and Lot 37 on the New York City Tax Map. The Site is 12,740 square feet in area and is bounded by Schermerhorn Street to the north, State Street to the south, Nevins Street to the east, and a Holiday Inn Hotel and residential properties to the west. The Site is currently vacant and undergoing interior renovation. The Site Location Map is provided in **Figure 1**.

The Site contains one 7-story (southern portion) to 9-story (northern portion) building fronting Nevins Street and has a full cellar that extends beyond the existing building footprint (the top of the cellar slab is approximately 16 feet bgs). The Site also contains an asphalt paved parking area on the northwestern portion fronting Schermerhorn Street. A Site Plan is provided in **Figure 2**. Photographs of the Site are included in **Appendix A**.

## 1.2 Redevelopment Plan

The development project consists of the renovation of the existing 7-story to 9-story building (with full cellar and sub-cellar levels) and the construction of a new 10-story building addition (with full cellar and sub-cellar levels) on the northwestern portion of the Site (i.e. the current parking area). The proposed approximately 12,150 square-foot building footprint will cover 95% of the lot. The upper three stories of the new building addition will be connected to, and extended above, the northern portion of the existing building. The approximately 126-foot high mixed-use building will feature commercial space on the first floor and residential units on upper levels. The cellar uses will consist of retail, storage, fitness, detention tank, cycle parking, laundry room, electric room, compactor room, etc. The sub-cellar, open to cellar floor on the western portions, will be used for office, computer lab/after-school program, conference room, pantry/lunch room, RPZ room, refuse, etc. A paved courtyard will be located southwest of the new building, adjacent to the adjoining existing 4-story residential properties (Block 172 Lots 43, 44 and 45). The proposed cellar excavation for the new building will be limited to the existing parking area (i.e. approximately 4,000 square feet of the new building footprint) down to approximately 20 feet bgs. This will generate an estimated 3,500 cubic yards (CY) of excavated material. Groundwater is anticipated at a depth of 35 feet bgs or deeper and therefore will not be encountered during excavation activities. The proposed development comprises 129 units, of which 78 are supporting housing units and 51 are affordable housing units. The total internal gross square footage (as reported to the Department of Buildings) is 88,793 square feet. Layout of the proposed site development is presented in **Appendix B**.

The current zoning designation is within high bulk commercial district (C6-4) as well as a Mandatory Inclusionary Housing (MIH) area. The proposed use is consistent with existing zoning for the property.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

### **1.3 Description of Surrounding Property**

The Site vicinity is primarily zoned as residential (R6B) with commercial properties (C6-2, C6-4). Residences are generally multi-story buildings west and southwest of the Site. Commercial establishments such as hotels, restaurants, and general stores are mostly located along Schermerhorn Street and Nevins Street, to the north and east respectively. State Street is located to the south and several townhouses are located to the west of the Site. Several daycare facilities were identified within a 500-foot radius of the Site. These include the Strong Place for Hope Day Care Center/DBA – Atlantic, located 475 feet southeast of the Site; Hanover Place Child Care, LLC, and Milestone School for Child Development, located 475 feet northeast of the Site. No other sensitive receptors such as hospitals or schools were identified within the 500-foot radius. **Figure 3** shows the surrounding land usage.

### **1.4 Summary of Past Site Uses and Areas of Concern**

Based upon review of the Sanborn maps and historical documents, the Site consisted of dwellings with coal and wood yards in the late 1880s. It was part of the dense urban neighborhood of South Brooklyn. In the early 1900s, the Site was subdivided into several lots. The Site contained a 7-story to 9-story building with basement level in the main lot and three-story dwellings on the northwestern portion of the Site. The dwelling units on the northwestern portions were demolished around the 1950s and the area has been vacant and used as a parking lot since then. Harriet Judson Memorial Young Women's Christian Association (YWCA) occupied the building until around the 1960s. The Brooklyn Psychosocial Rehab Institute Inc, Brooklyn Vocational Rehabilitation Institute, Cobble Hill Rehabilitation Institute occupied the property until the late 1980s. ICL Real Property Holding Corporation has occupied the property since 1995.

Based on the previous investigations, the AOCs identified for this site include:

- A 3,000-gallon UST is located underneath the sidewalk vault along Nevins Street. Access to the vault is through an elevated crawl space in the building cellar. The vault appears old. Some unused piping also was observed.
- 250-gallon fuel oil AST in cellar of the 7-story building.

- Prior closed spills #0209832 due to tank test failure (closed on September 30, 2003) and #0104574 due to tank test failure (closed on November 26, 2008)

In addition, Phase I ESAs identified the following construction-related concerns:

- Several unused pipes were observed inside the sidewalk vault. Old utility lines should be properly decommissioned.
- Surface soil to be excavated for property development purposes could be impacted due to long-term exposure to the urban environment. Such impacted material that is excavated from a construction site for off-Site disposal is a regulated material and should be managed in accordance with applicable regulations.
- Although groundwater is not anticipated to be encountered, groundwater sampling and testing in conformance with New York City Department of Environmental Protection (NYCDEP) sewer discharge permit/approval requirements will be required should groundwater be encountered, and dewatering be implemented for construction.

## **1.5 Summary of Work Performed under the Remedial Investigation**

A Remedial Investigation was performed by GZA in August 2018. The following scope of services was performed during the RI:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Completed a geophysical survey event in the parking lot, basement, and the sidewalk along Schermerhorn Street and Nevins Street to assist in the possible identification of utilities, underground storage tanks and other substructures;
3. Installed six soil borings spaced evenly across the Site (i.e. three in existing building area [SB-1, SB-2, and SB-6] and three in parking lot [SB-3, SB-4, and SB-5]) and collected 10 soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed six evenly spaced soil vapor probes on the Site (i.e. three in existing building area [SV-1, SV-2, and SV-6] and three in parking lot [SV-3, SV-4, and SV-5]) and collected six soil vapor samples for chemical analysis.
5. Groundwater was not encountered during the RI (due to the Site's proximity to the NYCT tunnels) therefore groundwater samples were not collected analyzed.

A Supplemental Remedial Investigation (See **Appendix C**) was performed by GZA in February 7, 2019. The objective of the supplemental investigation was to verify the anomalous laboratory result received from soil vapor sample SV-5. As describe above, SV-5, which was collected on August 27, 2018 at a depth of 20 feet bgs, contained hexane at a concentration of 19,500 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). GZA installed two soil vapor probes to 20 feet bgs; one near SV-5 (designated as SV-7) and one approximately 20 feet north of SV-5 (designated as SV-8).

## **1.6 Summary of Findings of Remedial Investigation**

A remedial investigation was performed, and the results are documented in a companion document called "Remedial Investigation Report, 50 Nevins Street," revised February 25, 2019(RIR).



The Remedial Investigation findings are summarized below.

1. The property is at an approximate elevation of 40 feet above mean sea level (MSL).
2. Groundwater was not encountered due to Site's proximity to the NYCT subway tunnels and thus not sampled as part of this investigation.
3. Depth to bedrock is anticipated to be greater than 150 feet below ground surface. Bedrock was not encountered during this investigation.
4. The stratigraphy of the Site beneath the existing building concrete slab consists of a fill layer that extends 2 feet (approximately 18 feet bgs). The fill consisted mainly of brown, fine to coarse or fine to medium sand, with up to 35 percent gravel and varying amounts of brick fragments. The stratigraphy of the Site beneath the parking space asphalt pavement consists of a fill layer that extended to approximately 17 feet bgs. The fill consisted mainly of light brown, brown, or black, fine to coarse sand, with up to 35 percent gravel and varying amounts of debris such as concrete and brick fragments. The fill layer is underlain by a sand layer to more than 20 feet bgs.
5. Soil/fill samples collected during the Remedial Investigation were compared to the New York State Department of Environmental Conservation (NYSDEC) 6NYCRR Part 375 Section 6.8 Unrestricted Use and Restricted Residential Use Soil Cleanup Objectives (SCOs). The results are as follows:
  - No volatile organic compounds (VOCs) or polychlorinated biphenyls (PCBs) were detected exceeding SCOs with the exception of one VOC. Methylene chloride was detected at 0.32 milligrams per kilogram (mg/kg), a concentration exceeding Unrestricted Use SCOs in one shallow (0-2') sample.
  - Several SVOCs including benzo(a)anthracene (maximum 23 mg/kg), benzo(a)pyrene (maximum 20 mg/kg), benzo(b)fluoranthene (maximum 29 mg/kg), benzo(k)fluoranthene (maximum 4 mg/kg), chrysene (maximum 21 mg/kg), dibenzo(a,h)anthracene (maximum 2.9 mg/kg) and indeno(1,2,3-cd)pyrene (maximum 13 mg/kg), were detected in shallow and deep samples at concentrations exceeding Restricted Residential SCOs.

- Several metals including barium (maximum 730 mg/kg), copper (maximum 118 mg/kg), lead (maximum 2,490 mg/kg), mercury (maximum 10.1 mg/kg), nickel (maximum 47.5 mg/kg), and zinc (maximum 1,190 mg/kg) were detected at concentrations exceeding Unrestricted Use SCOs. Barium, lead, and mercury exceeded Restricted Residential SCOs.
  - Three pesticides including 4-4'-DDE (maximum 0.011 mg/kg), 4-4'-DDT (maximum 0.0107 mg/kg), and dieldrin (maximum 0.00855 mg/kg) were detected at concentrations exceeding Unrestricted Use SCOs in shallow and deep samples.
  - Overall, soil chemistry is consistent with sites containing historic urban fill material in New York City.
6. Soil vapor samples collected during the Remedial Investigation were compared to New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (revised May 2017) Matrix A, B, and C guidance values. Soil gas samples showed petroleum-related VOCs and chlorinated VOCs present at low concentrations. The total concentration of petroleum-related VOCs (BTEX) ranged from 156  $\mu\text{g}/\text{m}^3$  to 469.1  $\mu\text{g}/\text{m}^3$ . Overall, the highest reported concentration was for n-hexane at 19,500  $\mu\text{g}/\text{m}^3$ . The chlorinated VOC, tetrachloroethene (PCE) was detected in two of the six samples at concentrations ranging from 2.64  $\mu\text{g}/\text{m}^3$  to 4.08  $\mu\text{g}/\text{m}^3$ . Trichloroethene (TCE) was detected in one sample at a concentration of 1.24  $\mu\text{g}/\text{m}^3$ . The chlorinated VOCs methylene chloride, 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, carbon tetrachloride, and vinyl chloride were not detected in any of the samples. Concentrations of PCE and TCE are within the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.
7. Supplemental soil vapor samples analytical results were compared to NYSDOH Final Guidance on Soil Vapor Intrusion (revised May 2017) Matrix A, B, and C guidance values. Most significantly, sample SV-7 contained hexane at a concentration of 35.2  $\mu\text{g}/\text{m}^3$ , which is three orders of magnitude lower than the concentration detected in SV-5 during the August 2018 RI. Sample SV-8 contained hexane at an even lower concentration (2.28  $\mu\text{g}/\text{m}^3$ ). No other compounds were detected at concentrations within an order of

magnitude of hexane in SV-5. The total concentration of benzene, toluene, ethylbenzene, and total xylenes (BTEX) ranged from 41.33 µg/m<sup>3</sup> to 83.77 µg/m<sup>3</sup>. Overall, the highest reported concentration was for acetone (a common lab decontamination product) at 1,700 µg/m<sup>3</sup>. The chlorinated VOCs methylene chloride, 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, carbon tetrachloride, and vinyl chloride were not detected in the samples.

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this site.

## **2.0 Remedial Action Objectives**

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for this Site:

### **Soil**

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.

### **Soil Vapor**

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling.

### **3.0 Remedial Alternatives Analysis**

The goal of the remedy selection process is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). Remedial alternatives are then developed and evaluated based on the following ten criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community acceptance;
- Land use; and
- Sustainability.

As required, a Track 1 Unrestricted Use scenario is evaluated for the remedial action. The following is a detailed description of the alternatives analyzed to address impacted media at the Site:

#### **Alternative 1:**

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) SCOs.
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. If soil/fill containing analytes at concentrations above Unrestricted Use SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building's cellar level and hot spot removal is complete, additional

excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 1 Unrestricted Use SCOs.

- No Engineering or Institutional Controls are required for a Track 1 cleanup. As part of development, a vapor barrier and composite cover would be installed to prevent potential exposures from soil vapor in the future.

**Alternative 2:**

- Removal of all soil/fill exceeding Track 4 Site-specific SCOs and confirmation that Track 4 Site-specific SCOs have been achieved with post-excavation end point sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by excavating one hot spot (SB-5 area) to a depth of about 22 feet. As part of development, soil beneath the rest of the site will be removed to a depth of 20 feet for construction of the new building's cellar. It is likely that soil with analytes above Track 4 Site-Specific SCOs will be encountered below the excavation depths required for development and hot spot removal. If soil/fill containing analytes at concentrations above Track 4 Site-specific SCOs are still present at the base of the excavation, additional excavation would be performed to meet Track 4 Site-Specific SCOs.
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill;
- For the new building construction, installation of a vapor barrier system consisting of Grace Preprufe 300R overlain by the new building slab. For the existing building renovation, installation of a vapor barrier system consisting of 60 dry mil liquid boot waterproofing system applied over the existing floor slab, then overlain by an additional 2-inch concrete slab. The vapor barrier systems will be extended along foundation side walls and the existing building walls to prevent potential exposures from soil vapor;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were

intended. The SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP; and

- The property will continue to be registered with an E-Designation at the NYC Buildings Department.
- Placement of a deed notice to record the ECs/ICs on the deed to ensure that future owners of the Site continue to comply with the SMP, as required.

We propose Track 4 SCO's for this work plan. Based upon the end point samples, Alternative 2 Restricted Residential or Restricted Commercial SCO's may be achieved.

### **3.1 Threshold Criteria**

#### **Protection of Public Health and the Environment**

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

**Alternative 1** would be protective of human health and the environment by removing all soil/fill exceeding Track 1 Unrestricted Use SCO's and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contaminants leaching into groundwater.

**Alternative 2** would achieve comparable protections of human health and the environment by excavation and removal of most of the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCO's, as well as by placement of Institutional and Engineering Controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan and continuing the E-designation instituting a deed notice on the property would ensure that the composite cover system remains intact and protective of public health. Establishment of Track 4 Site-Specific SCO's would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils or groundwater (if encountered) during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil/Materials Management Plan, and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater (if encountered) would be prevented because its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier across the entire slab and outside of the foundation walls of the new building construction and incorporation of the vapor barrier into the interior renovation of floors and walls of the existing building.

## **3.2 Balancing Criteria**

### **Compliance with Standards, Criteria and Guidance (SCGs)**

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

**Alternative 1** would achieve compliance with the remedial goals, chemical-specific standards, criteria, and guidance (SCGs) and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Protection of Groundwater SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system beneath the slab and outside of subgrade foundation walls for the new building construction and overlaying the vapor barrier system in the interior of subgrade floors and walls during existing building renovation.

**Alternative 2** would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system beneath the slab and outside of subgrade foundation walls for the new building construction and overlaying the vapor barrier system in the interior of subgrade floors and walls during existing building renovation. A Site Management Plan would ensure that these controls remained protective for the long term.

Health and safety measures contained in the CHASP and CAMP will be implemented during Site redevelopment under this RAWP. For both alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of

contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

## **Short-Term Effectiveness and Impacts**

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their short-term effects during the remedial action on public health and the environment during implementation of the remedial action, including protection of the community, protection of onsite workers and environmental impacts.

Both **Alternative 1** and **2** have similar short-term effectiveness during their implementation, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic during the new building construction and with the grinding and sanding of the existing building slab during the existing building renovation. Short-term impacts could potentially be higher for Alternative 1 since excavation of greater amounts of historical fill material would take place. However, focused attention to means and methods during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.

An additional short-term adverse impact and risk to the community associated with both remedial alternatives is increased truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flag persons will be used to protect pedestrians at Site entrances and exits.

The potential adverse impact to the community, workers and the environment for both alternatives would be minimized through implementation of control plans including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) would provide protection from on-Site



contaminants by using personal protective equipment would be worn consistent with the documented risks within the respective work zones.

## **Long-term effectiveness and permanence**

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of Engineering Controls/Institutional Controls (ECs/ICs) that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of ECs.

**Alternative 1** would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill above Track 1 Unrestricted Use SCO's. Removal of on-Site contaminant sources will also prevent future groundwater contamination.

**Alternative 2** would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; installing a composite cover system across the Site (for both new building construction and the existing building renovation); maintaining use restrictions; establishing an SMP to ensure long-term management of ICs and ECs; and maintaining registration as an E-designated property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended, assuring that protections designed into the remedy continue to provide the required level of protection.

## **Reduction of toxicity, mobility, or volume of contaminated material**

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are

to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

**Alternative 1** will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 Unrestricted Use SCO's.

**Alternative 2** would remove most of the historic fill at the Site, and all remaining on-Site soil/fill beneath the new building will meet Track 4 Site-Specific SCO's.

Alternative 1 would remove a greater total mass of contaminants from the Site. The removal of soil to 20 feet for the new building construction and hot spot soil removal to 22 feet in both scenarios would lessen the difference in contaminant mass removal between these two alternatives.

## **Implementability**

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

The techniques, materials and equipment to implement both **Alternatives 1** and **2** are readily available and have been proven to be effective in remediating the contaminants present on the Site. They use standard equipment and technologies that are well established in the industry. The reliability of each remedy is also high. There are no special difficulties associated with any of the activities proposed.

## **Cost Effectiveness**

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site

management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Since historic fill at the Site was found to extend to a depth of up to at least 20 feet below grade during the RI, and the new building requires excavation of the entire Site to a depth of 20 feet, the costs associated with both **Alternative 1** and **Alternative 2** will likely be comparable. Costs associated with Alternative 1 could potentially be higher than Alternative 2 if soil with analytes above Track 1 Unrestricted Use SCOs is encountered below the excavation depth required for the new building construction. Additional costs would include installation of additional shoring/underpinning, disposal of additional soil, and import of clean soil for backfill. The cost associated with Alternative 1 could also be potentially higher for the existing building renovation because it will necessitate the analyses of the soils underneath the existing building and the removal soils underneath of the existing building slab if analytes are found to be above Track 1 SCOs. However, long-term costs for Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

The remedial plan would couple the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan will also consider the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during cleanup and redevelopment of the Site.

## **Community Acceptance**

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

This RAWP will be subject to a public review under the NYC E-Designation and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in **Appendix D**. Observations here will be supplemented by public comment received on the RAWP. Under both alternatives, the overall goals of the remedial program, to protect public health and the environment and eliminate potential contaminant exposures, have been broadly supported by citizens in NYC communities.

## Land Use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. The proposed future use of the Site includes a 7-story to 10-story residential building to provide 78 supporting housing units and 51 affordable housing units. Following remediation, the Site will meet either Track 1 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are protective of public health and the environment for its planned residential use. The proposed use is compliant with the property's zoning and is consistent with recent development patterns. The areas surrounding the site is urban and primarily consists of residential and commercial properties. Residences are generally multi-story buildings west and southwest of the Site. Commercial establishments such as hotels, restaurants, and general stores are mostly located along Schermerhorn Street and Nevins Street, to the north and east respectively. State Street is located to the south and several townhouses are located to the west of the Site. Several daycare facilities were identified within a 500-foot radius of the Site. These include the Strong Place for Hope Day Care Center/DBA – Atlantic, located 475 feet southeast of the Site; Hanover Place Child Care, LLC and Milestone School for Child Development, located 475 feet northeast of the Site. No other sensitive receptors such as hospitals or schools were identified with the 500-foot radius. The development would remediate the contaminated parking lot, expand and renovate the existing vacant building, and provide a modern residential building with supporting housing units and affordable housing units. The proposed

development would clean up the property and make it safer, create new employment opportunities, living space for affordable and supportive housing and associated societal benefits to the community, and other economic benefits from land revitalization.

Temporary short-term project impacts are being mitigated through site management controls and truck traffic controls during remediation activities. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Track 4 Site-Specific SCOs, both of which are protective of public health and the environment for its planned use.

The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is located in an urban area and not in proximity to fish or wildlife and neither alternative would result in any potential exposure pathways of contaminant migration affecting fish or wildlife. The remedial action is also protective of groundwater natural resources. The Site does not lie in a Federal Emergency Management Agency (FEMA)-designated flood plain. Both alternatives are equally protective of natural resources and cultural resources. Improvements in the current environmental condition of the property achieved by both alternatives considered in this plan are consistent with the City's goals for cleanup of contaminated land.

## **Sustainability of the Remedial Action**

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in PlaNYC: A Greener, Greater New York. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

While **Alternative 2** would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan for either alternative

would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. The New York City Clean Soil Bank program is available for reuse of any clean native soils under either alternative. A complete list of green remedial activities is included in a Sustainability Statement attached in **Appendix E**.

### **Selection of Preferred Remedy:**

The preferred remedy for the site is **Alternative 2, Track 4 Site Specific SCOs**. Data generated during the site investigation support the conclusion that Restricted Residential Use SCOs for soil can be achieved with the proposed excavations at this site and will be confirmed by end point samples. If Unrestricted Use SCOs are achieved, Track 2 will be given to this Site. The Alternative 2 remedy will remove all soil/fill exceeding Track 4 Site Specific Use SCOs throughout the Site, which will be confirmed with post-excavation sampling. Engineering Controls are required for a Track 4 cleanup. A vapor barrier covering the concrete cellar slab of the new development would be installed. It will consist of Grace Preprufe 300R overlain by the new building slab. The Engineering Controls for the existing building will be comprised of a vapor barrier system consisting of 60 dry mil liquid boot waterproofing system applied over the existing floor slab, then overlain by an additional 2-inch concrete slab. The vapor barrier systems will be extended along foundation side walls and the existing building walls. Use restrictions will be imposed on the site (including prohibitions on any use higher than Restricted Residential, e.g. the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without NYSDEC approval). The Site would continue to be encumbered with an E-designation for hazardous material.”

## 4.0 Remedial Action

### 4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is **Alternative 2**, the Track 4 remedial action. The preferred remedial action achieves protection of public health and the environment for the intended use of the property. The preferred remedial action will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Track 4 Site-specific SCOs.
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs for lead, mercury, barium and SVOC hotspot removal, approximately 25 square feet of area in the parking lot will be excavated to 22 feet below grade. The rest of the parking lot area (approximately 4775 square feet) will be excavated to a depth of approximately 20 feet below grade for development purposes. Approximately 5,500 tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.

8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Permanently close one 3,000-gallon UST underneath the sidewalk vault along Nevins Street and removal of all USTs that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with USTs and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of five end-point samples and one end-point sample at the base of the hot-spot excavation to determine the performance of the remedy with respect to attainment of Track 4 Site-Specific SCOs.
12. Import of materials to be used for backfilling and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. For the new building construction, the installation of an engineered composite cover consisting of a minimum of six-inch thick concrete building mat slab with a 6-inch clean granular sub-base. For the existing building renovation, construction of an engineered composite cover consisting of an additional 2-inch topping concrete layer (poured on top of the existing 2- to 8-inch thick concrete slab that will remain in place) and the construction of a minimum of 4-inch poured concrete layer on a 6-inch sub-base in courtyard areas.
14. For the new building construction, the installation of a vapor barrier system beneath the building slab and outside of sub-grade foundation sidewalls. The vapor barrier system will consist of a nominal 46-mil Grace Preprufe 300R (or approved equivalent) below the slab and a 31-mil Grace Preprufe 160R, or 60-mil Bituthene 4000 (or approved equivalent) outside the sub-grade foundation sidewalls within the new building area. All welds, seams and penetrations will be properly sealed with Bituthene (or approved equivalent) per manufacturer instructions to prevent preferential pathways for vapor migration. For the



existing building (which includes the existing cellar that occupies portions of Lot 43, 44, and 45), the installation of a CETCO Liquid Boot system (or approved equivalent), consisting of Liquid Boot® Ultrashield G-1000, 60-dry mil Liquid Boot®, Liquid Boot® base fabric, and Liquid Boot® Ultrashield G-1000, 60-dry mil Liquid Boot® (or approved equivalent) applied on the existing cellar slab and then subsequently topped with a 2-inch thick concrete slab. The two types of vapor barriers will be applied in different sections of the proposed development which will be separated by building walls and are not anticipated to overlap or seam together.

15. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
18. Submission of an approved SMP in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
19. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

## 4.2 Soil Cleanup Objectives and Soil/ Fill Management

The following Track 4 Site-Specific SCO's will be utilized for this project:

<u>Contaminant</u>	<u>Site-Specific SCO's</u>
Total SVOCs	200 ppm
Lead	800 ppm
Mercury	1.5 ppm
Barium	600 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in **Appendix F**. Discrete contaminant sources (such as hotspots) identified during the Remedial Action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

### Soil/Fill Excavation and Removal

Soil/fill exceeding Track 4 Site Specific SCO's will be removed. For lead, mercury, barium and SVOC hotspot removal, approximately 25 square feet of area in the parking lot will be excavated to 22 feet below grade. The rest of the parking lot area (approximately 4,775 square feet) will be excavated to a depth of approximately 20 feet below grade for development purposes. The locations of the planned excavations are shown in **Figure 4**. The total quantity of soil/fill expected to be excavated and disposed off-Site is approximately 5,250 tons (3,500 cubic yards). For each disposal facility to be used in the remedial action, a letter from the developer/QEP to the receiving facility requesting approval for disposal and a letter back to the developer/QEP providing approval for disposal will be submitted to OER prior to any transport and disposal of soil at a facility.

The proposed disposal locations for Site-derived impacted materials are listed below.

Disposal Facility	Waste Type	Estimated Quantity
CleanEarth of Carteret, 24 Middlesex Avenue, Carteret, NJ	Non-Hazardous soil Historic Fill and Hotspot Excavation.	3,500cubic yards

Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

## End-point Sampling

End-point samples will be analyzed for compounds and elements as described below utilizing the following methodology:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs performing end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. The proposed seven end-point sample locations are shown on **Figure 5**.

## Confirmation End-point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation end-point soil sampling. Five bottom samples (at approximately 20 feet bgs) will be collected from the base of the development excavation and one sample will be collected at the base of the hot-spot excavation. In addition, one endpoint sample will be collected from beneath the existing building cellar prior to the installation of the vapor barrier. To evaluate attainment of Track 1 or Track 4 Site-specific SCOs, analytes will include VOCs, SVOCs, Metals, Pesticides, and PCBs.

## Hotspot End-point Sampling

End-point samples will be collected from the base of excavation at the lead, mercury, barium and SVOC hotspot location identified in the Remedial Investigation, according to the procedure listed below. The hotspot is located at SB-5 and the contaminants present are mercury, lead, barium, and total SVOCs. End-point samples will be analyzed for SCO trigger parameters.

For any additional hotspots identified during this remedial program, including any hotspots identified during the remedial action, hotspot removal actions will be performed to ensure that hotspots are fully removed, and end-point samples will be collected at the following frequency:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
  - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
  - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation end-point sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

If either light non-aqueous phase liquid (LNAPL) and/or dense non-aqueous phase liquid (DNAPL) are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

## **Quality Assurance/Quality Control**

The Quality Assurance Project Plan (QAPP) generally describes a Quality Assurance / Quality Control (QA/QC) program of the Site consistent with contract documents and the nature of the work to be performed, including applicable codes, standards and regulations. Elements considered in preparing a QAPP are:

- the quality-related activities to be performed according to the contract scope of work;
- the need for special controls over QA/QC activities;
- sample collection apparatus
- sampling methods
- decontamination methods
- sample containers
- holding time
- preservatives including temperature
- lab blanks
- detection levels

QA/QC procedures will be used to provide performance information with regard to accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sampling and analysis for this investigation. Field QA/QC procedures will be used: (1) to document that samples are representative of actual conditions at the Site; and (2) identify possible cross-contamination from field activities or sample transit. Laboratory QA/QC procedures and analyses will be used to demonstrate whether analytical results were biased either by interfering compounds in the sample matrix, or by laboratory techniques that could have introduced systematic or random errors to the analytical process. Trip blanks will be collected and analyzed for VOCs at an ELAP-certified laboratory. The QAPP is included as **Appendix G**.

## **Import of Soils**

Import of soils onto the property will be performed in conformance with the Soil/Materials Management Plan in **Appendix F**. Imported soil will meet the lower of:

- Track 2 Restricted Residential SCOs, and
- Groundwater Protection Standards in Part 375-6.8.

The estimated quantity of soil to be imported into the Site for backfill is approximately 60 cubic yards to raise the hot spot excavation back to development grade. A map of soil backfill placement locations is provided in **Figure 6**.

## **Reuse of Onsite Soils**

Soil reuse is not planned on this project.

### **4.3 Engineering Controls**

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the site. The Site has two primary Engineering Control Systems. These are:

- (1) Composite Cover System
- (2) Soil Vapor Barrier Systems

#### **Composite Cover System**

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site.

For the new building construction, the installation of an engineered composite cover consisting of a minimum of six-inch thick concrete building mat slab with a 6-inch clean granular sub-base. For the existing building, construction of an engineered composite cover consisting of an additional 2-inch topping concrete layer (poured on top of the existing 2- to 8-inch thick concrete slab that will remain in place) and the construction of a minimum of 4-inch poured concrete layer on a 6-inch sub-base in courtyard areas

**Appendix H** shows the typical design for each remedial cover type used on this Site. **Figure 7** shows the location of each cover type built at the Site.

The composite cover system will be a permanent engineering control. The system will be inspected, and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials Management Plan (SMMP) will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the Remedial Action Report.

## **Vapor Barrier System**

Migration of soil vapor from onsite or offsite sources into the building will be mitigated with a combination of building slab and vapor barrier.

For the new building construction, the installation of a vapor barrier system will consist of consist of a nominal 46-mil Grace Preprufe 300R (or approved equivalent) below the slab and a 31-mil Grace Preprufe 160R, or 60-mil Bituthene 4000 (or approved equivalent) outside the sub-grade foundation sidewalls within the new building area. All welds, seams and penetrations will be properly sealed with Bituthene (or approved equivalent) per manufacturer instructions to prevent preferential pathways for vapor migration. For the existing building (which includes the existing cellar that occupies portions of Lot 43, 44, and 45), the vapor barrier system will consist of the installation of a CETCO Liquid Boot system (or approved equivalent), consisting of Liquid Boot® Ultrashield G-1000, 60-dry mil Liquid Boot®, Liquid Boot® base fabric, and Liquid Boot® Ultrashield G-1000, 60-dry mil Liquid Boot® (or approved equivalent) applied on the existing cellar slab and topped with a 2-inch thick concrete slab. The two types of vapor barriers will be applied in different sections of the proposed development will be separated by building walls and are not anticipated to overlap or seam together.

The vapor barrier system is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building. The vapor barrier will extend throughout the

area occupied by the footprint of both the new and existing buildings and up the foundation sidewalls. It will be installed in accordance with manufacturer specifications.

A plan view showing the location of the proposed vapor barrier system is provided in **Figure 7**. Composite cover details for the existing building areas and the proposed building areas and typical design sections for the vapor barrier on slab and sidewalls are provided in **Drawings A-310 and A-311** included in **Appendix H**. Product specification sheets are provided in **Appendix H**. The Remedial Action Report will include as-built drawings and diagrams, manufacturer documentation, and photographs.

The Remedial Action Report will include a PE-certified letter (on company letterhead) from the primary contractor responsible for installation oversight and field inspections and a copy of the manufacturer's certificate of warranty.

The Vapor Barrier System is a permanent engineering control and will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying vapor barrier system is disturbed after the remedial action is complete. Maintenance of these systems will be described in the Site Management Plan in the Remedial Action Report.

#### **4.4 Institutional Controls**

A series of Institutional Controls (IC's) are required under this Remedial Action to assure permanent protection of public health by elimination of exposure to residual materials. These IC's define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a Site Management Plan included in the final Remedial Action Report (RAR). Institutional Controls would be:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the SMP which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;



- Submittal of a SMP in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, inspection, and certification of ECs and IC's. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3).
- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for a mixed residential and commercial use and will not be used for a higher level of use without prior approval by OER.

## **4.5 Site Management Plan**

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the OER

requirements. This includes a plan for: (1) implementation of EC's and ICs; (2) operation and maintenance of EC's; (3) inspection and certification of IC's and EC's.

Site management activities and EC/IC certification will be scheduled by OER on a periodic basis to be established in the RAR and the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 30 of the year following the reporting period.

#### **4.6 Qualitative Human Health Exposure Assessment**

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Data and information reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA) for this project. A QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk under current and future conditions by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

#### **Known and Potential Contaminant Sources**

Based on the results of the RIR, the contaminants of concern are:

##### **Soil:**

- Several SVOCs, specifically Polycyclic Aromatic Hydrocarbons (PAHs), including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene, were identified above their applicable Track 2 Restricted Residential SCOs.

- Barium, lead, and mercury exceeded Track 2 Restricted Residential SCOs.

### **Soil Vapor:**

- Trichloroethene (TCE) was detected in one sample at a concentration of  $1.24 \mu\text{g}/\text{m}^3$ , below NYSDOH AGV and NYSDOH Matrix A. However, the concentration is higher than NYSDOH Fuel Oil 2003 Upper Fence Limit Indoor and Outdoor values.
- Tetrachloroethene (PCE) was detected in two of the eight samples at concentrations ranging from  $2.64 \mu\text{g}/\text{m}^3$  to  $4.08 \mu\text{g}/\text{m}^3$ . The concentrations are below NYSDOH AGV and NYSDOH Matrix B values and above NYSDOH Fuel Oil 2003 Upper Fence Limit Indoor and Outdoor values.

### **Nature, Extent, Fate and Transport of Contaminants**

- **Soil:** The PAHs found in soils were identified in both the shallow and deep soil samples at SB-5. Barium and mercury in soils were identified in the shallow soil sample. Lead in soils was in both the shallow and deep soil samples. The contamination is likely associated with historic fill, which was encountered underneath the asphalt pavement and extended to approximately 17 feet bgs. It is anticipated that transport of contaminants is through leaching and volatilization into soil vapor.
- **Soil Vapor:** Both TCE and PCE were identified at low levels underneath the parking lot at SV-3 and the existing building slab at SV-6. PCE was also found at SV-1 underneath building slab. Even though the concentration underneath the southern existing building slab is slightly higher, the origin of the TCE and PCE is not known. The contaminants may have volatilized from groundwater and represent a background condition in this urban area.

### **Receptor Populations**

On-Site Receptors: The site currently contains one 7-story to -9-story vacant building and access to the Site is restricted by an 8-foot-high, chained and locked, perimeter fence in the parking lot area and doors at street level for the existing building. Onsite receptors are limited to trespassers, site representatives and visitors granted access to the property. During construction, potential on-site receptors include construction workers, site representatives, and visitors. Under

proposed future conditions, potential on-site receptors include adult and child building residents, workers and visitors.

Off-Site Receptors: Potential off-site receptors within a 500-foot radius of the Site include adult and child residents; children at the day care centers; commercial and construction workers; pedestrians; and trespassers based on the following land uses within 500 feet of the Site:

1. Commercial Businesses – existing and future
2. Residential Buildings – existing and future
3. Building Construction/ Renovation – existing and future
4. Pedestrians, Trespassers, Cyclists – existing and future
5. Schools – existing and future
6. Day Care Centers – existing and future

## **Potential Routes of Exposure**

Three potential primary routes exist by which chemicals can enter the body: ingestion, inhalation, and dermal absorption. Exposure can occur based on the following potential media:

- Ingestion of fill/ soil;
- Inhalation of vapors or particulates; and
- Dermal absorption of fill/ soil.

## **Potential Exposure Points**

*Current Conditions:* The site is currently capped with asphalt and building slab, thus there are no potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill. Groundwater is not exposed at the site. The site is served by the public water supply and there is no potential for exposure. The site is currently occupied by a vacant building and the building slab was disturbed during geotechnical and environmental subsurface investigation. The soil vapor may accumulate underneath building slab and intrude into the building.

*Construction/ Remediation Conditions:* During the remedial action, onsite workers will come into direct contact with surface and subsurface soils as a result of on-Site construction and excavation

activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with exposed impacted soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. Due to the depth of groundwater, direct contact with groundwater is not expected. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan, dust controls, and through the implementation of the Community Air Monitoring Program and a Construction Health and Safety Plan.

*Proposed Future Conditions:* Under future remediated conditions, all soils in excess of Track 4 SCOs will be removed. The site will be fully capped, preventing potential direct exposure to soil and groundwater remaining in place, and engineering controls (composite cover system and vapor barrier) will prevent any potential exposure due to inhalation by preventing soil vapor intrusion. The site is served by the public water supply, and groundwater is not used at the site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

## **Overall Human Health Exposure Assessment**

There are potential complete exposure pathways for the current site condition that require mitigation during implementation of the remedy. There are no complete exposure pathways under future conditions after the site is developed and this Plan is implemented. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide surface cover, and a subsurface vapor barrier system for the building. Under current conditions, on-Site exposure pathways exist for those with access to the Site and trespassers. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters near the Site that could be impacted or threatened.

## **5.0 Remedial Action Management**

### **5.1 Project Organization and Oversight**

Principal personnel who will participate in the remedial action include Benjamin Alter. The Professional Engineer (PE) and Qualified Environmental Professional (QEP) for this project are Stephen M. Kline and Benjamin Alter, respectively.

### **5.2 Site Security**

Site access will be controlled by gated entrances to the fenced parking lot and existing building.

### **5.3 Work Hours**

The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. The hours of operation will be conveyed to OER during the pre-construction meeting.

### **5.4 Construction Health and Safety Plan**

The Health and Safety Plan is included in **Appendix I**. The Site Safety Coordinator will be determined by the project manager, Nikant Ohri of ICL, closer to construction. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, such as 40-hour hazardous waste operator training and annual 8-hour refresher training. The Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and will comply with all requirements of 29 CFR 1910.120. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the CHASP. That document will define the specific project contacts for use in case of emergency.

## **5.5 Community Air Monitoring Plan**

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed 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, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed 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. Exceedances of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

## **VOC Monitoring, Response Levels, and Actions**

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

## **Particulate Monitoring, Response Levels, and Actions**

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate



monitoring will 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 will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m<sup>3</sup>) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m<sup>3</sup> above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m<sup>3</sup> above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m<sup>3</sup> of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for OER personnel to review.

## **5.6 Agency Approvals**

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

## **5.7 Site Preparation**

### **Pre-Construction Meeting**

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

## **Mobilization**

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

## **Utility Marker Layouts, Easement Layouts**

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations including NYC Building Code to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Mark-Out Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

## **Dewatering**

Dewatering is not anticipated during remediation and construction.

## **Equipment and Material Staging**

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

## **Stabilized Construction Entrance**

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete pads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

## **Truck Inspection Station**

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and clean water will be utilized for the removal of soil from vehicles and equipment, as necessary.

## **Extreme Storm Preparedness and Response Contingency Plan**

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

## **Storm Preparedness**

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

## **Storm Response**

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties,

property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

## **Storm Response Reporting**

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website ([www.nyc.gov/oer](http://www.nyc.gov/oer)) and will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the OER project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

## **5.8 Traffic Control**

Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the Site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is shown on **Figure 8**.

## **5.9 Demobilization**

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (e.g., soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

## **5.10 Reporting and Record Keeping**

### **Daily reports**

Daily reports providing a general summary of activities for each day of active remedial work will be emailed to the OER Project Manager by the end of the following business day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of excavation and other remedial work performed;
- Quantities of material imported and exported from the Site;

- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP results noting all excursions. CAMP data may be reported;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

## **Record Keeping and Photo Documentation**

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

### **5.11 Complaint Management**

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

### **5.12 Deviations from the Remedial Action Work Plan**

All changes to the RAWP will be reported to, and approved by, the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to

be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
- Determination with basis that the remedial action with the deviation(s) is protective of public health and the environment.

## **6.0 Remedial Action Report**

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- Text description with thorough detail of all engineering and institutional controls (if Track 1 remedial action is not achieved)
- As-built drawings for all constructed remedial elements;
- Manifests for all soil or fill disposal;
- Photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 remedial action is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results (including all soil test results from the remedial investigation for soil that will remain on site) and all soil/fill waste characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all soil or fill material removed from the Site including a map showing the location of these excavations and hotspots, tanks or other contaminant source areas;



- Full accounting of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material;
- Account of the origin and required chemical quality testing for material imported onto the Site;
- Continue registration of the property with an E-Designation by the NYC Department of Buildings (if Track 1 remedial action is not achieved);
- The RAWP and Remedial Investigation Report will be included as appendices to the RAR;
- Reports and supporting material will be submitted in digital form and final PDF's will include bookmarks for each appendix.

## Remedial Action Report Certification

I, Stephen M. Kline, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the 50 Nevins Street site, site number 18EHAN493K. I certify to the following:

- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated January 2019 and Stipulations in a letter dated TBD were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

PE License Number

Signature

Date

PE Stamp

I, Benjamin Alter, am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 50 Nevins Street site, site number 18EHAN493K. I certify to the following:

- The OER-approved Remedial Action Work Plan dated January 2019 and Stipulations in a letter dated TBD were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

Date

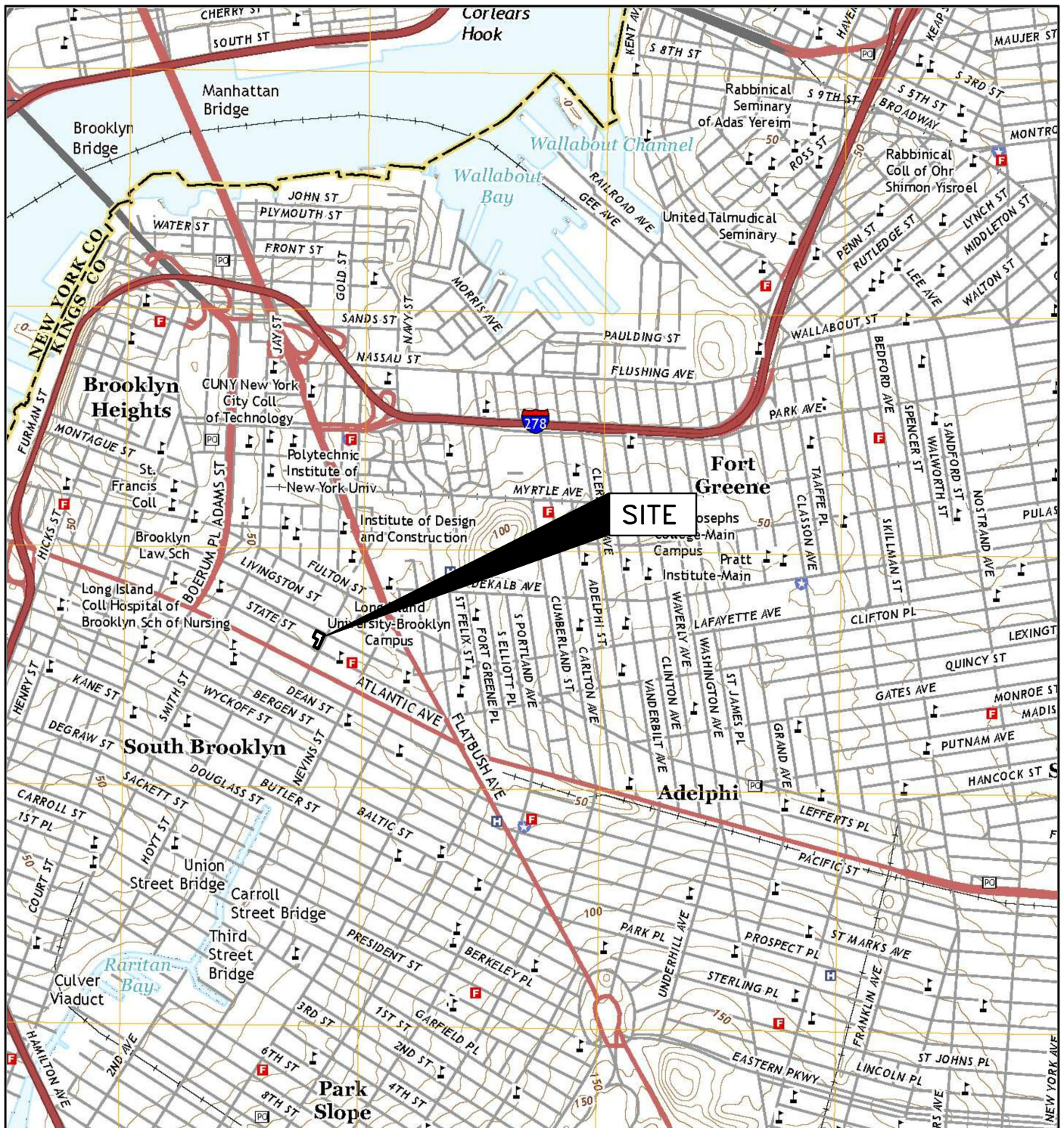
## 7.0 Schedule

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a two-month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	[-13]	-2
Fact Sheet 2 announcing start of remedy	[-9]	-1
Mobilization	1	2
Remedial Excavation	3	12
Demobilization	15	1
Record Declaration of Covenants and Restrictions	16	6
Submit Remedial Action Report	21	4

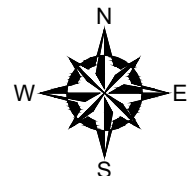
The development timeline is anticipated to start after the closing of funding sources in March 2019. Construction is then anticipated to start in April 2019.

## FIGURES



QUADRANGLE LOCATION

SOURCE:  
USGS TOPOGRAPHIC MAP: BROOKLYN, NY (2016).  
CONTOUR INTERVAL 10 FT, NAVD-1988, ORIGINAL SCALE  
1:24,000 (1IN = 2,000FT).



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50 NEVINS STREET  
BROOKLYN, NEW YORK

PREPARED BY:



GZA GeoEnvironmental, Inc.  
Engineers and Scientists  
www.gza.com

PREPARED FOR:

INSTITUTE FOR COMMUNITY LIVING

PROJ MGR: RM

REVIEWED BY: SK

CHECKED BY: SK

DESIGNED BY: RM

DRAWN BY: YX

SCALE: 1" = 2,000'

DATE:

PROJECT NO.

REVISION NO.

FEB. 2019

12.0076392.00

FIGURE

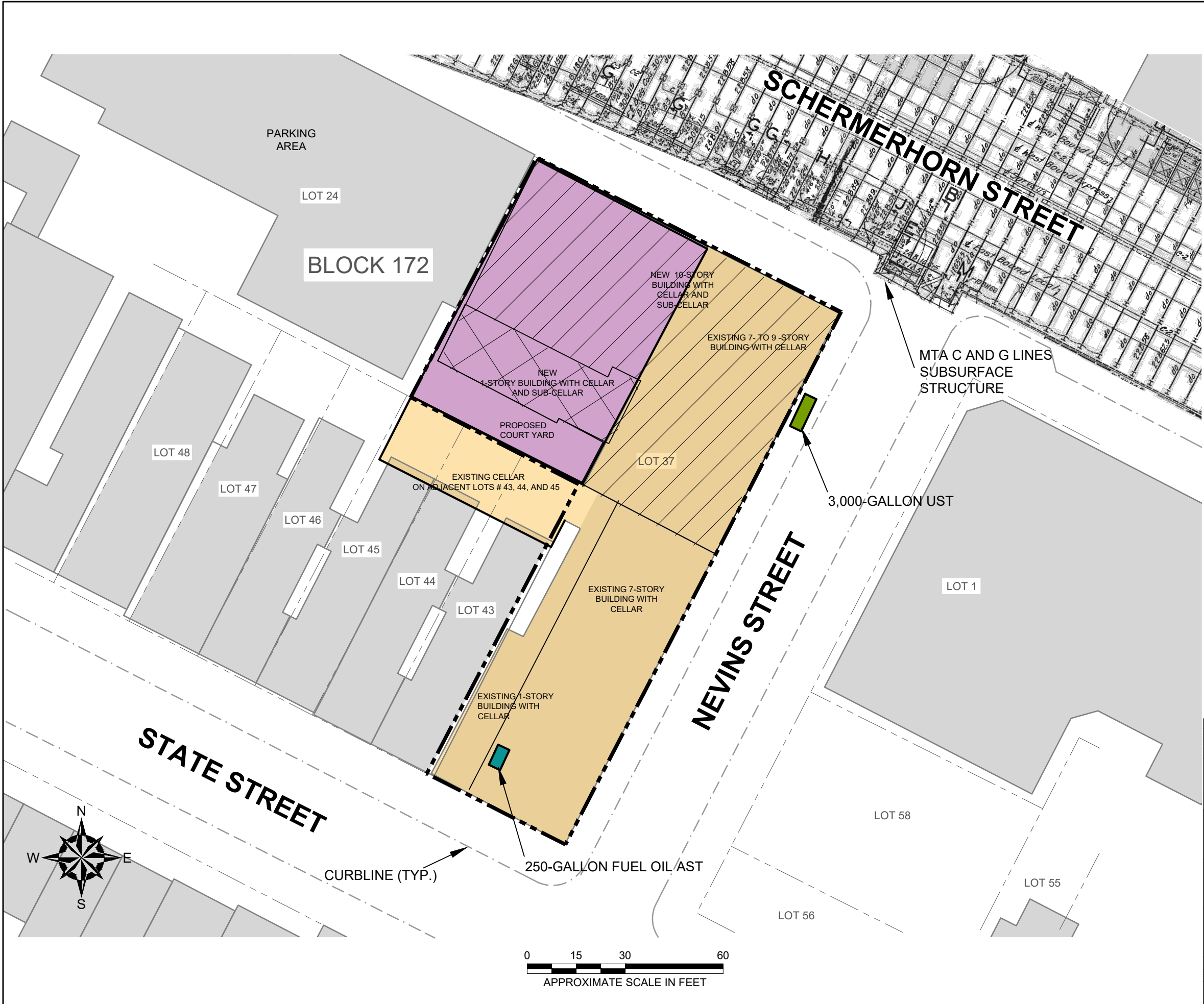
1

SHEET NO.

**SITE LOCATION MAP**



©2015 - GZA GeoEnvironmental, Inc. GZA-\\GZAHAM1\Jobs\76300's\12.0076392.00\Figures\CAD\76392.00.006B.dwg [2] February 13, 2019 - 3:24pm yi.xiao



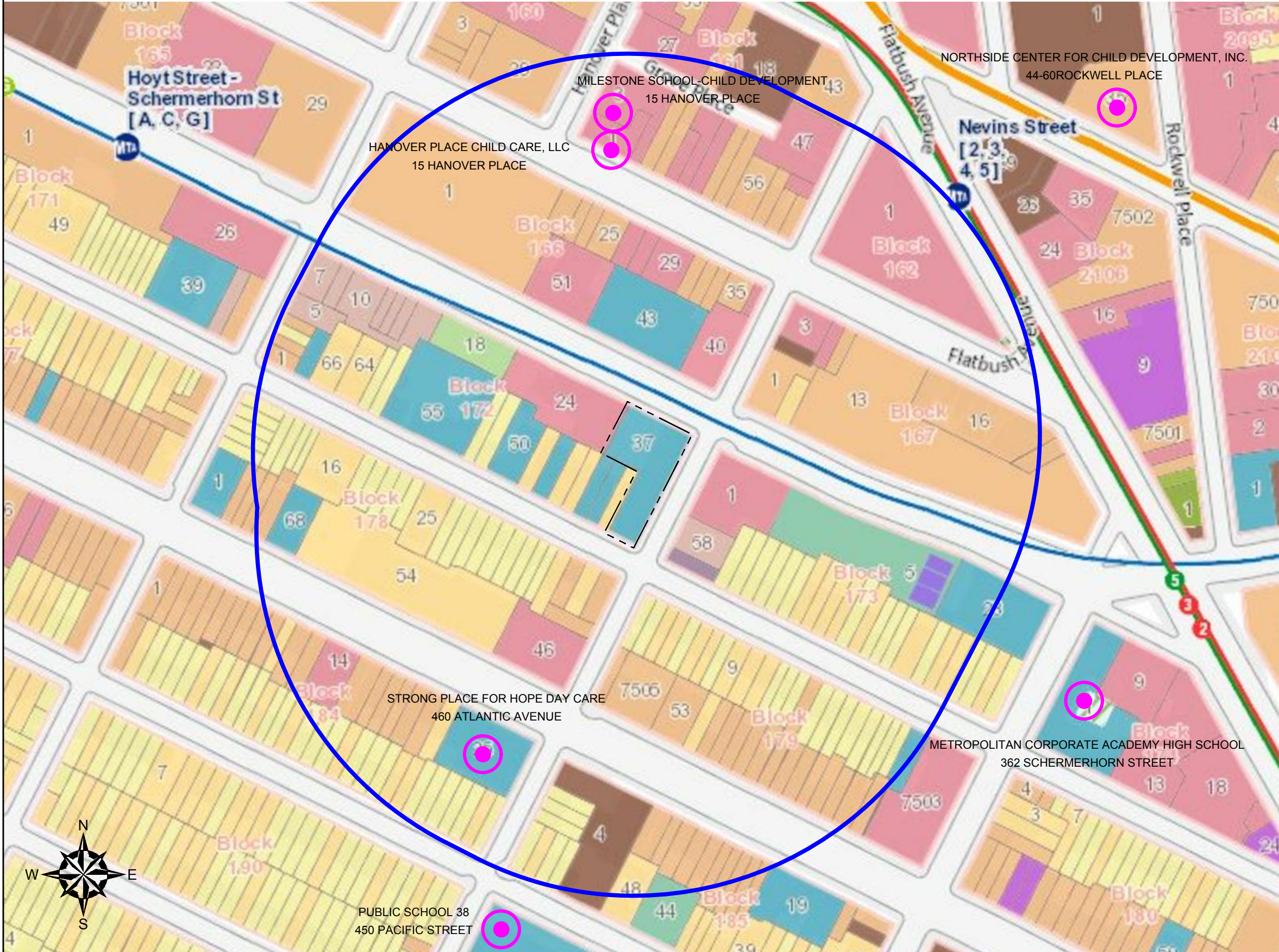
- NOTES:**
1. THE BASE MAP WAS DEVELOPED FROM AN IMAGE OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE ONLINE TAX MAPS.
  2. LOCATION OF PROPOSED BUILDING WAS APPROXIMATED BASED ON DRAWING A-100, TITLED "SITE PLAN", PROVIDED BY DATTNER ARCHITECTS, DATED APRIL 28, 2017.
  3. THE LOCATIONS OF EXPLORATION WERE APPROXIMATED BY GZA FIELD REPRESENTATIVE DURING SITE VISITS, DATED AUGUST 27 AND AUGUST 28, 2018.
  4. THE PURPOSE OF THIS DRAWING IS TO LOCATE, DESCRIBE, AND REPRESENT THE POSITIONS OF PROPOSED EXPLORATIONS, IN RELATION TO THE SUBJECT SITE. THIS DRAWING IS NOT CONSIDERED A LAND SURVEY. THE LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

- LEGEND:**
- SITE BOUNDARY
  - PROPERTY BOUNDARY
  - EXISTING VICINITY BUILDING
  - EXISTING SITE BUILDING WITH CELLAR / SUBCELLAR
  - EXISTING PARKING LOT
  - PROPOSED 10-STORY BUILDING AND ADDITION
  - PROPOSED 1-STORY BUILDING

NO.	ISSUE/DESCRIPTION	BY	DATE
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50 NEVINS STREET BROOKLYN, NEW YORK			
<b>SITE PLAN</b>			
PREPARED BY: <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	<b>FIGURE</b> <b>2</b> SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 30'	
DATE: FEB. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	



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**NOTES:**

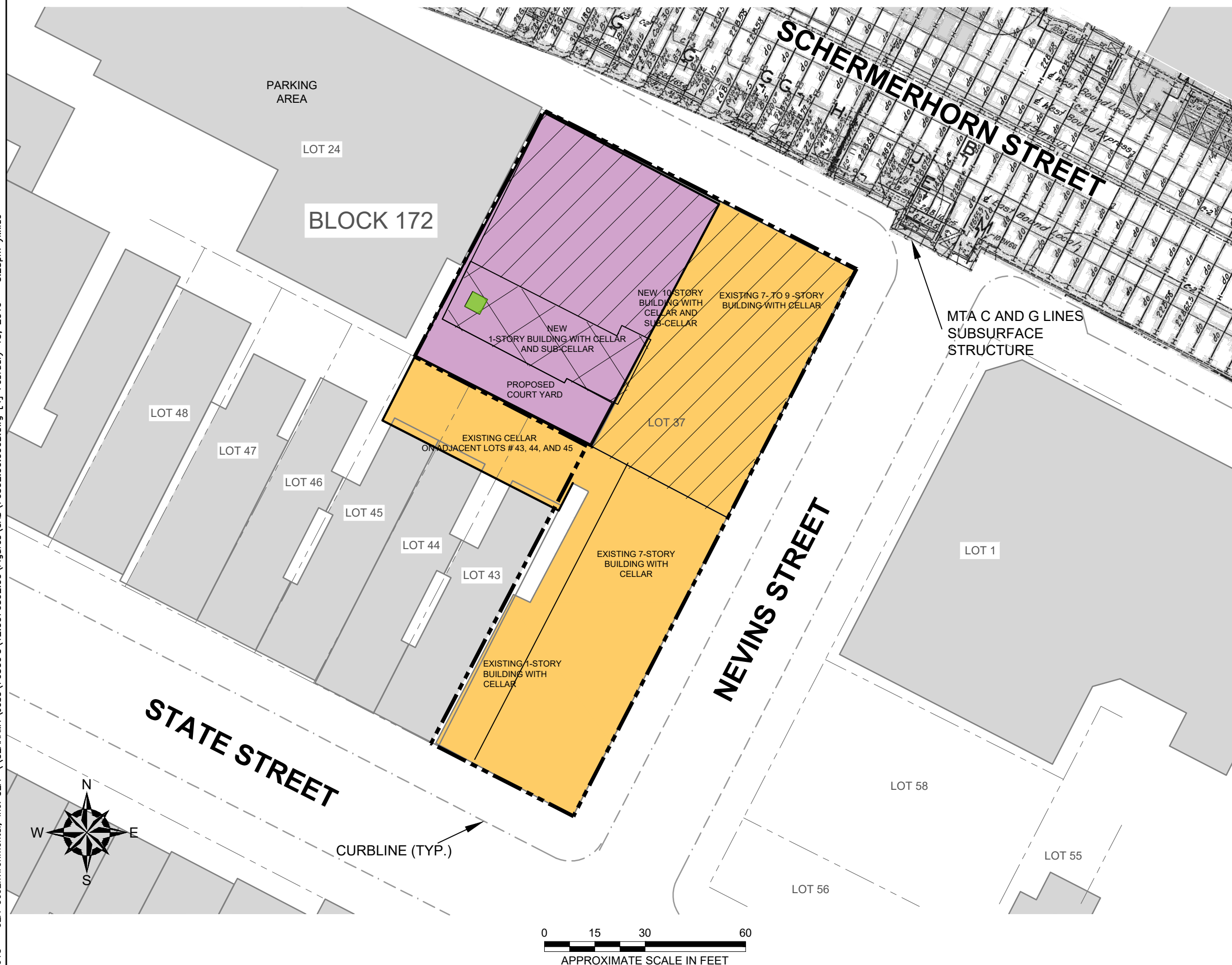
1. THE BASE MAP WAS DEVELOPED FROM OPEN ACCESSIBLE SPACE INFORMATION SYSTEM (OASIS) WEBSITE.

**LEGEND:**

- SITE BOUNDARY
- 500 FEET BUFFER
- SENSITIVE RECEPTPR
- NYC subway routes and stations
- Parks, Playgrounds, & Open Space**
  - Parks & Public Lands
  - Forested Areas (NJ)
  - Community Gardens
  - School property with garden
  - Playgrounds
  - Green Spaces Along Streets
  - Golf Courses
  - Baseball/Soccer/Football Fields
  - Tennis/Basketball/Handball Courts &
- Tracks**
  - Cemeteries
- Land Use**
  - Block/Lot Boundaries**
    - (Building footprints in gray )
  - 1 & 2 Family Residential
  - Multi-family Residential
  - Mixed Use
  - Open space & outdoor recreation
  - Commercial
  - Institutions
  - Industrial
  - Parking
  - Transportation / Utilities
  - Vacant Lots

NO.	ISSUE/DESCRIPTION	BY	DATE
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50 NEVINS STREET BROOKLYN, NEW YORK			
SURROUNDING LAND USE			
PREPARED BY: <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	FIGURE <b>3</b> SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 150'	
DATE: JAN. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	













NOTES:

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2. LOCATION OF PROPOSED BUILDING WAS APPROXIMATED BASED ON DRAWING A-100, TITLED "SITE PLAN", PROVIDED BY DATTNER ARCHITECTS, DATED APRIL 28, 2017.
3. THE EXTENT OF EXCAVATION WERE APPROXIMATED BASED ON DRAWING A-101, TITLED "FLOOR PLAN - SUB-CELLAR" AND DRAWING A-250.00, TITLED "BUILDING SECTION 1 - NORTH-SOUTH", PROVIDED BY DATTNER ARCHITECTS, DATED SEPTEMBER 21, 2018.
4. THE PURPOSE OF THIS DRAWING IS TO LOCATE, DESCRIBE, AND REPRESENT THE EXTENT OF PROPOSED EXCAVATION, IN RELATION TO THE SUBJECT SITE. THIS DRAWING IS NOT CONSIDERED A LAND SURVEY. THE LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

LEGEND:


-  SITE BOUNDARY
  -  PROPERTY BOUNDARY
  -  EXISTING VICINITY BUILDING
  -  PROPOSED 10-STORY BUILDING AND ADDITION
  -  PROPOSED 1-STORY BUILDING
  -  EXISTING SITE BUILDING WITH CELLAR / SUBCELLAR (NO EXCAVATION)
  -  EXISTING PARKING LOT / PROPOSED EXCAVATION AREA (20 FEET BELOW GROUND SURFACE)
  -  PROPOSED 5' BY 5' HOTSPOT REMOVAL AREA (22 FEET BELOW GROUND SURFACE)

NO.	ISSUE / DESCRIPTION	RY	DATE

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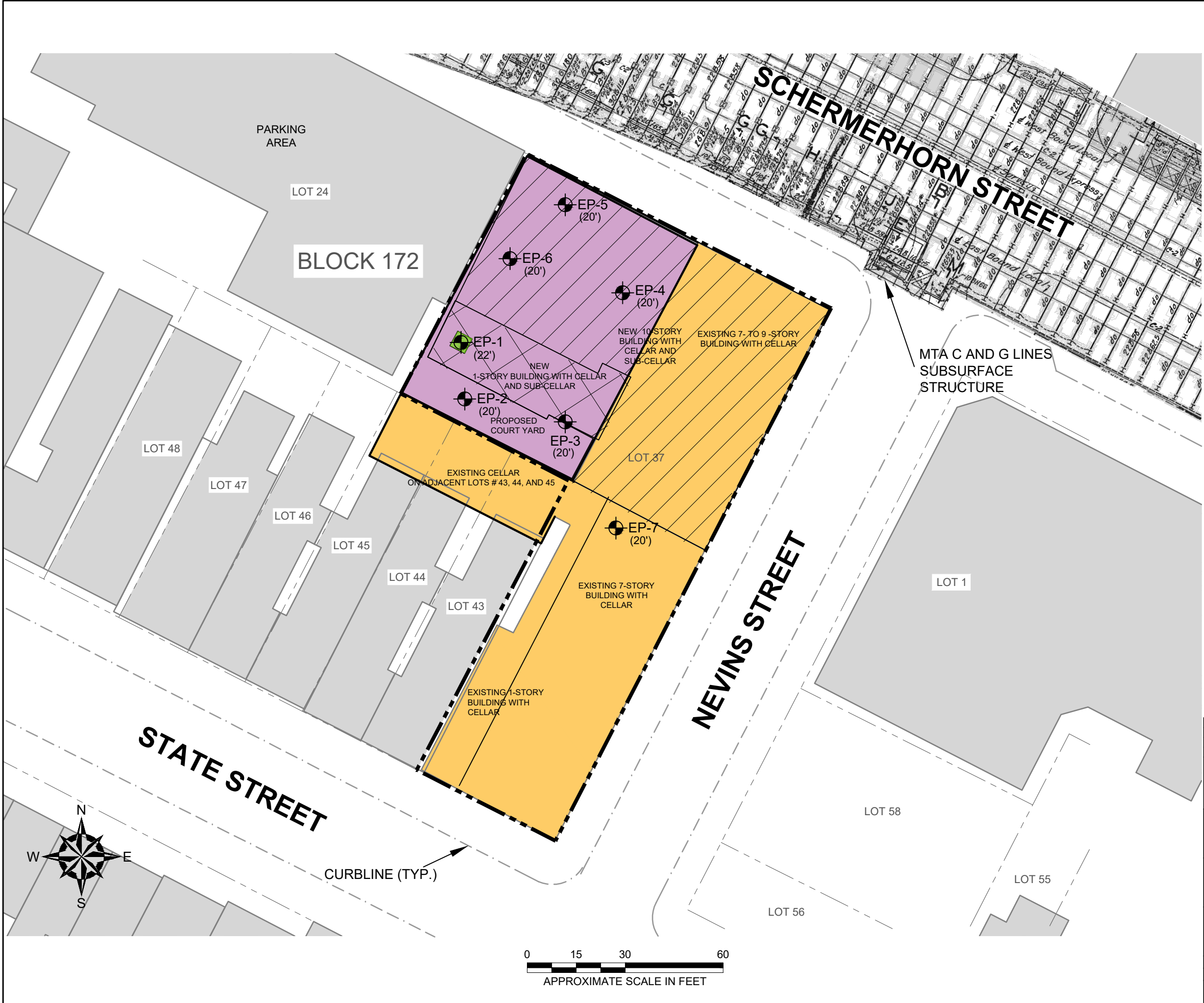
50 NEVINS STREET  
BROOKLYN, NEW YORK

## SITE EXCAVATION PLAN

PREPARED BY:  <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists <a href="http://www.gza.com">www.gza.com</a>		PREPARED FOR:  INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	<b>FIGURE</b>  <div style="font-size: 2em; text-align: center;">4</div> SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 30'	
DATE: FEB. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	



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- NOTES:
1. THE BASE MAP WAS DEVELOPED FROM AN IMAGE OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE ONLINE TAX MAPS.
  2. LOCATION OF PROPOSED BUILDING WAS APPROXIMATED BASED ON DRAWING A-100, TITLED "SITE PLAN", PROVIDED BY DATNER ARCHITECTS, DATED APRIL 28, 2017.
  3. THE EXTENT OF EXCAVATION WERE APPROXIMATED BASED ON DRAWING A-101, TITLED "FLOOR PLAN - SUB-CELLAR" AND DRAWING A-250.00, TITLED "BUILDING SECTION 1 - NORTH-SOUTH", PROVIDED BY DATNER ARCHITECTS, DATED SEPTEMBER 21, 2018.
  4. THE PURPOSE OF THIS DRAWING IS TO LOCATE, DESCRIBE, AND REPRESENT THE ENDPOINT SAMPLE LOCATIONS, IN RELATION TO THE SUBJECT SITE. THIS DRAWING IS NOT CONSIDERED A LAND SURVEY. THE LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

LEGEND:

- SITE BOUNDARY
- PROPERTY BOUNDARY
- EXISTING VICINITY BUILDING
- PROPOSED 10-STORY BUILDING AND ADDITION
- PROPOSED 1-STORY BUILDING
- EXISTING SITE BUILDING WITH CELLAR / SUBCELLAR (NO EXCAVATION)
- EXISTING PARKING LOT / PROPOSED EXCAVATION AREA (20 FEET BELOW GROUND SURFACE)
- PROPOSED 5' BY 5' HOTSPOT REMOVAL AREA (22 FEET BELOW GROUND SURFACE)
- EP-# PROPOSED ENDPOINT SAMPLE LOCATION

NO.	ISSUE/DESCRIPTION	BY	DATE

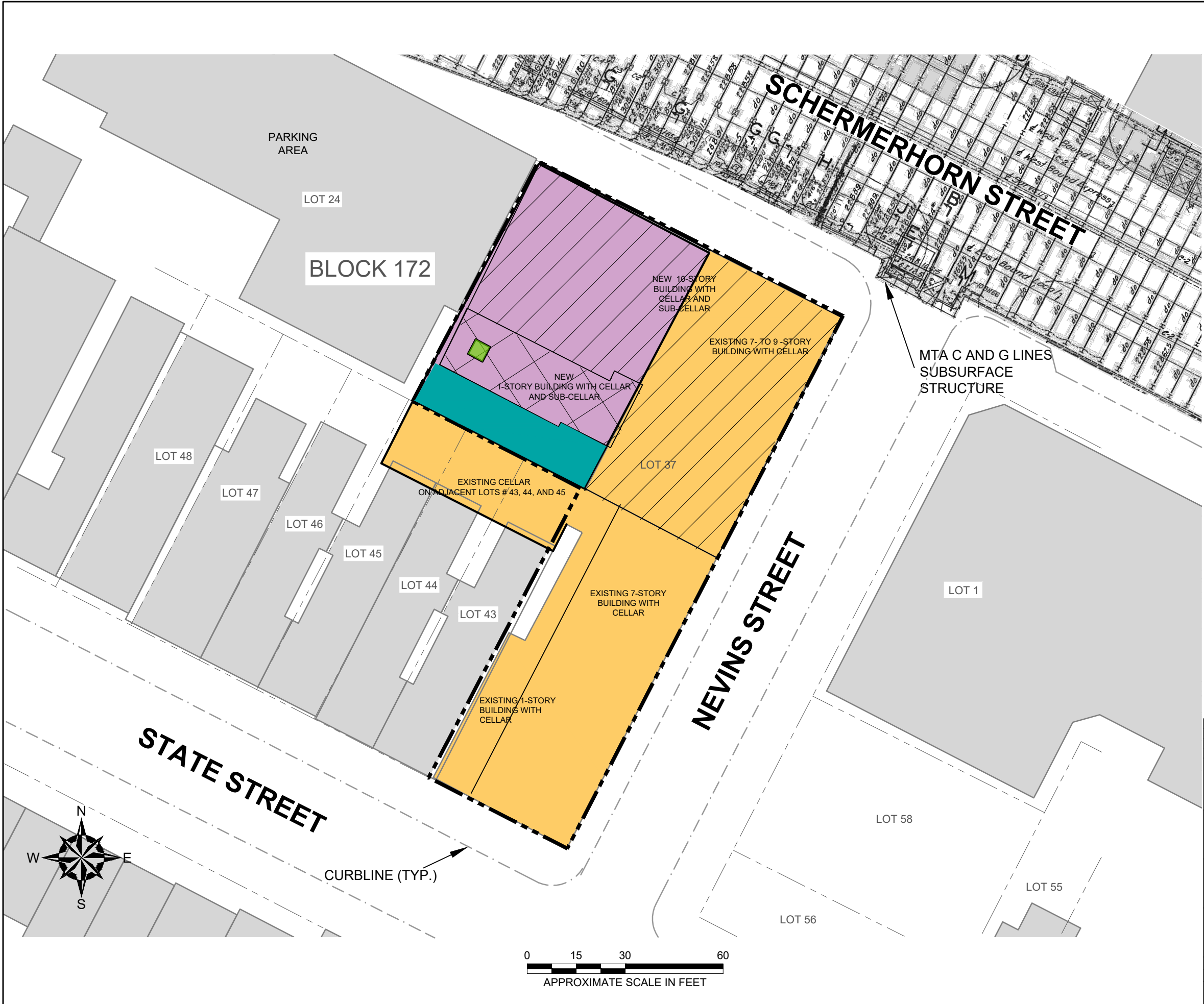
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50 NEVINS STREET  
BROOKLYN, NEW YORK

END-POINT SAMPLE LOCATION PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	FIGURE 5 SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 30'	
DATE: FEB. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	

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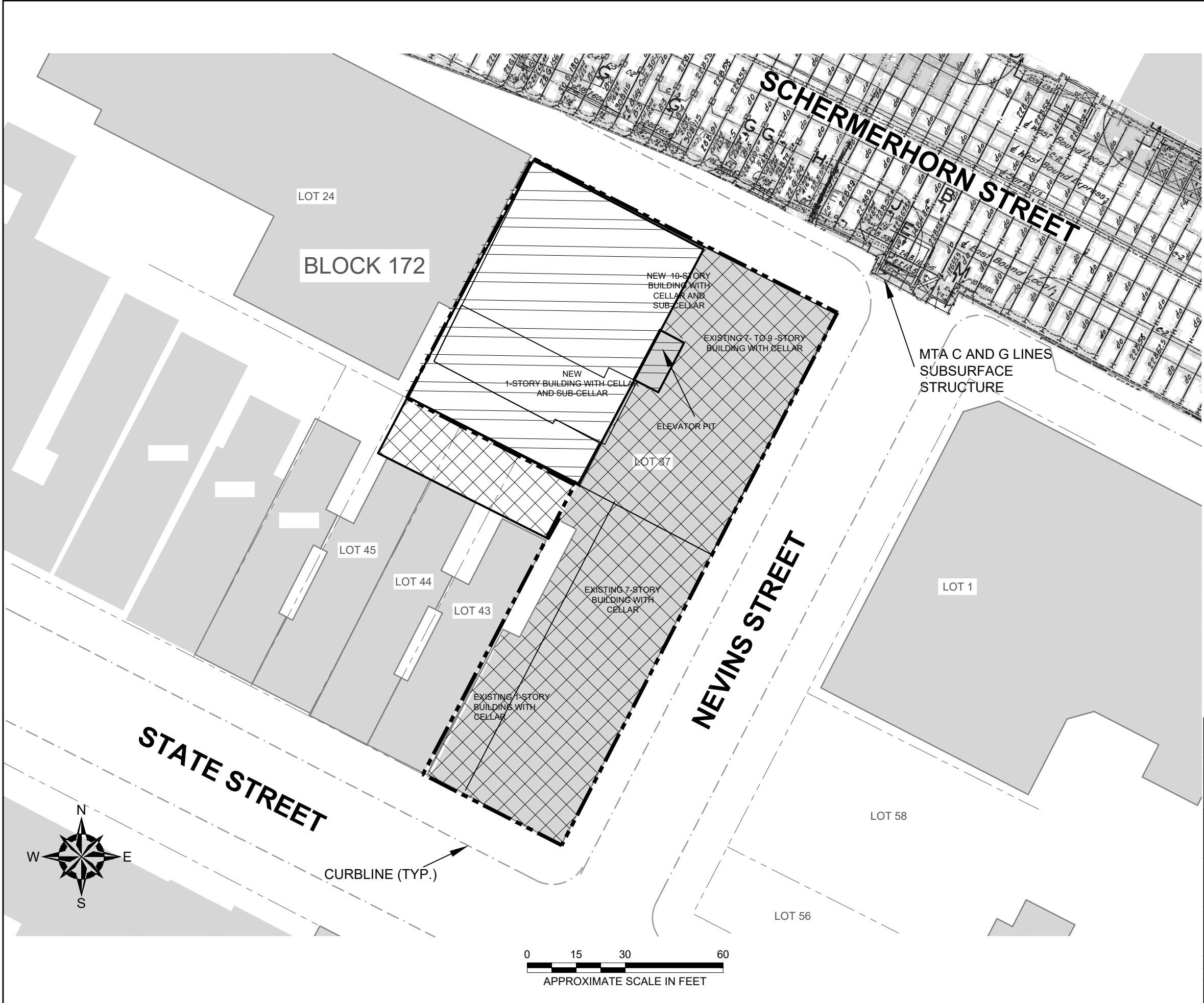
- NOTES:
1. THE BASE MAP WAS DEVELOPED FROM AN IMAGE OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE ONLINE TAX MAPS.
  2. LOCATION OF PROPOSED BUILDING WAS APPROXIMATED BASED ON DRAWING A-100, TITLED "SITE PLAN", PROVIDED BY DATNER ARCHITECTS, DATED APRIL 28, 2017.
  3. THE PURPOSE OF THIS DRAWING IS TO LOCATE, DESCRIBE, AND REPRESENT THE EXTENT OF BACKFILL, IN RELATION TO THE SUBJECT SITE. THIS DRAWING IS NOT CONSIDERED A LAND SURVEY. THE LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

- LEGEND:
- SITE BOUNDARY
  - PROPERTY BOUNDARY
  - EXISTING SITE BUILDING WITH CELLAR / SUBCELLAR (NO BACKFILL)
  - COURTYARD / PROPOSED CELLAR AND SUBCELLAR (NO BACKFILL)
  - PROPOSED 10-STORY BUILDING AND ADDITION (GRAVEL DRAINAGE LAYER)
  - PROPOSED 1-STORY BUILDING (GRAVEL DRAINAGE LAYER)
  - PROPOSED 5' BY 5' BACKFILL AREA (BACKFILLED 2 FEET TO REACH DRAINAGE LAYER ELEVATION)

NO.	ISSUE/DESCRIPTION	BY	DATE
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50 NEVINS STREET BROOKLYN, NEW YORK			
BACKFILL PLACEMENT PLAN			
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	FIGURE 6 SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 30'	
DATE: FEB. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	



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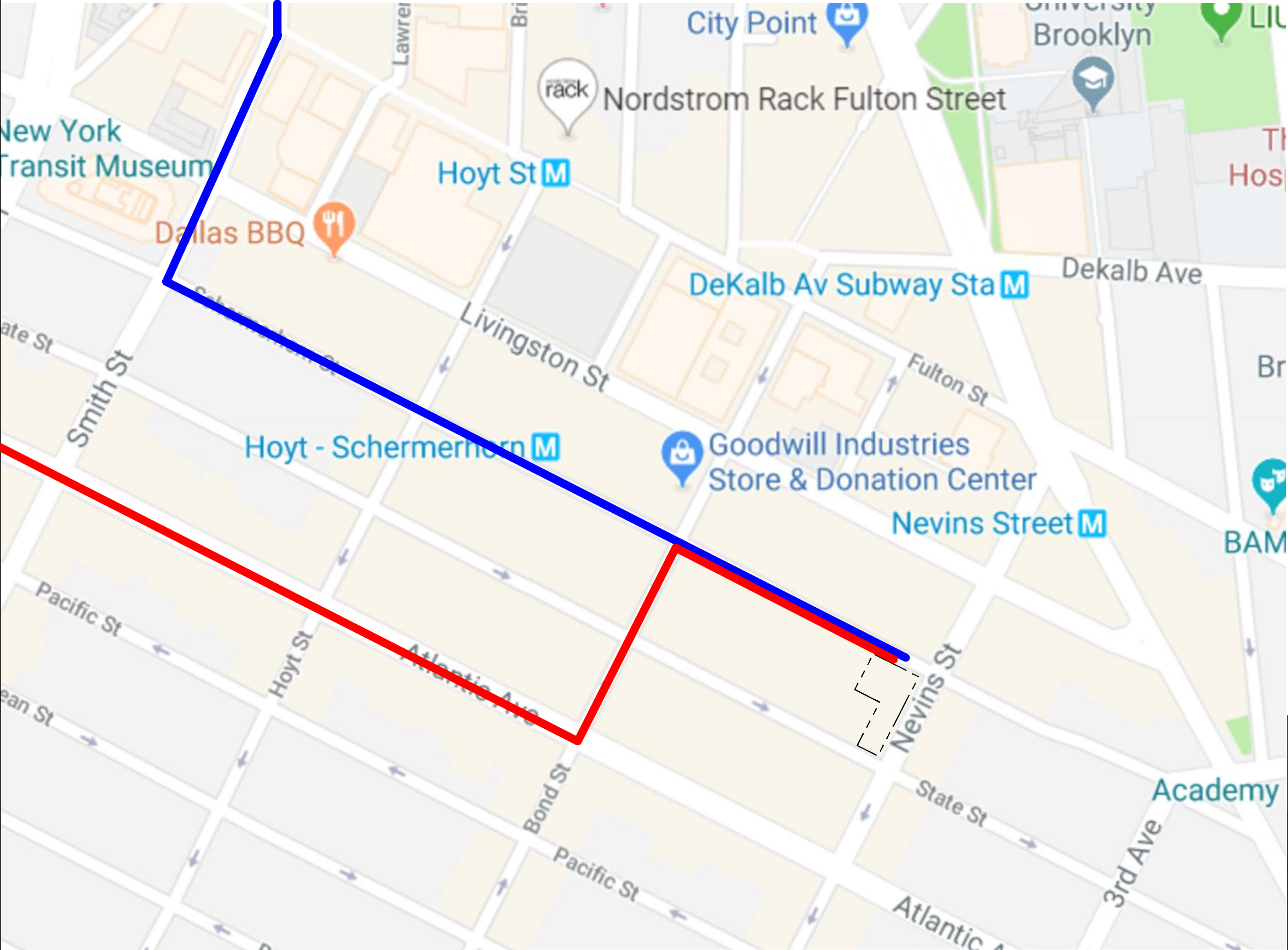
- NOTES:
1. THE BASE MAP WAS DEVELOPED FROM AN IMAGE OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE ONLINE TAX MAPS.
  2. LOCATION OF PROPOSED BUILDING WAS APPROXIMATED BASED ON DRAWING A-100, TITLED "SITE PLAN", PROVIDED BY DATTNER ARCHITECTS, DATED APRIL 28, 2017.
  3. THE PURPOSE OF THIS DRAWING IS TO LOCATE, DESCRIBE, AND REPRESENT THE EXTENT OF SITE-WIDE COVER SYSTEM, IN RELATION TO THE SUBJECT SITE. THIS DRAWING IS NOT CONSIDERED A LAND SURVEY. THE LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
  4. REFER TO DRAWINGS A-310 AND A-311 IN REMEDIAL ACTION WORK PLAN APPENDIX H FOR COMPOSITE COVER AND VAPOR BARRIER SYSTEM DETAILS.

- LEGEND:
- SITE BOUNDARY
  - - - - - PROPERTY BOUNDARY
  - ===== COMPOSITE COVER SYSTEM AND VAPOR BARRIER (GRACE PREPRUFE 330R AND 160R) ACROSS THE PROPOSED NEW BUILDING FOOTPRINT
  - XXXXXX COMPOSITE COVER SYSTEM AND VAPOR BARRIER (CETCO LIQUID BOOT SYSTEM ) ACROSS THE OLD BUILDING FOOTPRINT

NO.	ISSUE/DESCRIPTION	BY	DATE
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50 NEVINS STREET BROOKLYN, NEW YORK			
SITE COVER PLAN			
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	FIGURE 7 SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 30'	
DATE: FEB. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	

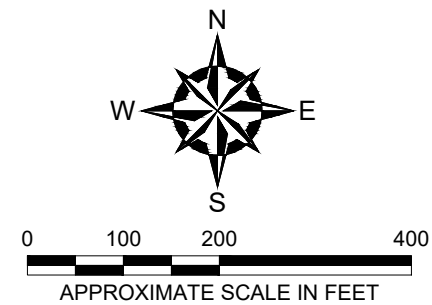



©2015 - GZA GeoEnvironmental, Inc. GZA-\\GZAHAM1\Jobs\76300's\12.0076392.00\Figures\CAD\76392.00.006.dwg [B TRUCK] January 11, 2019 - 3:14pm yi.xiao



- NOTES:
1. THE BASE MAP WAS DEVELOPED FROM GOOGLE MAP DATA 2018.
  2. TRUCK ROUTES WERE DETERMINED BASED ON NEW YORK CITY TRUCK ROUTE MAP ISSUED BY NEW YORK CITY DEPARTMENT OF TRANSPORTATION (NYCDOT), DATED 2015.

- LEGEND:
- SITE BOUNDARY
  - NORTH BOUND TRAFFIC
  - SOUTH BOUND TRAFFIC





NO.	ISSUE/DESCRIPTION	BY	DATE
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50 NEVINS STREET BROOKLYN, NEW YORK			
TRUCK ROUTE MAP			
PREPARED BY:  GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	FIGURE 8 SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 30'	
DATE: FEB. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	


**APPENDIX A**  
**SITE PHOTOGRAPHS**





## Site Photographs



<b>Client Name:</b>  <b>Institute of Community Living</b> <small>People Get Better With Us™</small>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 1	<b>Date:</b> 6/21/18		
<b>Direction Photo Taken:</b>  South			
<b>Description:</b>  Site exterior from across Nevins Street.			

<b>Photo No.</b> 2	<b>Date:</b> 6/21/18	
<b>Direction Photo Taken:</b>  West		
<b>Description:</b>  Site exterior from across Nevins Street.		





## Site Photographs



<b>Client Name:</b>  <b>Institute of Community Living</b>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 3	<b>Date:</b> 6/21/18		
<b>Direction Photo Taken:</b>  North			
<b>Description:</b>  Grates along Site exterior along Nevins Street.			


<b>Photo No.</b> 4	<b>Date:</b> 6/21/18		
<b>Direction Photo Taken:</b>  West			
<b>Description:</b>  Fuel oil fill port and vent along Nevins Street			





## Site Photographs


<b>Client Name:</b>  <b>Institute of Community Living</b> <small>People Get Better With Us™</small>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 5	<b>Date:</b> 6/21/18		
<b>Direction Photo Taken:</b>  South			
<b>Description:</b>  Site exterior and parking lot along Schermerhorn Street.			

<b>Photo No.</b> 6	<b>Date:</b> 6/21/18	
<b>Direction Photo Taken:</b>  South		
<b>Description:</b>  Site parking lot along Schermerhorn Street.		






## Site Photographs


<b>Client Name:</b>  <b>Institute of Community Living</b>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 7	<b>Date:</b> 6/21/18		
<b>Direction Photo Taken:</b> North			
<b>Description:</b> Parking lot and patio.			

<b>Photo No.</b> 8	<b>Date:</b> 6/21/18	
<b>Direction Photo Taken:</b> South		
<b>Description:</b> Garbage compactor in parking lot.		



## Site Photographs



<b>Client Name:</b>  <b>Institute of Community Living</b>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 9	<b>Date:</b> 6/21/18		
<b>Direction Photo Taken:</b>  West			
<b>Description:</b>  Cellar boiler room.			


<b>Photo No.</b> 10	<b>Date:</b> 6/21/18	
<b>Direction Photo Taken:</b>  West		
<b>Description:</b>  250-gal aboveground storage tank (AST) in cellar generator room. Staining and rust are observed.		





## Site Photographs



<b>Client Name:</b>  <b>Institute of Community Living</b>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 11	<b>Date:</b> 8/27/18		
<b>Direction Photo Taken:</b>  South			
<b>Description:</b>  Geophysical survey being performed by NOVA in the parking area.			

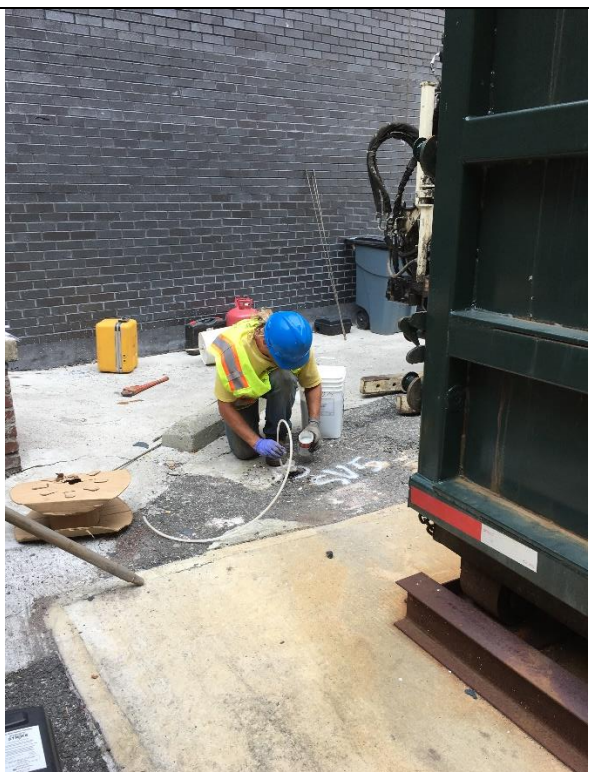
<b>Photo No.</b> 12	<b>Date:</b> 8/27/18	
<b>Direction Photo Taken:</b>  North		
<b>Description:</b>  Proposed soil vapor and soil boring locations were marked out prior to subsurface exploration.		







## Site Photographs

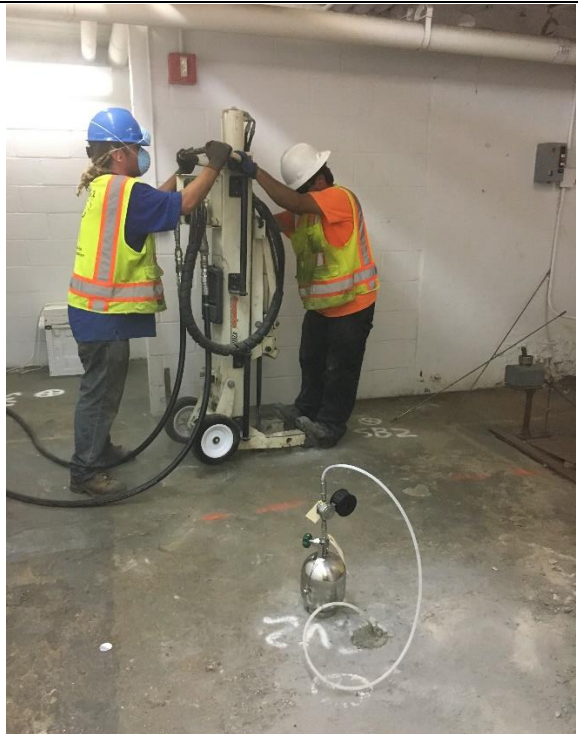
<b>Client Name:</b>  <b>Institute of Community Living</b> <small>People Get Better With Us™</small>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 13	<b>Date:</b> 8/27/18		
<b>Direction Photo Taken:</b>  South			
<b>Description:</b>  EPhase 2 was subcontracted to advance boring SB-5 with a GeoProbe™ 6712DT drill rig in the parking lot area.			

<b>Photo No.</b> 14	<b>Date:</b> 8/28/18		
<b>Direction Photo Taken:</b>  West			
<b>Description:</b>  Soil vapor point installation at SV-05.			



## Site Photographs

<b>Client Name:</b>  <b>Institute of Community Living</b>		<b>Site Location:</b> 50 Nevins Street, Brooklyn, NY	<b>Project No.</b> 12.0076392.10
<b>Photo No.</b> 15	<b>Date:</b> 8/28/18		
<b>Direction Photo Taken:</b>  South			
<b>Description:</b>  For indoor drilling, exhaust tube was used to direct effluent exhaust gasses outside the building.			

<b>Photo No.</b> 16	<b>Date:</b> 8/28/18	
<b>Direction Photo Taken:</b>  East		
<b>Description:</b>  At SB-02, indoor boring was advanced using a GeoProbe™ 420M drill rig. The collocated soil vapor point SV-02 was located 5 feet away from the soil borehole.		

**APPENDIX B**  
**PROPOSED DEVELOPMENT PLANS**



### 50 Nevins Area Summary Chart

Super's Unit (Affordable Housing Unit)

**NET (HPD):** Area measured to interior face of demising wall and to face of mechanical shafts at demising wall (per HPD Design Guidelines).

**Note:** As per DOB Bulletin 2011-003, if the facility provides 60% of Supportive housing, it may be classified entirely as Use Group 3 - Community Facility.

① Area Summary chart  
1" = 80'-0"

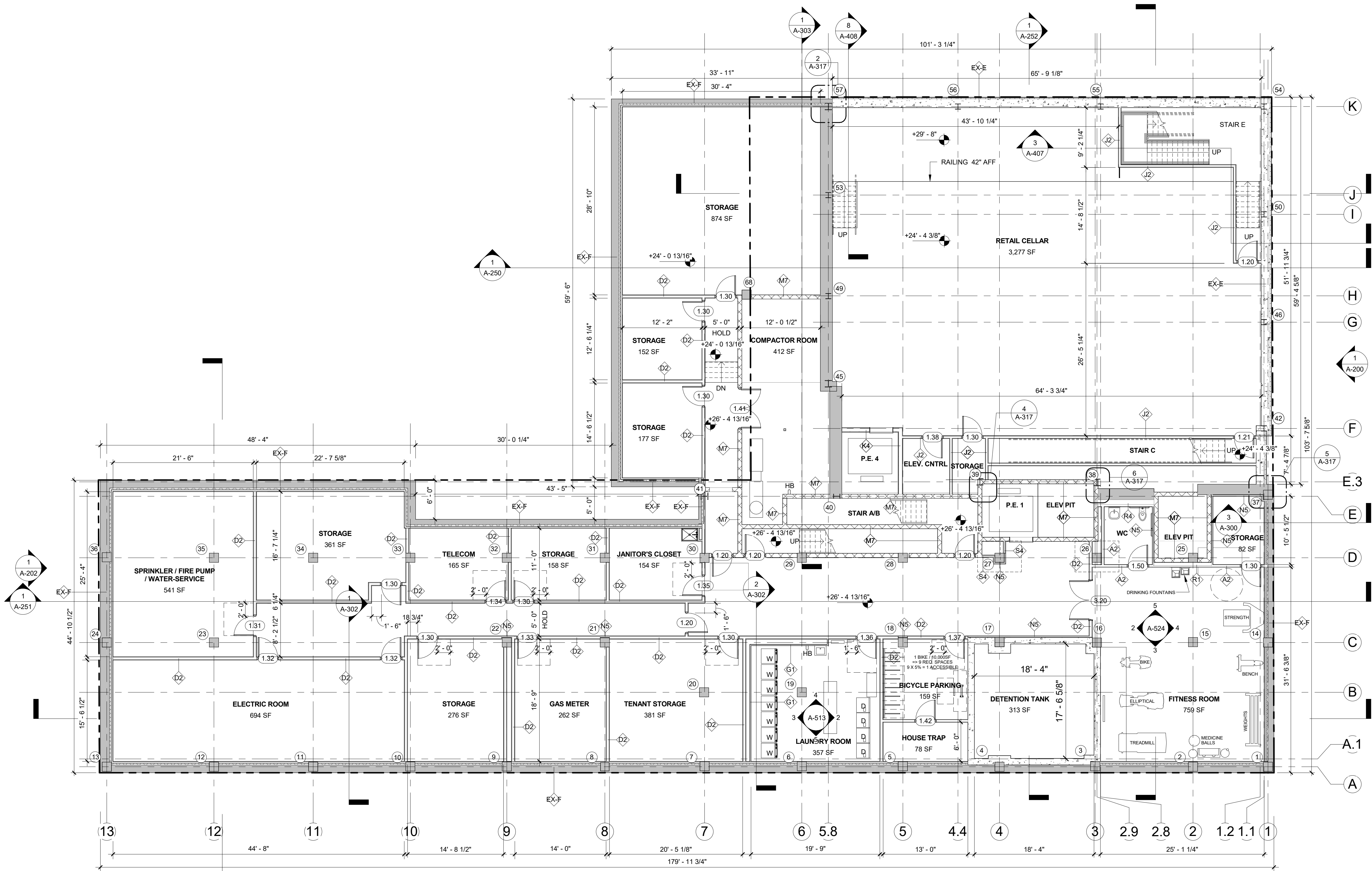
Floor Level	District	Use Group	Structure	GSF	Zoning Deductions	Zoning Floor Area	
Mechanical Bulkhead	C6-4/C6-1	UG3	New Addition	1,268SF	1,268SF	0	
Floor 10	C6-4/C6-1	UG3	New Addition	6,736SF	199SF	6,537SF	
Floor 9	C6-4/C6-1	UG3	New Addition	6,736SF	199SF	6,537SF	
Floor 8	C6-4/C6-1	UG3	New Addition	6,598SF	194SF	6,404SF	
Floor 7	R6-B	UG3	Existing Building	3,072SF	83SF	2,989SF	
	C6-4/C6-1	UG3	Existing Building	3,930SF	119SF	3,811SF	
	C6-4/C6-1	UG3	New Addition	2,875SF	75SF	2,800SF	
	Floor 7 Total Existing Bldg Floor 7 Total New Addition Floor 7 Total			7,002SF	202SF	6,800SF	
				2,875SF	75SF	2,800SF	
Floor 6	R6-B	UG3	Existing Building	3,072SF	83SF	2,989SF	
	C6-4/C6-1	UG3	Existing Building	3,930SF	119SF	3,811SF	
	C6-4/C6-1	UG3	New Addition	2,875SF	75SF	2,800SF	
	Floor 6 Total Existing Bldg Floor 6 Total New Addition Floor 6 Total			7,002SF	202SF	6,800SF	
				2,875SF	75SF	2,800SF	
Floor 5	R6-B	UG3	Existing Building	3,072SF	83SF	2,989SF	
	C6-4/C6-1	UG3	Existing Building	3,930SF	119SF	3,811SF	
	C6-4/C6-1	UG3	New Addition	2,875SF	75SF	2,800SF	
	Floor 5 Total Existing Bldg Floor 5 Total New Addition Floor 5 Total			7,002SF	202SF	6,800SF	
				2,875SF	75SF	2,800SF	
Floor 4	R6-B	UG3	Existing Building	3,072SF	83SF	2,989SF	
	C6-4/C6-1	UG3	Existing Building	3,930SF	119SF	3,811SF	
	C6-4/C6-1	UG3	New Addition	2,875SF	75SF	2,800SF	
	Floor 4 Total Existing Bldg Floor 4 Total New Addition Floor 4 Total			7,002SF	202SF	6,800SF	
				2,875SF	75SF	2,800SF	
Floor 3	R6-B	UG3	Existing Building	3,072SF	83SF	2,989SF	
	C6-4/C6-1	UG3	Existing Building	3,930SF	119SF	3,811SF	
	C6-4/C6-1	UG3	New Addition	2,875SF	75SF	2,800SF	
	Floor 3 Total Existing Bldg Floor 3 Total New Addition Floor 3 Total			7,002SF	202SF	6,800SF	
				2,875SF	75SF	2,800SF	
Floor 2	R6-B	UG3	Existing Building	3,072SF	83SF	2,989SF	
	C6-4/C6-1	UG3	Existing Building	3,930SF	119SF	3,811SF	
	C6-4/C6-1	UG3	New Addition	2,875SF	75SF	2,800SF	
	Floor 2 Total Existing Bldg Floor 2 Total New Addition Floor 2 Total			7,002SF	202SF	6,800SF	
				2,875SF	75SF	2,800SF	
Floor 1	R6-B	UG3	Existing Building	3,785SF	7SF	3,778SF	
	C6-4/C6-1	UG3	Existing Building	3,886SF	12	3,874SF	
	C6-4/C6-1	UG3	New Addition	105SF	28	77SF	
	C6-4/C6-1	UG6	New Addition	3,995SF	9SF	3,986SF	
	Floor 1 Total Existing Bldg Floor 1 Total New Addition Floor 1 Total			7,671SF	19SF	7,652SF	
Cellar	R6-B	UG3	Existing Building	3,785SF	3,785SF	0	
	C6-4/C6-1	UG3	Existing Building	3,933SF	3,933SF	0	
	C6-4/C6-1	UG3	New Addition	120SF	120SF	0	
	C6-4/C6-1	UG6	New Addition	0	0	0	
	Cellar Total Existing Bldg Cellar Total New Addition Cellar Total Floor Area			7,718SF	7,718SF	0	
Sub-Cellar	R6-B	UG3	Existing Building	4,474SF	4,474SF	0	
	C6-4/C6-1	UG3	Existing Building	5,187SF	5,187SF	0	
	C6-4/C6-1	UG6	Existing Building	40SF	40SF	0	
	C6-4/C6-1	UG3	New Addition	19SF	19SF	0	
	C6-4/C6-1	UG6	New Addition	4,046SF	4,046SF	0	
	Sub-Cellar Total Existing Bldg Sub-Cellar Total New Addition Sub-Cellar Total Floor Area			9,701SF	9,701SF	0	
				4,065SF	4,065SF	0	
				13,766SF	13,766SF	0	
	TOTAL	R6-B	UG3	EXISTING BUILDING	30,476SF	8,764SF	21,712SF
		C6-4/C6-1	UG3	EXISTING BUILDING	36,586SF	9,846SF	26,740SF
C6-4/C6-1		UG6	EXISTING BUILDING	40SF	40SF	0	
C6-4/C6-1		UG3	NEW ADDITION	38,832SF	2,477SF	36,355SF	
C6-4/C6-1		UG6	NEW ADDITION	8,041SF	4,055SF	3,986SF	
TOTAL EXISTING BUILDING			67,102SF	18,650SF	48,452SF		
TOTAL NEW ADDITION			46,873SF	6,532SF	40,341SF		
TOTAL FLOOR AREA			113,975SF	25,182SF	88,793SF		







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1 Sub-Cellar and Retail Cellar Floor Plan  
1/8" = 1'-0"

- PLAN NOTES:
- See EN-006 for exterior wall types (EX-A through EX-G).
- See A-602 through A-604 for interior partition types.
- Partition type N3 used at all columns, U.O.N.
- Partition type N3 used at exterior walls, CMU walls, and structural concrete walls, U.O.N.
- Elevation levels are based on the project datum unless noted otherwise.
- Project datum 0'-0" = (+41.20') NAVD88.
- Project base plane = (+41.40') NAVD88.
- Elevation levels are top of structural slab unless otherwise noted.
- Sinks in Janitor Closets in the Residential floors provided at 2nd, 4th, 6th & 9th floors only.

- LEGEND:
- Existing building component to remain
- New building component/ New Addition
- MOBILITY UNIT  
Units comply with UFAS requirements for mobility impairments
- VISION / HEARING IMPAIRMENT UNIT  
Units comply with UFAS requirements for visual and hearing impairments
- Dwelling Unit
- Sidewalk or Slab Elevation
- Finished Floor Elevation
- Column Grid line
- Fire Alarm Remote Annunciator
- Fire Command Center
- Pull Station
- Hose Bib
- KEYNOTES:

# 50 Nevins

50 Nevins Street  
Brooklyn NY 11217

Institute for Community Living  
125 Broad Street  
New York NY 10004

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Structural Engineers  
Rodney D. Gible Consulting Engineers  
18 W 21st Street  
New York, NY 10010

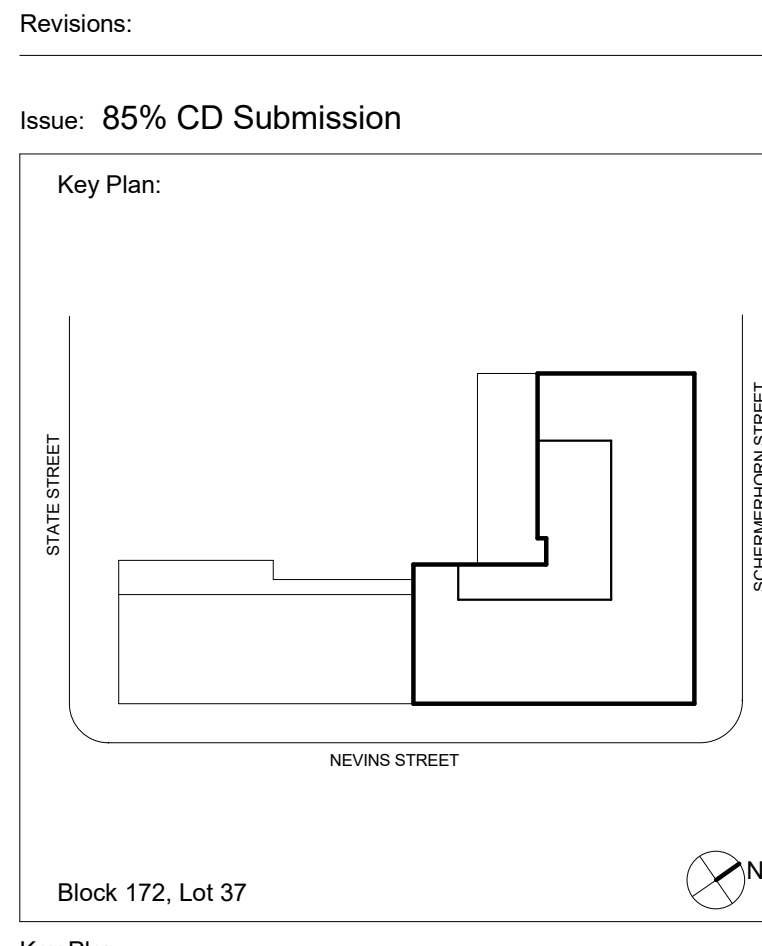
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Rodkin Cardinale Consulting Engineers  
224 W 29th Street  
New York, NY 10001

Geotechnical Engineers  
Tectonic Engineering & Surveying Consultants  
1279 Route 300  
Newburgh, NY, 12550

SOE Engineers  
RA Consultants LLC  
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New York, NY 10018

Sustainability Consultant  
Steven Winter Associates  
307 Seventh Avenue, Suite 1701  
New York, NY 10001

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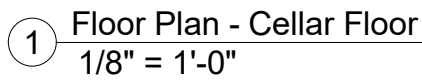


Block 172, Lot 37

Key Plan  
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## Floor Plan - Sub-Cellar

Date	09/21/18
Scale	As indicated
Drawn By	PB, AH, PM
Checked By	JW
Project No.	1636 Seal
Sheet No.:	



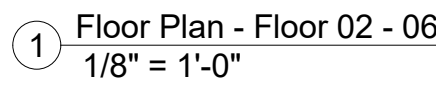
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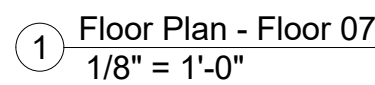
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Plotted: 11/5/2018 10:07:10 AM



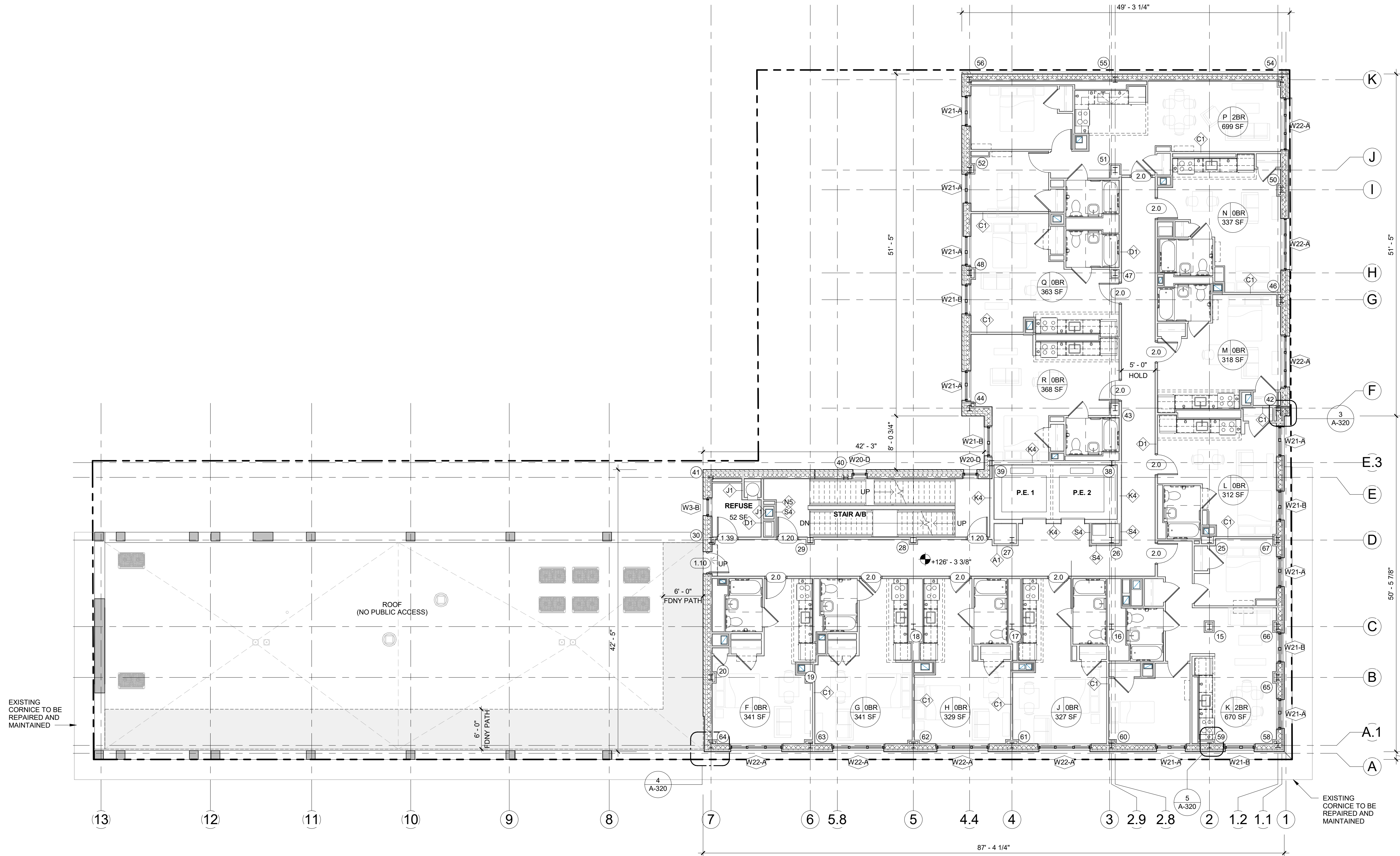
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6 of **A-103.00**



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1 Floor Plan - Floor 08  
1/8" = 1'-0"

PLAN NOTES:

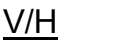
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- See A-602 through A-604 for interior partition types.
- Partition type N3 used at all columns, U.O.N.
- Partition type N3 used at exterior walls, CMU walls, and structural concrete walls, U.O.N.
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- Project base plane = (+41.40') NAVD88.
- Elevation levels are top of structural slab unless otherwise noted.
- Sinks in Janitor Closets in the Residential floors provided at 2nd, 4th, 6th & 9th floors only.

LEGEND:

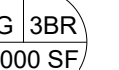
- Existing building component to remain
- New building component/ New Addition



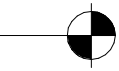
MOBILITY UNIT  
Units comply with UFAS requirements for mobility impairments



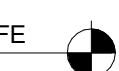
VISION / HEARING IMPAIRMENT UNIT  
Units comply with UFAS requirements for visual and hearing impairments



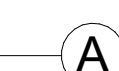
Dwelling Unit



Finished Floor Elevation



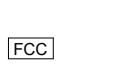
Column Grid line



Fire Alarm Remote Annunciator



Fire Command Center



Pull Station



Hose Bib

KEYNOTES:

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Rodkin Cardinale Consulting Engineers  
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New York, NY 10001

Geotechnical Engineers  
Tectonic Engineering & Surveying Consultants  
1279 Route 300  
Newburgh, NY, 12550

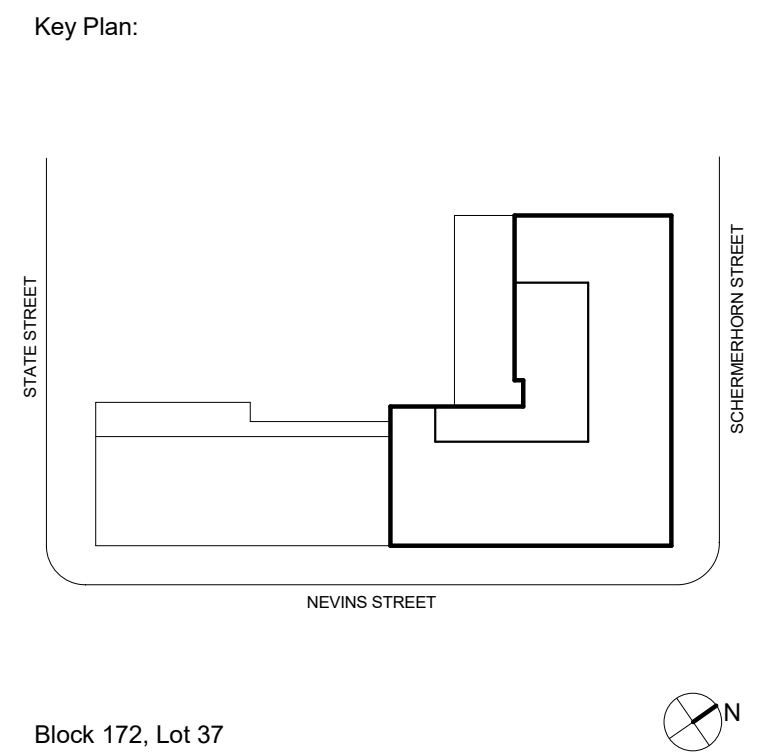
SOE Engineers  
RA Consultants LLC  
512 7th Avenue, 6th Floor  
New York, NY 10018

Sustainability Consultant  
Steven Winter Associates  
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New York, NY 10001

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September 21, 2018

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Issue: 85% CD Submission



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## Floor Plan - Floor 08

Date 09/21/18

Scale As indicated

Drawn By CL+SB

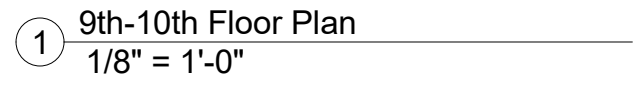
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Project No. 1636 Seal

Sheet No.:



C



KEYNOTES:

Sheet No.:

A-107.00



**KEYNOTES:**

6 of 10



50 Nevins Street  
Brooklyn NY 11217

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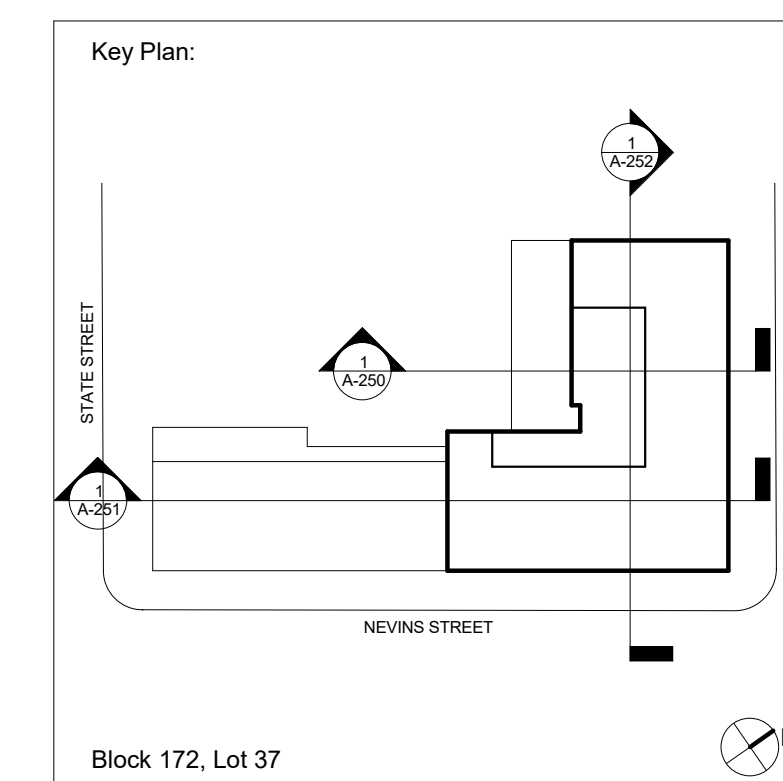
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Mechanical/Electrical/Plumbing Engineers  
Rodkin Cardinale Consulting Engineers  
224 W 29th Street  
New York NY 10001

Other  
Consultant 4  
Address Line 1  
City, State Zip

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September 21, 2018

Issue: 85% CD Submission



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## Date 09/21/18

Scale NTS

Scale NTS

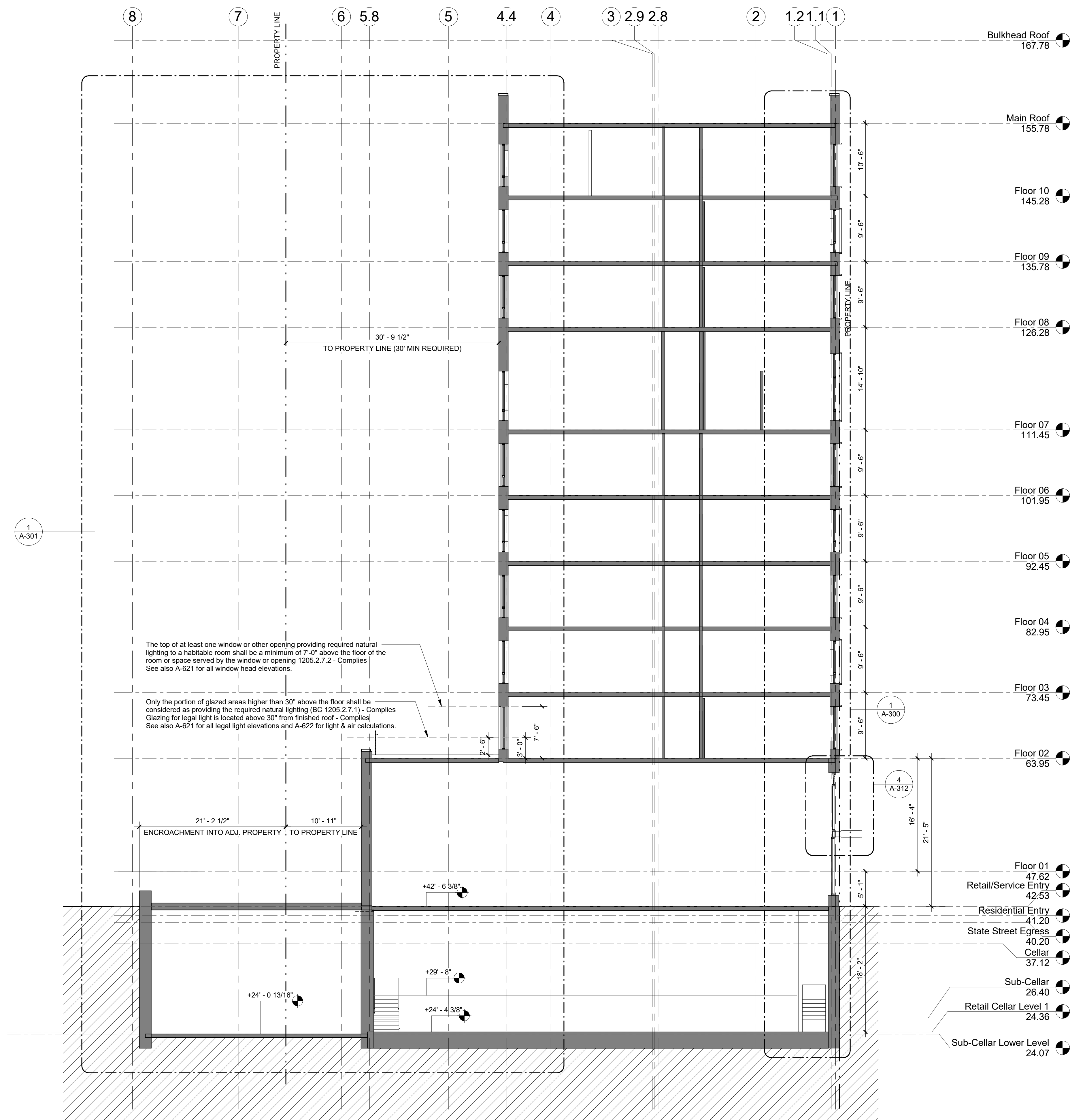
Drawn By \_\_\_\_\_ Author \_\_\_\_\_

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Project No. 1636 Sea

Sheet No. \_\_\_\_\_

A-250.00



1 Building Section 1 - North-South  
1/8" = 1'-0"

50 Nevins Street  
Brooklyn NY 11217

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tel 212 247 2660  
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224 W 29th Street  
New York NY 10001

Other  
Consultant 4  
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City, State Zip

Revisions:

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## Date 09/21/18

Scale	NTS
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Scale	NTS
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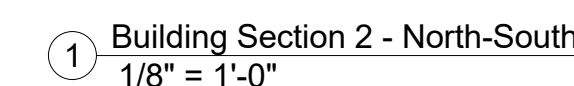
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Project No. 1636 Seal

Sheet No.:

A-251.00

6 of 6



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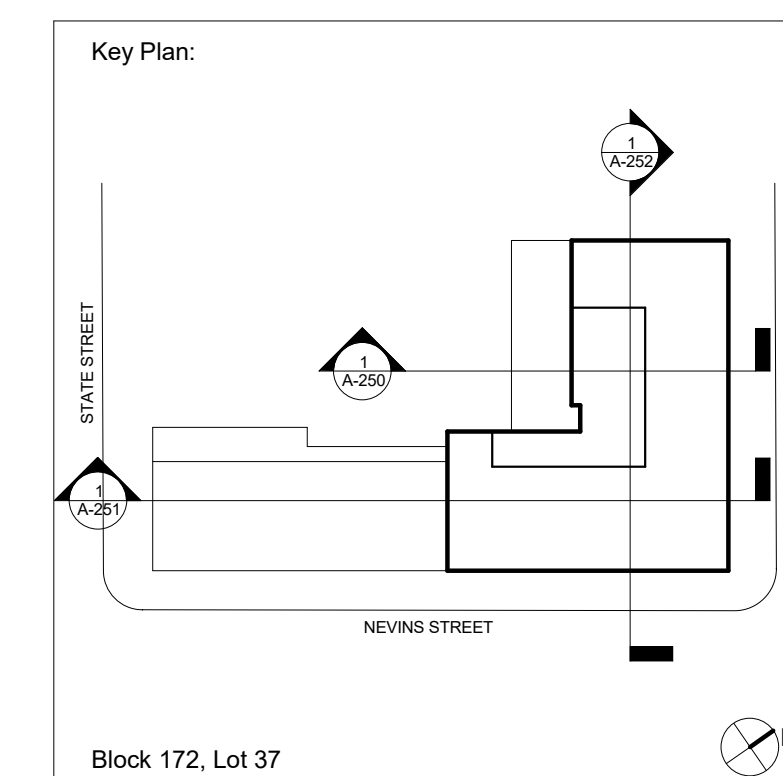
Mechanical/Electrical/Plumbing Engineers  
Rodkin Cardinale Consulting Engineers  
224 W 29th Street  
New York NY 10001

Other  
Consultant 4  
Address Line 1  
City, State Zip

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## Revisions

Issue: 85% CD Submission



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Scale	NTS
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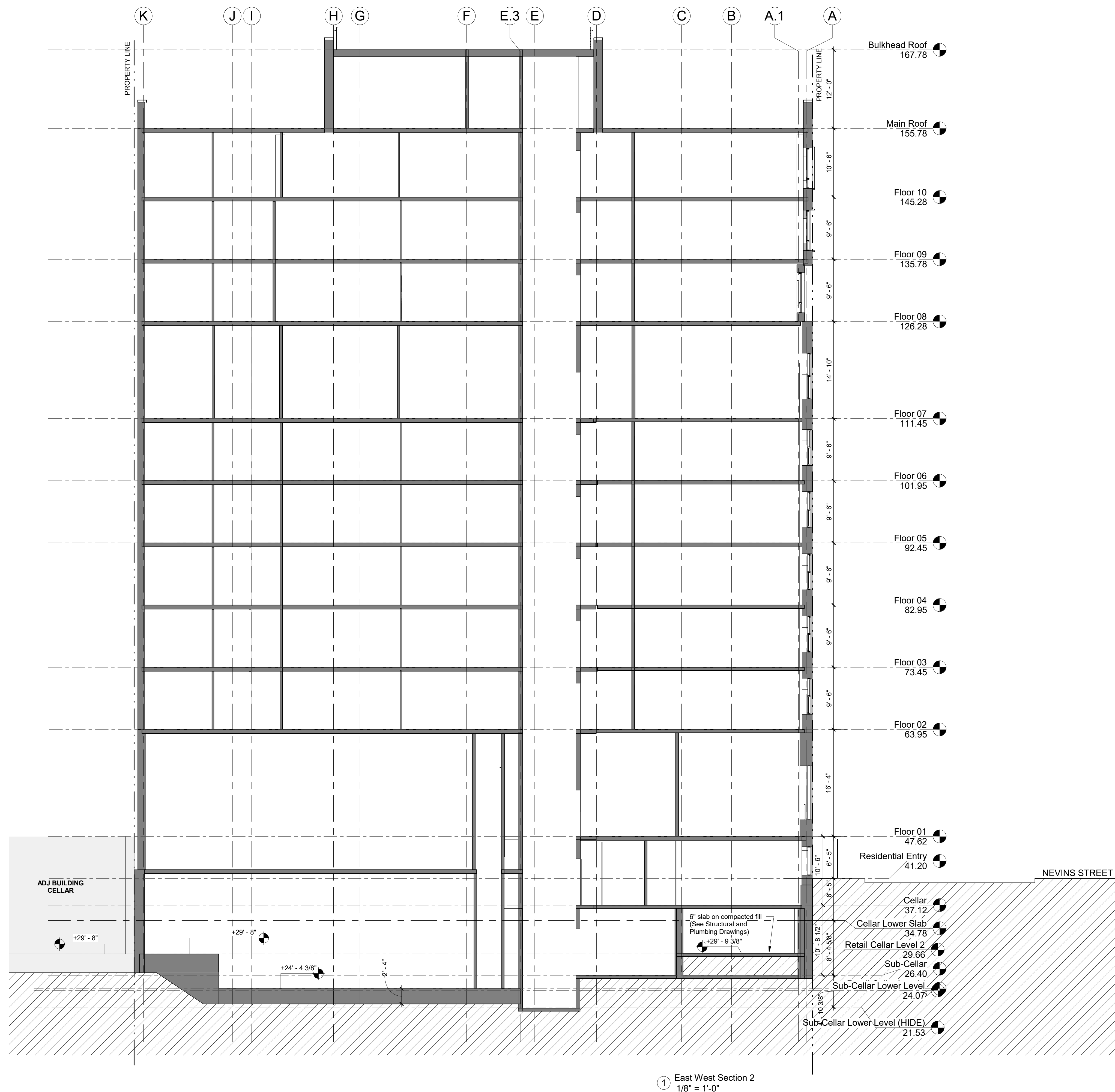
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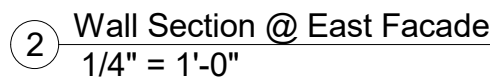
Project No. 1636 Sea

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**A-252.00**



① East West Section 2  
1/8" = 1'-0"



## Project No. 1636 Seal

## Wall Sections

## Wall Sections

Sheet No.:

6 of A-300.00



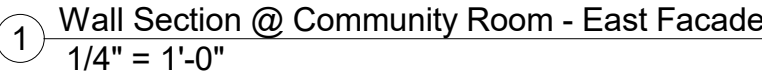
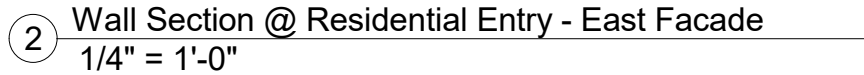
3 Wall Section above Existing Roof - South Facade  
1/4" = 1'-0"

2 Wall Section @ Existing Building - South Facade  
1/4" = 1'-0"

## Sheet No.

A-301.00

C



## Wall Sections

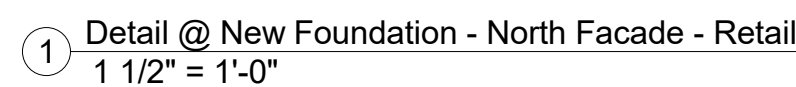
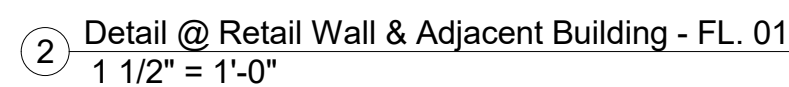
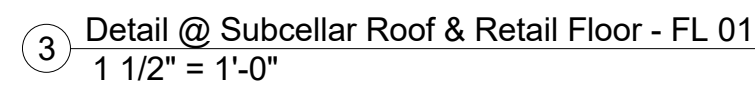
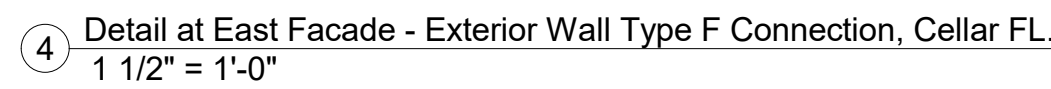
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


6 of 6 A-303.00





LEGEND:

- |   |                      |
|---|----------------------|
|  | EXISTING BUILDING    |
|  | SPRAY INSULATION     |
|  | ALUMINUM METAL PANEL |
|  | SOLID GROUT          |
|  | EARTH                |
|  | GRAVEL               |
|  | RIGID INSULATION     |
|  | FIREPROOFING         |

KEYNOTES:

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September 21, 2018

## Revisions

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**Key Plan:**



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## Wall Section Details

Project No. 1636 Sea

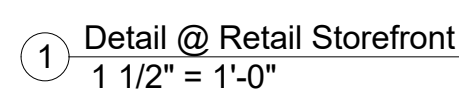
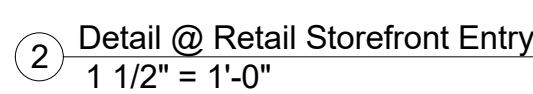
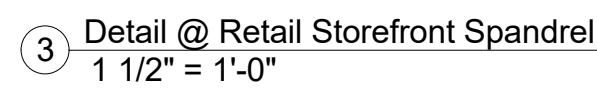
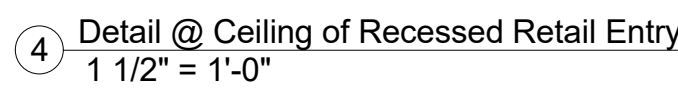
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




A-310.00







**LEGEND:**

	EXISTING BUILDING
	SPRAY INSULATION
	ALUMINUM METAL PANEL
	SOLID GROUT
	EARTH
	GRAVEL
	RIGID INSULATION
	FIREPROOFING

KEYNOTES:

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September 21, 2018

Date	09/21/18	
Scale	1 1/2" = 1'-0"	
Drawn By	Author	
Checked By	Checker	
Project No.	1636	Seal
Sheet No.:	A 1 2 3 4 5 6 7 8 9 10 11 12	

6 of A-3 12.00













① Detail @ Security Room Window  
1 1/2" = 1'-0"



ELEVATION OF  
UNDERSIDE/BOTTOM OF  
MARQUEE MUST BE AT 10' FROM  
THE SIDEWALK ELEVATION (SEE  
A-620).  
MARQUEE BOTTOM ELEVATION:  
+ 52.53'

	EXISTING BUILDING
	SPRAY INSULATION
	ALUMINUM METAL PANEL
	SOLID GROUT
	EARTH
	GRAVEL
	RIGID INSULATION
	FIREPROOFING

## September 21, 2018

Issue: 85% CD Submission

**Key Plan:**

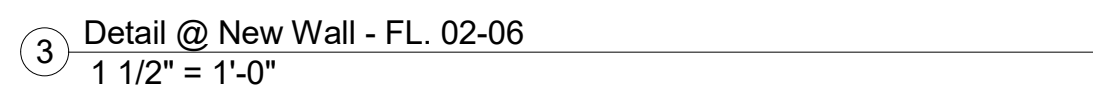
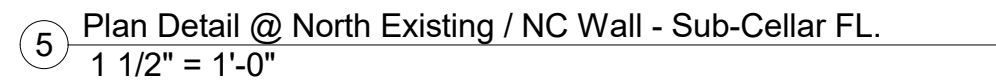
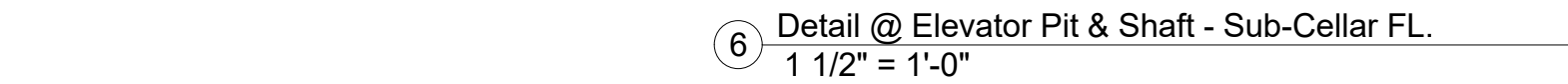
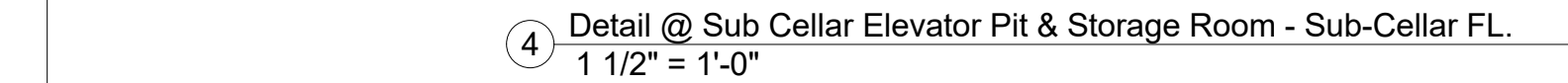
Key Plan  
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## Project No. 1636 Sea

Sheet No.:

6 of 6

A-313.00



307 Seventh Avenue, Suite 1701  
New York, NY 10001

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## 6 c

A-317.00

**APPENDIX C**  
**SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT**



Proactive by Design

GEOTECHNICAL

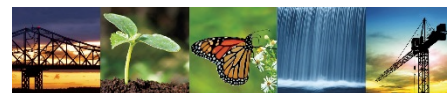
ENVIRONMENTAL

ECOLOGICAL

WATER

CONSTRUCTION  
MANAGEMENT

55 Lane Road  
Suite 407  
Fairfield, NJ 07004  
T: 973-774-3300  
F: 973-774-3350  
www.gza.com



February 14, 2019  
File No. 12.0076392.10

Myrna Hanna  
New York City Office of Environmental Remediation  
100 Gold Street, 2<sup>nd</sup> Floor  
New York, NY 10038

Re: Supplemental Soil Vapor Investigation  
50 Nevins Street  
Brooklyn, New York 11217

Dear Ms. Hanna,

At the request of the New York City Office of Environmental Remediation (NYC OER), and the New York State Department of Health (NYSDOH) on February 4, 2019, GZA GeoEnvironmental, Inc. (GZA) conducted a supplemental soil vapor assessment for the property located at 50 Nevins Street, Brooklyn, New York (the "Site"). **Figure 1** shows the Site location. The objective of the supplemental investigation was to confirm the laboratory result received from soil vapor sample SV-5. SV-5, which was collected on August 27, 2018 at a depth of 20 feet below ground surface (bgs), contained hexane at a concentration of 19,500 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). This concentration, if verifiable, would necessitate the installation of a sub-slab depressurization system (SSDS) in the existing building and proposed building.

#### SUPPLEMENTAL SOIL VAPOR INVESTIGATION

On February 7, 2019, EPhase2, LLC of Huntington Station, New York installed two soil vapor probes to 20 feet bgs. Soil vapor probe SV-7 was installed near the former SV-5 location and soil vapor probe SV-8 was installed approximately 20 feet north of SV-5. They were advanced using a Geoprobe® 6712DT direct-push technology drill rig. After installation of the probes, soil vapor was purged at less than 0.2 liters-per minute flow rate to limit ambient infiltration. Prior to sampling, a helium leak-detection test was performed at each soil vapor location, and no leaks were noted. The soil vapor sampling locations are shown on **Figure 2**.

GZA field screened the soil vapor samples for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID). The soil vapor samples were collected in a laboratory-supplied 2.7-liter stainless steel Summa canisters equipped with two-hour flow regulators and then submitted to Alpha Analytical (Alpha) of Westborough, Massachusetts, a New York State Environmental Laboratory Approval Program (NYS ELAP)-certified analytical laboratory. Alpha analyzed the samples for VOCs by EPA Method TO-15.



## RESULTS

GZA summarized the analytical results in the attached **Table 1**. The results were compared to New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (May 2017) Matrix A, B, and C guidance values. Most significantly, sample SV-7 contained hexane at a concentration of  $35.2 \mu\text{g}/\text{m}^3$ , which is three orders of magnitude lower than the concentration detected in SV-5. Sample SV-8 contained hexane at an even lower concentration ( $2.28 \mu\text{g}/\text{m}^3$ ). No other compounds were detected at concentrations approaching that of hexane in SV-5. The total concentration of benzene, toluene, ethylbenzene, and total xylenes (BTEX) ranged from  $41.33 \mu\text{g}/\text{m}^3$  to  $83.77 \mu\text{g}/\text{m}^3$ . Overall, the highest reported concentration was for acetone (a common lab decontamination product) at  $1,700 \mu\text{g}/\text{m}^3$ . The chlorinated VOCs methylene chloride, 1,1,1-trichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, carbon tetrachloride, and vinyl chloride were not detected in the samples. The laboratory report is provided in **Attachment A**.

## RECOMMENDATIONS

Based on the results of this supplementary sampling event, GZA concludes that a vapor barrier will provide sufficient protection for building residents from vapor intrusion hazards consistent with the recommended approach documented in the Remedial Action Work Plan, dated January 16, 2019. No SSDS installation is warranted for either the new building or the existing building.

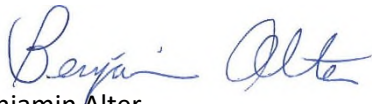
Please contact Ben Alter at (973) 774-3309 if you have any questions or comments regarding the contents of this report. Thank you.

Sincerely,

**GZA GEOENVIRONMENTAL, INC.**

  
Reinbill Maniquez  
Project Manager

  
Stephen M. Kline, P.E.  
Consultant Reviewer

  
Benjamin Alter  
Senior Vice President

### Attachments:

Table 1 – VOCs in Soil Vapor

Figure 1 – Site Location Map

Figure 2 – Site Plan

Attachment A - Alpha Analytical Laboratory Report



## TABLES



**Table 1 - Volatile Organic Compounds (VOCs) in Soil Vapor Analytical Results**  
**Supplemental Remedial Investigation Report**  
**50 Nevins Street**  
**Brooklyn, New York**

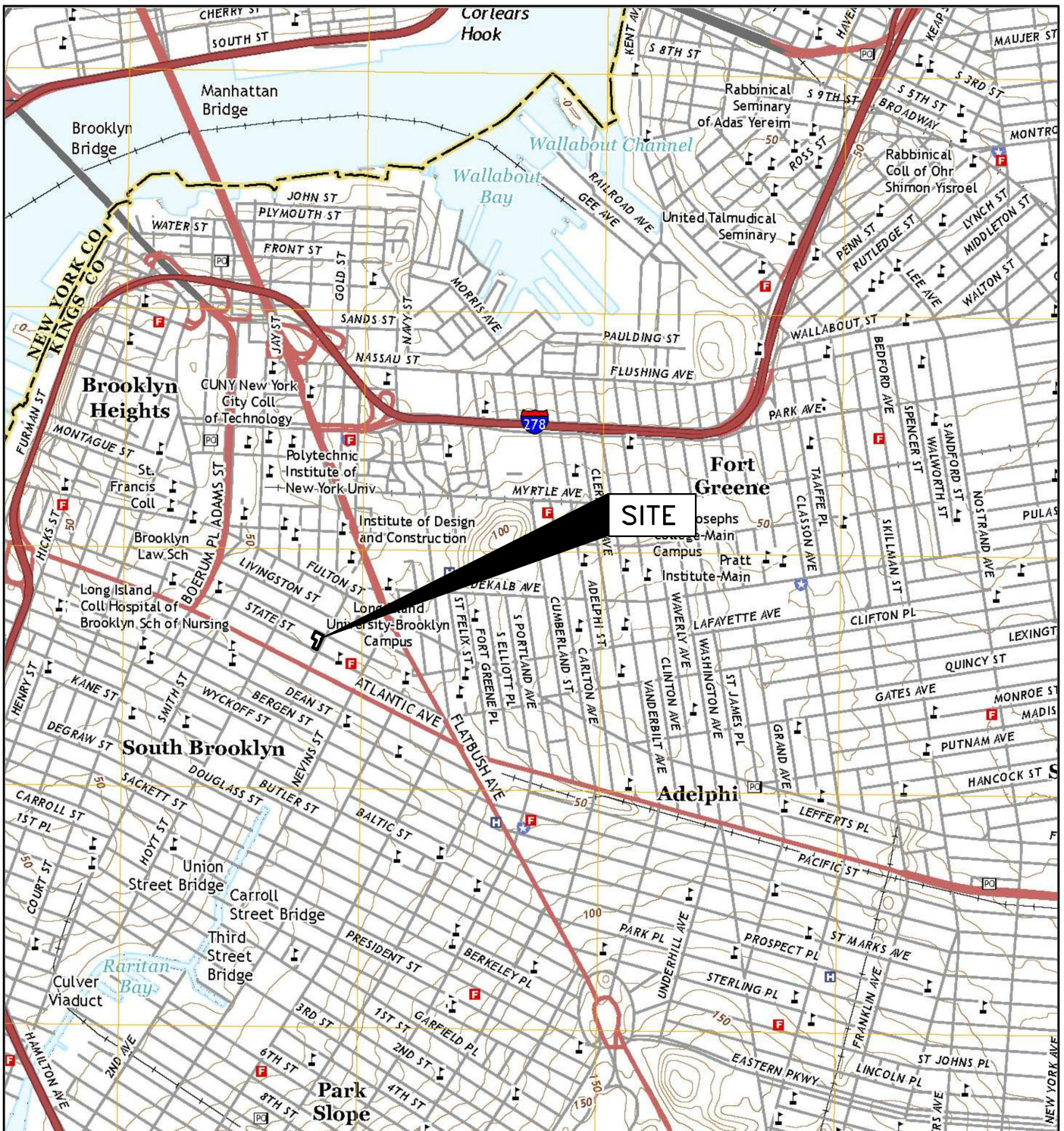
LOCATION	NYSDOH Air Guideline Values	NYSDOH Matrix A	NYSDOH Matrix B	NYSDOH Matrix C	NYSDOH Fuel Oil 2003 Upper Fence Limit		SV-07		SV-08	
SAMPLING DATE							2/7/2019		2/7/2019	
LAB SAMPLE ID							L1905093-01		L1905093-02	
SAMPLE TYPE							AIR		AIR	
SAMPLE DEPTH (ft. bgs)							20		20	
					Indoor	Outdoor	Results	Qual	Results	Qual
<b>VOCs in Air by TO-15 (µg/m³)</b>										
1,1,1-Trichloroethane	100	-	100	-	25	0.6	2.18	U	1.09	U
1,1,2,2-Tetrachloroethane	-	-	-	-	0.4	0.4	2.75	U	1.37	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	-	-	-	-	2.5	2.5	3.07	U	1.53	U
1,1,2-Trichloroethane	-	-	-	-	0.4	0.3	2.18	U	1.09	U
1,1-Dichloroethane	-	-	-	-	0.4	-	1.62	U	0.809	U
1,1-Dichloroethene	-	6	-	-	0.4	0.4	1.59	U	0.793	U
1,2,4-Trichlorobenzene	-	-	-	-	0.5	0.4	2.97	U	1.48	U
1,2,4-Trimethylbenzene	-	-	-	-	9.8	1.9	2.93	U	1.77	U
1,2-Dibromoethane	-	-	-	-	0.4	0.4	3.07	U	1.54	U
1,2-Dichloro-1,1,2,2-tetrafluoroethane	-	-	-	-	0.4	0.5	2.8	U	1.4	U
1,2-Dichlorobenzene	-	-	-	-	0.5	0.4	2.4	U	1.2	U
1,2-Dichloroethane	-	-	-	-	0.4	0.4	1.62	U	0.809	U
1,2-Dichloropropane	-	-	-	-	0.4	0.4	1.85	U	0.924	U
1,3,5-Trimethylbenzene	-	-	-	-	3.9	0.7	1.97	U	0.983	U
1,3-Butadiene	-	-	-	-	-	-	48.2	U	0.442	U
1,3-Dichlorobenzene	-	-	-	-	0.5	0.4	2.4	U	1.2	U
1,4-Dichlorobenzene	-	-	-	-	1.5	0.5	2.4	U	1.2	U
1,4-Dioxane	-	-	-	-	-	-	1.44	U	0.721	U
2,2,4-Trimethylpentane	-	-	-	-	-	-	1.87	U	0.934	U
2-Butanone	-	-	-	-	16	5.3	18.7	U	7.9	U
2-Hexanone	-	-	-	-	-	-	1.64	U	0.967	U
3-Chloropropene	-	-	-	-	-	-	1.25	U	0.626	U
4-Ethyltoluene	-	-	-	-	-	-	1.97	U	0.983	U
4-Methyl-2-pentanone	-	-	-	-	-	-	4.1	U	2.05	U
Acetone	-	-	-	-	115	30	1,070	U	618	U
Benzene	-	-	-	-	13	4.8	14.2	U	2.1	U
Benzyl chloride	-	-	-	-	-	-	2.07	U	1.04	U
Bromodichloromethane	-	-	-	-	-	-	2.68	U	1.34	U
Bromoform	-	-	-	-	-	-	4.14	U	2.07	U
Bromomethane	-	-	-	-	-	-	1.55	U	0.777	U
Carbon disulfide	-	-	-	-	-	-	4.73	U	0.623	U
Carbon tetrachloride	5	6	-	-	1.3	1.2	2.52	U	1.26	U
Chlorobenzene	-	-	-	-	0.4	-	1.84	U	0.921	U
Chloroethane	-	-	-	-	0.4	0.4	1.06	U	0.528	U
Chloroform	-	-	-	-	1.2	0.5	1.95	U	0.977	U
Chloromethane	-	-	-	-	4.2	4.3	1.04	U	0.413	U
cis-1,2-Dichloroethene	-	6	-	-	0.4	0.4	1.59	U	0.793	U
cis-1,3-Dichloropropene	-	-	-	-	0.4	0.4	1.82	U	0.908	U
Cyclohexane	-	-	-	-	6.3	0.9	2.86	U	0.688	U
Dibromochloromethane	-	-	-	-	-	-	3.41	U	1.7	U
Dichlorodifluoromethane	-	-	-	-	10	10	2.57	U	2.55	U
Ethyl Acetate	-	-	-	-	-	-	3.6	U	1.8	U
Ethyl Alcohol	-	-	-	-	1300	34	18.8	U	9.42	U
Ethylbenzene	-	-	-	-	6.4	1	7.6	U	4.56	U
Heptane	-	-	-	-	18	4.5	17.6	U	1.93	U
Hexachlorobutadiene	-	-	-	-	0.5	0.5	4.27	U	2.13	U
iso-Propyl Alcohol	-	-	-	-	-	-	2.46	U	1.23	U
Methyl tert butyl ether	-	-	-	-	14	-	1.44	U	0.721	U
Methylene chloride	60	-	100	-	16	16	3.47	U	1.74	U
n-Hexane	-	-	-	-	14	2.2	35.2	U	2.28	U
o-Xylene	-	-	-	-	7.1	1.5	6.47	U	4.07	U
p/m-Xylene	-	-	-	-	11	1	24.2	U	14.2	U
Styrene	-	-	-	-	1.4	0.5	1.7	U	0.852	U
tert-Butyl Alcohol	-	-	-	-	-	-	3.03	U	1.52	U
Tetrachloroethene	30	-	100	-	2.5	0.7	2.71	U	1.36	U
Tetrahydrofuran	-	-	-	-	0.8	0.4	2.95	U	1.47	U
Toluene	-	-	-	-	57	5.1	31.3	U	16.4	U
trans-1,2-Dichloroethene	-	-	-	-	-	-	1.85	U	0.987	U
trans-1,3-Dichloropropene	-	-	-	-	-	-	1.82	U	0.908	U
Trichloroethene	2	6	-	-	0.5	0.4	2.15	U	1.07	U
Trichlorofluoromethane	-	-	-	-	12	5.1	-	-	-	-
Vinyl bromide	-	-	-	-	-	-	1.75	U	0.874	U
Vinyl chloride	-	-	-	6	0.4	0.4	1.02	U	0.511	U

**TABLE NOTES:**

NYSDOH	New York State Department of Health Final Guidance for Evaluating Soil Vapor Intrusion, Revised May 2017.
100	Exceeds both indoor and outdoor NYSDOH 2003 Fuel Oil Upper Fence
100	Exceeds outdoor NYSDOH 2003 Fuel Oil Upper Fence Limit
U	Not detected at the reported detection limit for the sample.
B	The analyte was detected above the reporting limit in the associated
<i>Italicized</i>	Reporting Limit Exceeds Criteria.
-	No Standard or Guidance Value.
--	Not analyzed.
µg/m³	Micrograms per cubic meter.
Qual	Qualifiers.



## FIGURES

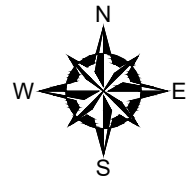


NEW YORK



QUADRANGLE LOCATION

SOURCE:  
USGS TOPOGRAPHIC MAP: BROOKLYN, NY (2016).  
CONTOUR INTERVAL 10 FT, NAVD-1988, ORIGINAL SCALE  
1:24,000 (1IN = 2,000FT).



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50 NEVINS STREET  
BROOKLYN, NEW YORK

PREPARED BY:



GZA GeoEnvironmental, Inc.  
Engineers and Scientists  
www.gza.com

PREPARED FOR:

INSTITUTE FOR COMMUNITY LIVING

PROJ MGR:

RM

REVIEWED BY:

SK

CHECKED BY:

SK

DESIGNED BY:

RM

DRAWN BY:

YX

SCALE:

1" = 2,000'

DATE:

FEB. 2019

PROJECT NO.

12.0076392.00

REVISION NO.

FIGURE

1

SHEET NO.

**SITE LOCATION MAP**



©2015 - GZA GeoEnvironmental, Inc. GZA-\\GZAHAM1\Jobs\76300's\12.0076392.00\Figures\CAD\76392.00.007.dwg [2] February 11, 2019 - 2:38pm yi.xiao



**NOTES:**

1. THE BASE MAP WAS DEVELOPED FROM AN IMAGE OBTAINED FROM NEW YORK CITY DEPARTMENT OF FINANCE ONLINE TAX MAPS.
2. LOCATION OF PROPOSED BUILDING WAS APPROXIMATED BASED ON DRAWING A-100, TITLED "SITE PLAN", PROVIDED BY DATNER ARCHITECTS, DATED APRIL 28, 2017.
3. THE LOCATIONS OF EXPLORATION WERE APPROXIMATED BY GZA FIELD REPRESENTATIVE DURING SITE VISITS, DATED AUGUST 27 AND 28, 2018 AND FEBRUARY 7, 2019.
4. THE PURPOSE OF THIS DRAWING IS TO LOCATE, DESCRIBE, AND REPRESENT THE POSITIONS OF PROPOSED EXPLORATIONS, IN RELATION TO THE SUBJECT SITE. THIS DRAWING IS NOT CONSIDERED A LAND SURVEY. THE LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

**LEGEND:**

- SITE BOUNDARY
- PROPERTY BOUNDARY
- EXISTING SITE BUILDING WITH CELLAR / SUBCELLAR
- EXISTING PARKING LOT
- PROPOSED 10-STORY BUILDING AND ADDITION
- PROPOSED 1-STORY BUILDING
- SB-# SOIL BORING LOCATION (AUGUST 2018)
- ▼ SV-# SOIL VAPOR POINT LOCATION (AUGUST 2018)
- SV-# SUPPLEMENTAL SOIL VAPOR POINT LOCATION (FEBRUARY 2019)

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

50 NEVINS STREET  
BROOKLYN, NEW YORK

**SUPPLEMENTAL SUBSURFACE EXPLORATION PLAN**

PREPARED BY: <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: INSTITUTE FOR COMMUNITY LIVING	
PROJ MGR: RM	REVIEWED BY: SK	CHECKED BY: SK	FIGURE <b>2</b> SHEET NO.
DESIGNED BY: RM	DRAWN BY: YX	SCALE: 1" = 30'	
DATE: FEB. 2019	PROJECT NO. 12.0076392.10	REVISION NO.	



## **ATTACHMENT A**

### **LABORATORY ANALYTICAL REPORT**





## ANALYTICAL REPORT

Lab Number:	L1905093
Client:	GZA GeoEnvironmental, Inc. 104 West 29th Street, 10th Floor New York, NY 10001
ATTN:	Reinbill Maniquez
Phone:	(212) 594-8140
Project Name:	50 NEVINS STREET
Project Number:	12.0076392.10
Report Date:	02/11/19

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

---

320 Forbes Boulevard, Mansfield, MA 02048-1806  
508-822-9300 (Fax) 508-822-3288 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** 50 NEVINS STREET  
**Project Number:** 12.0076392.10

**Lab Number:** L1905093  
**Report Date:** 02/11/19

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1905093-01	SV-07(20')	SOIL_VAPOR	BROOKLYN, NEW YORK	02/07/19 11:35	02/07/19
L1905093-02	SV-08(20')	SOIL_VAPOR	BROOKLYN, NEW YORK	02/07/19 11:45	02/07/19

**Project Name:** 50 NEVINS STREET  
**Project Number:** 12.0076392.10

**Lab Number:** L1905093  
**Report Date:** 02/11/19

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

**HOLD POLICY** - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

---

**Project Name:** 50 NEVINS STREET  
**Project Number:** 12.0076392.10

**Lab Number:** L1905093  
**Report Date:** 02/11/19

### Case Narrative (continued)

#### Volatile Organics in Air

Canisters were released from the laboratory on February 6, 2019. The canister certification results are provided as an addendum.

L1905093-01 results for Acetone should be considered estimated due to co-elution with a non-target peak.

L1905093-01: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

#### Sample Receipt

The flow controller ID number for the sample designated SV-07(20') (L1905093-01) is listed on the CoC as 01082 but should be 01085.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Christopher J. Anderson

Title: Technical Director/Representative

Date: 02/11/19



**AIR**

**Project Name:** 50 NEVINS STREET**Project Number:** 12.0076392.10**Lab Number:** L1905093**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-01 D  
 Client ID: SV-07(20')  
 Sample Location: BROOKLYN, NEW YORK

Date Collected: 02/07/19 11:35  
 Date Received: 02/07/19  
 Field Prep: Not Specified

Sample Depth:  
 Matrix: Soil\_Vapor  
 Analytical Method: 48,TO-15  
 Analytical Date: 02/10/19 05:07  
 Analyst: EW

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Dichlorodifluoromethane	0.520	0.400	--	2.57	1.98	--		2
Chloromethane	0.506	0.400	--	1.04	0.826	--		2
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.400	--	ND	2.80	--		2
Vinyl chloride	ND	0.400	--	ND	1.02	--		2
1,3-Butadiene	21.8	0.400	--	48.2	0.885	--		2
Bromomethane	ND	0.400	--	ND	1.55	--		2
Chloroethane	ND	0.400	--	ND	1.06	--		2
Ethyl Alcohol	ND	10.0	--	ND	18.8	--		2
Vinyl bromide	ND	0.400	--	ND	1.75	--		2
Acetone	450	2.00	--	1070	4.75	--		2
iso-Propyl Alcohol	ND	1.00	--	ND	2.46	--		2
1,1-Dichloroethene	ND	0.400	--	ND	1.59	--		2
tert-Butyl Alcohol	ND	1.00	--	ND	3.03	--		2
Methylene chloride	ND	1.00	--	ND	3.47	--		2
3-Chloropropene	ND	0.400	--	ND	1.25	--		2
Carbon disulfide	1.52	0.400	--	4.73	1.25	--		2
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.400	--	ND	3.07	--		2
trans-1,2-Dichloroethene	0.466	0.400	--	1.85	1.59	--		2
1,1-Dichloroethane	ND	0.400	--	ND	1.62	--		2
Methyl tert butyl ether	ND	0.400	--	ND	1.44	--		2
2-Butanone	6.33	1.00	--	18.7	2.95	--		2
cis-1,2-Dichloroethene	ND	0.400	--	ND	1.59	--		2
Ethyl Acetate	ND	1.00	--	ND	3.60	--		2



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-01 D  
 Client ID: SV-07(20')  
 Sample Location: BROOKLYN, NEW YORK

Date Collected: 02/07/19 11:35  
 Date Received: 02/07/19  
 Field Prep: Not Specified

Sample Depth:

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Chloroform	ND	0.400	--	ND	1.95	--		2
Tetrahydrofuran	ND	1.00	--	ND	2.95	--		2
1,2-Dichloroethane	ND	0.400	--	ND	1.62	--		2
n-Hexane	9.99	0.400	--	35.2	1.41	--		2
1,1,1-Trichloroethane	ND	0.400	--	ND	2.18	--		2
Benzene	4.45	0.400	--	14.2	1.28	--		2
Carbon tetrachloride	ND	0.400	--	ND	2.52	--		2
Cyclohexane	0.830	0.400	--	2.86	1.38	--		2
1,2-Dichloropropane	ND	0.400	--	ND	1.85	--		2
Bromodichloromethane	ND	0.400	--	ND	2.68	--		2
Xylene (Total)	7.07	0.400	--	30.7	1.74	--		2
1,4-Dioxane	ND	0.400	--	ND	1.44	--		2
Trichloroethene	ND	0.400	--	ND	2.15	--		2
2,2,4-Trimethylpentane	ND	0.400	--	ND	1.87	--		2
Heptane	4.30	0.400	--	17.6	1.64	--		2
cis-1,3-Dichloropropene	ND	0.400	--	ND	1.82	--		2
4-Methyl-2-pentanone	ND	1.00	--	ND	4.10	--		2
trans-1,3-Dichloropropene	ND	0.400	--	ND	1.82	--		2
1,1,2-Trichloroethane	ND	0.400	--	ND	2.18	--		2
Toluene	8.31	0.400	--	31.3	1.51	--		2
1,2-Dichloroethene (total)	0.466	0.400	--	1.85	1.59	--		2
2-Hexanone	ND	0.400	--	ND	1.64	--		2
1,3-Dichloropropene, Total	ND	0.400	--	ND	1.82	--		2
Dibromochloromethane	ND	0.400	--	ND	3.41	--		2
1,2-Dibromoethane	ND	0.400	--	ND	3.07	--		2
Tetrachloroethene	ND	0.400	--	ND	2.71	--		2



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-01 D  
 Client ID: SV-07(20')  
 Sample Location: BROOKLYN, NEW YORK

Date Collected: 02/07/19 11:35  
 Date Received: 02/07/19  
 Field Prep: Not Specified

Sample Depth:

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Chlorobenzene	ND	0.400	--	ND	1.84	--		2
Ethylbenzene	1.75	0.400	--	7.60	1.74	--		2
p/m-Xylene	5.58	0.800	--	24.2	3.47	--		2
Bromoform	ND	0.400	--	ND	4.14	--		2
Styrene	ND	0.400	--	ND	1.70	--		2
1,1,2,2-Tetrachloroethane	ND	0.400	--	ND	2.75	--		2
o-Xylene	1.49	0.400	--	6.47	1.74	--		2
4-Ethyltoluene	ND	0.400	--	ND	1.97	--		2
1,3,5-Trimethylbenzene	ND	0.400	--	ND	1.97	--		2
1,2,4-Trimethylbenzene	0.596	0.400	--	2.93	1.97	--		2
Benzyl chloride	ND	0.400	--	ND	2.07	--		2
1,3-Dichlorobenzene	ND	0.400	--	ND	2.40	--		2
1,4-Dichlorobenzene	ND	0.400	--	ND	2.40	--		2
1,2-Dichlorobenzene	ND	0.400	--	ND	2.40	--		2
1,2,4-Trichlorobenzene	ND	0.400	--	ND	2.97	--		2
Hexachlorobutadiene	ND	0.400	--	ND	4.27	--		2

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	100		60-140
Bromochloromethane	98		60-140
chlorobenzene-d5	103		60-140



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-01 D  
 Client ID: SV-07(20')  
 Sample Location: BROOKLYN, NEW YORK

Date Collected: 02/07/19 11:35  
 Date Received: 02/07/19  
 Field Prep: Not Specified

Sample Depth:

Matrix: Soil\_Vapor  
 Analytical Method: 48,TO-15-SIM  
 Analytical Date: 02/10/19 05:07  
 Analyst: EW

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Trichlorofluoromethane	0.256	0.100	--	1.44	0.562	--		2

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	100		60-140
bromochloromethane	98		60-140
chlorobenzene-d5	106		60-140





**Project Name:** 50 NEVINS STREET**Project Number:** 12.0076392.10**Lab Number:** L1905093**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-02  
 Client ID: SV-08(20')  
 Sample Location: BROOKLYN, NEW YORK

Date Collected: 02/07/19 11:45  
 Date Received: 02/07/19  
 Field Prep: Not Specified

Sample Depth:  
 Matrix: Soil\_Vapor  
 Analytical Method: 48,TO-15  
 Analytical Date: 02/10/19 05:45  
 Analyst: EW

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Dichlorodifluoromethane	0.515	0.200	--	2.55	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.200	--	ND	1.40	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethyl Alcohol	ND	5.00	--	ND	9.42	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acetone	260	1.00	--	618	2.38	--		1
iso-Propyl Alcohol	ND	0.500	--	ND	1.23	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
tert-Butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	0.249	0.200	--	0.987	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	2.68	0.500	--	7.90	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-02  
 Client ID: SV-08(20')  
 Sample Location: BROOKLYN, NEW YORK

Date Collected: 02/07/19 11:45  
 Date Received: 02/07/19  
 Field Prep: Not Specified

Sample Depth:

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	0.646	0.200	--	2.28	0.705	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Benzene	0.657	0.200	--	2.10	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
Xylene (Total)	4.21	0.200	--	18.3	0.869	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Heptane	0.471	0.200	--	1.93	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	4.35	0.200	--	16.4	0.754	--		1
1,2-Dichloroethene (total)	0.249	0.200	--	0.987	0.793	--		1
2-Hexanone	0.236	0.200	--	0.967	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,3-Dichloropropene, Total	ND	0.200	--	ND	0.908	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-02

Date Collected: 02/07/19 11:45

Client ID: SV-08(20')

Date Received: 02/07/19

Sample Location: BROOKLYN, NEW YORK

Field Prep: Not Specified

Sample Depth:

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	1.05	0.200	--	4.56	0.869	--		1
p/m-Xylene	3.27	0.400	--	14.2	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	0.936	0.200	--	4.07	0.869	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
1,2,4-Trimethylbenzene	0.360	0.200	--	1.77	0.983	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	99		60-140
Bromochloromethane	96		60-140
chlorobenzene-d5	101		60-140



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19**SAMPLE RESULTS**

Lab ID: L1905093-02  
 Client ID: SV-08(20')  
 Sample Location: BROOKLYN, NEW YORK

Date Collected: 02/07/19 11:45  
 Date Received: 02/07/19  
 Field Prep: Not Specified

Sample Depth:  
 Matrix: Soil\_Vapor  
 Analytical Method: 48,TO-15-SIM  
 Analytical Date: 02/10/19 05:45  
 Analyst: EW

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Trichlorofluoromethane	0.242	0.050	--	1.36	0.281	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	100		60-140
bromochloromethane	96		60-140
chlorobenzene-d5	104		60-140



Project Name: 50 NEVINS STREET

Lab Number: L1905093

Project Number: 12.0076392.10

Report Date: 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15

Analytical Date: 02/09/19 18:30

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG1205294-4								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethyl Alcohol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
iso-Propyl Alcohol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1
tert-Butyl Alcohol	ND	0.500	--	ND	1.52	--		1





Project Name: 50 NEVINS STREET

Lab Number: L1905093

Project Number: 12.0076392.10

Report Date: 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15

Analytical Date: 02/09/19 18:30

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG1205294-4								
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
Xylene (Total)	ND	0.200	--	ND	0.869	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Isopropyl Ether	ND	0.200	--	ND	0.836	--		1
Ethyl-Tert-Butyl-Ether	ND	0.200	--	ND	0.836	--		1
1,2-Dichloroethene (total)	ND	0.200	--	ND	0.793	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,3-Dichloropropene, Total	ND	0.200	--	ND	0.908	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1



Project Name: 50 NEVINS STREET

Lab Number: L1905093

Project Number: 12.0076392.10

Report Date: 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15

Analytical Date: 02/09/19 18:30

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG1205294-4								
Cyclohexane	ND	0.200	--	ND	0.688	--		1
Tertiary-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl Acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1



Project Name: 50 NEVINS STREET

Lab Number: L1905093

Project Number: 12.0076392.10

Report Date: 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15

Analytical Date: 02/09/19 18:30

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG1205294-4								
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1
Nonane (C9)	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
o-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
p-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane (C10)	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15

Analytical Date: 02/09/19 18:30

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG1205294-4								
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane (C12)	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1

Project Name: 50 NEVINS STREET

Lab Number: L1905093

Project Number: 12.0076392.10

Report Date: 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15-SIM

Analytical Date: 02/09/19 19:08

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-02 Batch: WG1205295-4								
Propylene	ND	0.500	--	ND	0.861	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Ethyl Alcohol	ND	5.00	--	ND	9.42	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
iso-Propyl Alcohol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,2-Dichloroethene (total)	ND	0.020	--	ND	0.079	--		1
tert-Butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
1,3-Dichloropropene, Total	ND	0.020	--	ND	0.091	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1





Project Name: 50 NEVINS STREET

Lab Number: L1905093

Project Number: 12.0076392.10

Report Date: 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15-SIM

Analytical Date: 02/09/19 19:08

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-02 Batch: WG1205295-4								
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Xylene (Total)	ND	0.020	--	ND	0.087	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1



Project Name: 50 NEVINS STREET

Lab Number: L1905093

Project Number: 12.0076392.10

Report Date: 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15-SIM

Analytical Date: 02/09/19 19:08

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-02 Batch: WG1205295-4								
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
1,2,3-Trichloropropane	ND	0.020	--	ND	0.121	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19

### Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15-SIM

Analytical Date: 02/09/19 19:08

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-02 Batch: WG1205295-4								
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

# Lab Control Sample Analysis

## Batch Quality Control

Project Name: 50 NEVINS STREET

Project Number: 12.0076392.10

Lab Number: L1905093

Report Date: 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205294-3								
Chlorodifluoromethane	93		-		70-130	-		
Propylene	118		-		70-130	-		
Propane	80		-		70-130	-		
Dichlorodifluoromethane	121		-		70-130	-		
Chloromethane	100		-		70-130	-		
1,2-Dichloro-1,1,2,2-tetrafluoroethane	115		-		70-130	-		
Methanol	81		-		70-130	-		
Vinyl chloride	116		-		70-130	-		
1,3-Butadiene	108		-		70-130	-		
Butane	108		-		70-130	-		
Bromomethane	116		-		70-130	-		
Chloroethane	116		-		70-130	-		
Ethyl Alcohol	88		-		40-160	-		
Dichlorofluoromethane	98		-		70-130	-		
Vinyl bromide	119		-		70-130	-		
Acrolein	90		-		70-130	-		
Acetone	129		-		40-160	-		
Acetonitrile	109		-		70-130	-		
Trichlorofluoromethane	136	Q	-		70-130	-		
iso-Propyl Alcohol	100		-		40-160	-		
Acrylonitrile	91		-		70-130	-		
Pentane	106		-		70-130	-		
Ethyl ether	73		-		70-130	-		

# Lab Control Sample Analysis

## Batch Quality Control

Project Name: 50 NEVINS STREET

Project Number: 12.0076392.10

Lab Number: L1905093

Report Date: 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205294-3								
1,1-Dichloroethene	118		-		70-130	-		
tert-Butyl Alcohol	76		-		70-130	-		
Methylene chloride	102		-		70-130	-		
3-Chloropropene	117		-		70-130	-		
Carbon disulfide	109		-		70-130	-		
1,1,2-Trichloro-1,2,2-Trifluoroethane	124		-		70-130	-		
trans-1,2-Dichloroethene	116		-		70-130	-		
1,1-Dichloroethane	116		-		70-130	-		
Methyl tert butyl ether	87		-		70-130	-		
Vinyl acetate	126		-		70-130	-		
2-Butanone	119		-		70-130	-		
cis-1,2-Dichloroethene	116		-		70-130	-		
Ethyl Acetate	118		-		70-130	-		
Chloroform	119		-		70-130	-		
Tetrahydrofuran	98		-		70-130	-		
2,2-Dichloropropane	103		-		70-130	-		
1,2-Dichloroethane	128		-		70-130	-		
n-Hexane	97		-		70-130	-		
Isopropyl Ether	78		-		70-130	-		
Ethyl-Tert-Butyl-Ether	64	Q	-		70-130	-		
1,2-Dichloroethene (total)	116		-			-		
1,2-Dichloroethene (total)	116		-			-		
1,1,1-Trichloroethane	113		-		70-130	-		



# **Lab Control Sample Analysis** Batch Quality Control

**Project Name:** 50 NEVINS STREET

**Project Number:** 12.0076392.10

**Lab Number:** L1905093

**Report Date:** 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205294-3								
1,1-Dichloropropene	103		-		70-130	-		
Benzene	90		-		70-130	-		
Carbon tetrachloride	122		-		70-130	-		
Cyclohexane	96		-		70-130	-		
Tertiary-Amyl Methyl Ether	58	Q	-		70-130	-		
Dibromomethane	98		-		70-130	-		
1,2-Dichloropropane	96		-		70-130	-		
Bromodichloromethane	108		-		70-130	-		
1,4-Dioxane	98		-		70-130	-		
Trichloroethene	100		-		70-130	-		
2,2,4-Trimethylpentane	100		-		70-130	-		
Methyl Methacrylate	96		-		40-160	-		
Heptane	92		-		70-130	-		
cis-1,3-Dichloropropene	92		-		70-130	-		
4-Methyl-2-pentanone	89		-		70-130	-		
trans-1,3-Dichloropropene	83		-		70-130	-		
1,1,2-Trichloroethane	102		-		70-130	-		
Toluene	98		-		70-130	-		
1,3-Dichloropropane	88		-		70-130	-		
2-Hexanone	86		-		70-130	-		
Dibromochloromethane	120		-		70-130	-		
1,2-Dibromoethane	98		-		70-130	-		
Butyl Acetate	79		-		70-130	-		

# Lab Control Sample Analysis

## Batch Quality Control

Project Name: 50 NEVINS STREET

Project Number: 12.0076392.10

Lab Number: L1905093

Report Date: 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205294-3								
Octane	91		-		70-130	-		
Tetrachloroethene	96		-		70-130	-		
1,1,1,2-Tetrachloroethane	102		-		70-130	-		
Chlorobenzene	98		-		70-130	-		
Ethylbenzene	100		-		70-130	-		
p/m-Xylene	104		-		70-130	-		
Bromoform	116		-		70-130	-		
Styrene	94		-		70-130	-		
1,1,2,2-Tetrachloroethane	101		-		70-130	-		
o-Xylene	106		-		70-130	-		
1,2,3-Trichloropropane	94		-		70-130	-		
Nonane (C9)	85		-		70-130	-		
Isopropylbenzene	99		-		70-130	-		
Bromobenzene	92		-		70-130	-		
o-Chlorotoluene	94		-		70-130	-		
n-Propylbenzene	95		-		70-130	-		
p-Chlorotoluene	98		-		70-130	-		
4-Ethyltoluene	105		-		70-130	-		
1,3,5-Trimethylbenzene	100		-		70-130	-		
tert-Butylbenzene	101		-		70-130	-		
1,2,4-Trimethylbenzene	108		-		70-130	-		
Decane (C10)	100		-		70-130	-		
Benzyl chloride	123		-		70-130	-		

# **Lab Control Sample Analysis** Batch Quality Control

**Project Name:** 50 NEVINS STREET

**Project Number:** 12.0076392.10

**Lab Number:** L1905093

**Report Date:** 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205294-3								
1,3-Dichlorobenzene	103		-		70-130	-		
1,4-Dichlorobenzene	102		-		70-130	-		
sec-Butylbenzene	101		-		70-130	-		
p-Isopropyltoluene	97		-		70-130	-		
1,2-Dichlorobenzene	106		-		70-130	-		
n-Butylbenzene	113		-		70-130	-		
1,2-Dibromo-3-chloropropane	107		-		70-130	-		
Undecane	102		-		70-130	-		
Dodecane (C12)	105		-		70-130	-		
1,2,4-Trichlorobenzene	111		-		70-130	-		
Naphthalene	105		-		70-130	-		
1,2,3-Trichlorobenzene	102		-		70-130	-		
Hexachlorobutadiene	117		-		70-130	-		

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 50 NEVINS STREET

Project Number: 12.0076392.10

Lab Number: L1905093

Report Date: 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205295-3								
Propylene	104		-		70-130	-		25
Dichlorodifluoromethane	108		-		70-130	-		25
Chloromethane	92		-		70-130	-		25
1,2-Dichloro-1,1,2,2-tetrafluoroethane	103		-		70-130	-		25
Vinyl chloride	106		-		70-130	-		25
1,3-Butadiene	99		-		70-130	-		25
Bromomethane	107		-		70-130	-		25
Chloroethane	107		-		70-130	-		25
Ethyl Alcohol	90		-		40-160	-		25
Vinyl bromide	115		-		70-130	-		25
Acetone	122		-		40-160	-		25
Trichlorofluoromethane	127		-		70-130	-		25
iso-Propyl Alcohol	96		-		40-160	-		25
Acrylonitrile	90		-		70-130	-		25
1,1-Dichloroethene	109		-		70-130	-		25
tert-Butyl Alcohol <sup>1</sup>	68	Q	-		70-130	-		25
Methylene chloride	99		-		70-130	-		25
3-Chloropropene	118		-		70-130	-		25
Carbon disulfide	104		-		70-130	-		25
1,1,2-Trichloro-1,2,2-Trifluoroethane	115		-		70-130	-		25
trans-1,2-Dichloroethene	109		-		70-130	-		25
1,1-Dichloroethane	107		-		70-130	-		25
Methyl tert butyl ether	82		-		70-130	-		25

# Lab Control Sample Analysis

## Batch Quality Control

Project Name: 50 NEVINS STREET

Project Number: 12.0076392.10

Lab Number: L1905093

Report Date: 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205295-3								
Vinyl acetate	109		-		70-130	-		25
2-Butanone	105		-		70-130	-		25
cis-1,2-Dichloroethene	89		-		70-130	-		25
Ethyl Acetate	111		-		70-130	-		25
Chloroform	109		-		70-130	-		25
Tetrahydrofuran	89		-		70-130	-		25
1,2-Dichloroethane	117		-		70-130	-		25
n-Hexane	92		-		70-130	-		25
1,1,1-Trichloroethane	106		-		70-130	-		25
Benzene	86		-		70-130	-		25
Carbon tetrachloride	116		-		70-130	-		25
Cyclohexane	87		-		70-130	-		25
Dibromomethane <sup>1</sup>	88		-		70-130	-		25
1,2-Dichloropropane	90		-		70-130	-		25
Bromodichloromethane	104		-		70-130	-		25
1,4-Dioxane	94		-		70-130	-		25
Trichloroethene	95		-		70-130	-		25
2,2,4-Trimethylpentane	97		-		70-130	-		25
cis-1,3-Dichloropropene	75		-		70-130	-		25
4-Methyl-2-pentanone	84		-		70-130	-		25
trans-1,3-Dichloropropene	83		-		70-130	-		25
1,1,2-Trichloroethane	97		-		70-130	-		25
Toluene	92		-		70-130	-		25



## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 50 NEVINS STREET

Project Number: 12.0076392.10

Lab Number: L1905093

Report Date: 02/11/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205295-3								
2-Hexanone	84		-		70-130	-		25
Dibromochloromethane	115		-		70-130	-		25
1,2-Dibromoethane	95		-		70-130	-		25
Tetrachloroethene	90		-		70-130	-		25
1,1,1,2-Tetrachloroethane	99		-		70-130	-		25
Chlorobenzene	92		-		70-130	-		25
Ethylbenzene	94		-		70-130	-		25
p/m-Xylene	99		-		70-130	-		25
Bromoform	111		-		70-130	-		25
Styrene	91		-		70-130	-		25
1,1,2,2-Tetrachloroethane	99		-		70-130	-		25
o-Xylene	100		-		70-130	-		25
1,2,3-Trichloropropane <sup>1</sup>	92		-		70-130	-		25
Isopropylbenzene	96		-		70-130	-		25
Bromobenzene <sup>1</sup>	90		-		70-130	-		25
4-Ethyltoluene	107		-		70-130	-		25
1,3,5-Trimethylbenzene	98		-		70-130	-		25
1,2,4-Trimethylbenzene	110		-		70-130	-		25
Benzyl chloride	118		-		70-130	-		25
1,3-Dichlorobenzene	112		-		70-130	-		25
1,4-Dichlorobenzene	113		-		70-130	-		25
sec-Butylbenzene	101		-		70-130	-		25
p-Isopropyltoluene	93		-		70-130	-		25

# **Lab Control Sample Analysis** Batch Quality Control

**Project Name:** 50 NEVINS STREET

**Project Number:** 12.0076392.10

**Lab Number:** L1905093

**Report Date:** 02/11/19

<b>Parameter</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>%Recovery Limits</b>	<b>RPD</b>	<b>Qual</b>	<b>RPD Limits</b>
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-02 Batch: WG1205295-3								
1,2-Dichlorobenzene	111		-		70-130	-		25
n-Butylbenzene	113		-		70-130	-		25
1,2,4-Trichlorobenzene	106		-		70-130	-		25
Naphthalene	98		-		70-130	-		25
1,2,3-Trichlorobenzene	105		-		70-130	-		25
Hexachlorobutadiene	115		-		70-130	-		25

**Project Name:** 50 NEVINS STREET

**Project Number:** 12.0076392.10

Serial\_No:02111916:54  
**Lab Number:** L1905093

**Report Date:** 02/11/19

### Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Date Prepared	Bottle Order	Cleaning Batch ID	Can Leak Check	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Controller Leak Chk	Flow Out mL/min	Flow In mL/min	% RPD
L1905093-01	SV-07(20')	01085	Flow 2	02/06/19	284653		-	-	-	Pass	40.0	41.9	5
L1905093-01	SV-07(20')	2632	6.0L Can	02/06/19	284653	L1904276-02	Pass	-29.6	-3.9	-	-	-	-
L1905093-02	SV-08(20')	0803	Flow 4	02/06/19	284653		-	-	-	Pass	40.0	40.0	0
L1905093-02	SV-08(20')	688	6.0L Can	02/06/19	284653	L1904276-02	Pass	-29.0	-3.9	-	-	-	-

**Project Name:** BATCH CANISTER CERTIFICATION  
**Project Number:** CANISTER QC BAT

**Lab Number:** L1904276  
**Report Date:** 02/11/19

### Air Canister Certification Results

**Lab ID:** L1904276-02  
**Client ID:** CAN 2271 SHELF 53  
**Sample Location:**

**Date Collected:** 02/01/19 16:00  
**Date Received:** 02/02/19  
**Field Prep:** Not Specified

**Sample Depth:**  
**Matrix:** Air  
**Analytical Method:** 48,TO-15  
**Analytical Date:** 02/02/19 18:51  
**Analyst:** AR

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Chlorodifluoromethane	ND	0.200	--	ND	0.707	--		1
Propylene	ND	0.500	--	ND	0.861	--		1
Propane	ND	0.500	--	ND	0.902	--		1
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.200	--	ND	1.40	--		1
Methanol	ND	5.00	--	ND	6.55	--		1
Vinyl chloride	ND	0.200	--	ND	0.511	--		1
1,3-Butadiene	ND	0.200	--	ND	0.442	--		1
Butane	ND	0.200	--	ND	0.475	--		1
Bromomethane	ND	0.200	--	ND	0.777	--		1
Chloroethane	ND	0.200	--	ND	0.528	--		1
Ethanol	ND	5.00	--	ND	9.42	--		1
Dichlorofluoromethane	ND	0.200	--	ND	0.842	--		1
Vinyl bromide	ND	0.200	--	ND	0.874	--		1
Acrolein	ND	0.500	--	ND	1.15	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Acetonitrile	ND	0.200	--	ND	0.336	--		1
Trichlorofluoromethane	ND	0.200	--	ND	1.12	--		1
Isopropanol	ND	0.500	--	ND	1.23	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
Pentane	ND	0.200	--	ND	0.590	--		1
Ethyl ether	ND	0.200	--	ND	0.606	--		1
1,1-Dichloroethene	ND	0.200	--	ND	0.793	--		1



**Project Name:** BATCH CANISTER CERTIFICATION  
**Project Number:** CANISTER QC BAT

**Lab Number:** L1904276  
**Report Date:** 02/11/19

### Air Canister Certification Results

**Lab ID:** L1904276-02  
**Client ID:** CAN 2271 SHELF 53  
**Sample Location:**

**Date Collected:** 02/01/19 16:00  
**Date Received:** 02/02/19  
**Field Prep:** Not Specified

**Sample Depth:**

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Tertiary butyl Alcohol	ND	0.500	--	ND	1.52	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
3-Chloropropene	ND	0.200	--	ND	0.626	--		1
Carbon disulfide	ND	0.200	--	ND	0.623	--		1
Freon-113	ND	0.200	--	ND	1.53	--		1
trans-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
1,1-Dichloroethane	ND	0.200	--	ND	0.809	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
Vinyl acetate	ND	1.00	--	ND	3.52	--		1
Xylenes, total	ND	0.600	--	ND	0.869	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.200	--	ND	0.793	--		1
Ethyl Acetate	ND	0.500	--	ND	1.80	--		1
Chloroform	ND	0.200	--	ND	0.977	--		1
Tetrahydrofuran	ND	0.500	--	ND	1.47	--		1
2,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
1,2-Dichloroethane	ND	0.200	--	ND	0.809	--		1
n-Hexane	ND	0.200	--	ND	0.705	--		1
Diisopropyl ether	ND	0.200	--	ND	0.836	--		1
tert-Butyl Ethyl Ether	ND	0.200	--	ND	0.836	--		1
1,2-Dichloroethene (total)	ND	1.00	--	ND	1.00	--		1
1,1,1-Trichloroethane	ND	0.200	--	ND	1.09	--		1
1,1-Dichloropropene	ND	0.200	--	ND	0.908	--		1
Benzene	ND	0.200	--	ND	0.639	--		1
Carbon tetrachloride	ND	0.200	--	ND	1.26	--		1
Cyclohexane	ND	0.200	--	ND	0.688	--		1
tert-Amyl Methyl Ether	ND	0.200	--	ND	0.836	--		1





**Project Name:** BATCH CANISTER CERTIFICATION  
**Project Number:** CANISTER QC BAT

**Lab Number:** L1904276  
**Report Date:** 02/11/19

### Air Canister Certification Results

**Lab ID:** L1904276-02  
**Client ID:** CAN 2271 SHELF 53  
**Sample Location:**

**Date Collected:** 02/01/19 16:00  
**Date Received:** 02/02/19  
**Field Prep:** Not Specified

**Sample Depth:**

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
Dibromomethane	ND	0.200	--	ND	1.42	--		1
1,2-Dichloropropane	ND	0.200	--	ND	0.924	--		1
Bromodichloromethane	ND	0.200	--	ND	1.34	--		1
1,4-Dioxane	ND	0.200	--	ND	0.721	--		1
Trichloroethene	ND	0.200	--	ND	1.07	--		1
2,2,4-Trimethylpentane	ND	0.200	--	ND	0.934	--		1
Methyl Methacrylate	ND	0.500	--	ND	2.05	--		1
Heptane	ND	0.200	--	ND	0.820	--		1
cis-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.200	--	ND	0.908	--		1
1,1,2-Trichloroethane	ND	0.200	--	ND	1.09	--		1
Toluene	ND	0.200	--	ND	0.754	--		1
1,3-Dichloropropane	ND	0.200	--	ND	0.924	--		1
2-Hexanone	ND	0.200	--	ND	0.820	--		1
Dibromochloromethane	ND	0.200	--	ND	1.70	--		1
1,2-Dibromoethane	ND	0.200	--	ND	1.54	--		1
Butyl acetate	ND	0.500	--	ND	2.38	--		1
Octane	ND	0.200	--	ND	0.934	--		1
Tetrachloroethene	ND	0.200	--	ND	1.36	--		1
1,1,1,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1
Chlorobenzene	ND	0.200	--	ND	0.921	--		1
Ethylbenzene	ND	0.200	--	ND	0.869	--		1
p/m-Xylene	ND	0.400	--	ND	1.74	--		1
Bromoform	ND	0.200	--	ND	2.07	--		1
Styrene	ND	0.200	--	ND	0.852	--		1
1,1,2,2-Tetrachloroethane	ND	0.200	--	ND	1.37	--		1



**Project Name:** BATCH CANISTER CERTIFICATION  
**Project Number:** CANISTER QC BAT

**Lab Number:** L1904276  
**Report Date:** 02/11/19

### Air Canister Certification Results

**Lab ID:** L1904276-02  
**Client ID:** CAN 2271 SHELF 53  
**Sample Location:**

**Date Collected:** 02/01/19 16:00  
**Date Received:** 02/02/19  
**Field Prep:** Not Specified

**Sample Depth:**

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								
o-Xylene	ND	0.200	--	ND	0.869	--		1
1,2,3-Trichloropropane	ND	0.200	--	ND	1.21	--		1
Nonane	ND	0.200	--	ND	1.05	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
Bromobenzene	ND	0.200	--	ND	0.793	--		1
2-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
n-Propylbenzene	ND	0.200	--	ND	0.983	--		1
4-Chlorotoluene	ND	0.200	--	ND	1.04	--		1
4-Ethyltoluene	ND	0.200	--	ND	0.983	--		1
1,3,5-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
tert-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trimethylbenzene	ND	0.200	--	ND	0.983	--		1
Decane	ND	0.200	--	ND	1.16	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
1,4-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.200	--	ND	1.20	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2-Dibromo-3-chloropropane	ND	0.200	--	ND	1.93	--		1
Undecane	ND	0.200	--	ND	1.28	--		1
Dodecane	ND	0.200	--	ND	1.39	--		1
1,2,4-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Naphthalene	ND	0.200	--	ND	1.05	--		1
1,2,3-Trichlorobenzene	ND	0.200	--	ND	1.48	--		1
Hexachlorobutadiene	ND	0.200	--	ND	2.13	--		1



**Project Name:** BATCH CANISTER CERTIFICATION**Lab Number:** L1904276**Project Number:** CANISTER QC BAT**Report Date:** 02/11/19**Air Canister Certification Results**

Lab ID: L1904276-02

Date Collected: 02/01/19 16:00

Client ID: CAN 2271 SHELF 53

Date Received: 02/02/19

Sample Location:

Field Prep: Not Specified

Sample Depth:

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-Difluorobenzene	92		60-140
Bromochloromethane	95		60-140
chlorobenzene-d5	90		60-140

**Project Name:** BATCH CANISTER CERTIFICATION  
**Project Number:** CANISTER QC BAT

**Lab Number:** L1904276  
**Report Date:** 02/11/19

### Air Canister Certification Results

**Lab ID:** L1904276-02  
**Client ID:** CAN 2271 SHELF 53  
**Sample Location:**

**Date Collected:** 02/01/19 16:00  
**Date Received:** 02/02/19  
**Field Prep:** Not Specified

**Sample Depth:**  
**Matrix:** Air  
**Analytical Method:** 48,TO-15-SIM  
**Analytical Date:** 02/02/19 18:51  
**Analyst:** AR

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Dichlorodifluoromethane	ND	0.200	--	ND	0.989	--		1
Chloromethane	ND	0.200	--	ND	0.413	--		1
Freon-114	ND	0.050	--	ND	0.349	--		1
Vinyl chloride	ND	0.020	--	ND	0.051	--		1
1,3-Butadiene	ND	0.020	--	ND	0.044	--		1
Bromomethane	ND	0.020	--	ND	0.078	--		1
Chloroethane	ND	0.100	--	ND	0.264	--		1
Acetone	ND	1.00	--	ND	2.38	--		1
Trichlorofluoromethane	ND	0.050	--	ND	0.281	--		1
Acrylonitrile	ND	0.500	--	ND	1.09	--		1
1,1-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Methylene chloride	ND	0.500	--	ND	1.74	--		1
Freon-113	ND	0.050	--	ND	0.383	--		1
trans-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
1,1-Dichloroethane	ND	0.020	--	ND	0.081	--		1
Methyl tert butyl ether	ND	0.200	--	ND	0.721	--		1
2-Butanone	ND	0.500	--	ND	1.47	--		1
cis-1,2-Dichloroethene	ND	0.020	--	ND	0.079	--		1
Chloroform	ND	0.020	--	ND	0.098	--		1
1,2-Dichloroethane	ND	0.020	--	ND	0.081	--		1
1,1,1-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Benzene	ND	0.100	--	ND	0.319	--		1
Carbon tetrachloride	ND	0.020	--	ND	0.126	--		1
1,2-Dichloropropane	ND	0.020	--	ND	0.092	--		1



**Project Name:** BATCH CANISTER CERTIFICATION  
**Project Number:** CANISTER QC BAT

**Lab Number:** L1904276  
**Report Date:** 02/11/19

### Air Canister Certification Results

**Lab ID:** L1904276-02  
**Client ID:** CAN 2271 SHELF 53  
**Sample Location:**

**Date Collected:** 02/01/19 16:00  
**Date Received:** 02/02/19  
**Field Prep:** Not Specified

**Sample Depth:**

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Bromodichloromethane	ND	0.020	--	ND	0.134	--		1
1,4-Dioxane	ND	0.100	--	ND	0.360	--		1
Trichloroethene	ND	0.020	--	ND	0.107	--		1
cis-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
4-Methyl-2-pentanone	ND	0.500	--	ND	2.05	--		1
trans-1,3-Dichloropropene	ND	0.020	--	ND	0.091	--		1
1,1,2-Trichloroethane	ND	0.020	--	ND	0.109	--		1
Toluene	ND	0.050	--	ND	0.188	--		1
Dibromochloromethane	ND	0.020	--	ND	0.170	--		1
1,2-Dibromoethane	ND	0.020	--	ND	0.154	--		1
Tetrachloroethene	ND	0.020	--	ND	0.136	--		1
1,1,1,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
Chlorobenzene	ND	0.100	--	ND	0.461	--		1
Ethylbenzene	ND	0.020	--	ND	0.087	--		1
p/m-Xylene	ND	0.040	--	ND	0.174	--		1
Bromoform	ND	0.020	--	ND	0.207	--		1
Styrene	ND	0.020	--	ND	0.085	--		1
1,1,2,2-Tetrachloroethane	ND	0.020	--	ND	0.137	--		1
o-Xylene	ND	0.020	--	ND	0.087	--		1
Isopropylbenzene	ND	0.200	--	ND	0.983	--		1
4-Ethyltoluene	ND	0.020	--	ND	0.098	--		1
1,3,5-Trimethybenzene	ND	0.020	--	ND	0.098	--		1
1,2,4-Trimethylbenzene	ND	0.020	--	ND	0.098	--		1
Benzyl chloride	ND	0.200	--	ND	1.04	--		1
1,3-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
1,4-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
sec-Butylbenzene	ND	0.200	--	ND	1.10	--		1





**Project Name:** BATCH CANISTER CERTIFICATION**Lab Number:** L1904276**Project Number:** CANISTER QC BAT**Report Date:** 02/11/19**Air Canister Certification Results**

Lab ID: L1904276-02

Date Collected: 02/01/19 16:00

Client ID: CAN 2271 SHELF 53

Date Received: 02/02/19

Sample Location:

Field Prep: Not Specified

Sample Depth:

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
p-Isopropyltoluene	ND	0.200	--	ND	1.10	--		1
1,2-Dichlorobenzene	ND	0.020	--	ND	0.120	--		1
n-Butylbenzene	ND	0.200	--	ND	1.10	--		1
1,2,4-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Naphthalene	ND	0.050	--	ND	0.262	--		1
1,2,3-Trichlorobenzene	ND	0.050	--	ND	0.371	--		1
Hexachlorobutadiene	ND	0.050	--	ND	0.533	--		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	92		60-140
bromochloromethane	96		60-140
chlorobenzene-d5	94		60-140

**Project Name:** 50 NEVINS STREET  
**Project Number:** 12.0076392.10

Serial\_No:02111916:54  
**Lab Number:** L1905093  
**Report Date:** 02/11/19

**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

**Cooler Information**

<b>Cooler</b>	<b>Custody Seal</b>
N/A	Absent

**Container Information**

<b>Container ID</b>	<b>Container Type</b>	<b>Cooler</b>	<b>Initial pH</b>	<b>Final pH</b>	<b>Temp deg C</b>	<b>Pres</b>	<b>Seal</b>	<b>Frozen Date/Time</b>	<b>Analysis(*)</b>
L1905093-01A	Canister - 2.7 Liter	N/A	NA			Y	Absent		TO15-LL(30),TO15-SIM(30)
L1905093-02A	Canister - 2.7 Liter	N/A	NA			Y	Absent		TO15-LL(30),TO15-SIM(30)

**Project Name:** 50 NEVINS STREET  
**Project Number:** 12.0076392.10

**Lab Number:** L1905093  
**Report Date:** 02/11/19

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

**Final pH:** As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

**Frozen Date/Time:** With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

**Initial pH:** As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

**PFAS Total:** With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total'

**Report Format:** Data Usability Report



**Project Name:** 50 NEVINS STREET**Lab Number:** L1905093**Project Number:** 12.0076392.10**Report Date:** 02/11/19

result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Data Qualifiers**

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e., co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the reporting limit (RL) for the sample.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

**Project Name:** 50 NEVINS STREET  
**Project Number:** 12.0076392.10

**Lab Number:** L1905093  
**Report Date:** 02/11/19

## REFERENCES

- 48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.





**Alpha Analytical, Inc.**Facility: **Company-wide**Department: **Quality Assurance**Title: **Certificate/Approval Program Summary**ID No.: **17873**Revision **12**

Published Date: 10/9/2018 4:58:19 PM

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**Certification Information**

The following analytes are not included in our Primary NELAP Scope of Accreditation:

**Westborough Facility****EPA 624/624.1:** m/p-xylene, o-xylene**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.**EPA 8270D:** NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.**EPA 6860:** SCM: Perchlorate**SM4500:** NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.**Mansfield Facility****SM 2540D:** TSS**EPA 8082A:** NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.**Biological Tissue Matrix:** EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

**Westborough Facility:****Drinking Water****EPA 300.0:** Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE,****EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B****EPA 332:** Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.****Non-Potable Water****SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH:** Ammonia-N and Kjeldahl-N, **EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300:** Chloride, Sulfate, Nitrate.**EPA 624.1:** Volatile Halocarbons & Aromatics,**EPA 608.3:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs**EPA 625.1:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.****Mansfield Facility:****Drinking Water****EPA 200.7:** Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1 Hg. EPA 522.****Non-Potable Water****EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.**EPA 200.8:** Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.**EPA 245.1 Hg.****SM2340B**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.



# AIR ANALYSIS

PAGE \_\_\_\_\_ OF \_\_\_\_\_

320 Forbes Blvd, Mansfield, MA 02048  
TEL: 508-822-9300 FAX: 508-822-3288

## Client Information

Client: GZA GeoEnvironmental NY  
Address: 104 West 29<sup>th</sup> street 10 fl  
New York, NY 10001  
Phone: (212) 594-8140  
Fax: (212) 594-8180  
Email: bill.maniquez@gza.com

☐ These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments:

Project-Specific Target Compound List: ☐

## Project Information

Project Name: 50 Nevins street  
Project Location: Brooklyn, New York  
Project #: 12-0076392.10  
Project Manager: Reinbill Maniquez  
ALPHA Quote #:

## Turn-Around Time

☒ Standard G.M. ☒ RUSH (only confirmed if pre-approved)  
2 Days  
Date Due: Time:

Date Rec'd in Lab: 2/8/19

## Report Information - Data Deliverables

☐ FAX  
☐ ADEX  
Criteria Checker:  
(Default based on Regulatory Criteria Indicated)  
Other Formats:  
☐ EMAIL (standard pdf report)  
☐ Additional Deliverables:  
Report to: (if different than Project Manager)

ALPHA Job #: 4905093

## Billing Information

☐ Same as Client info PO #:

## Regulatory Requirements/Report Limits

State/Fed	Program	Res / Comm

## ANALYSIS

## All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	COLLECTION						Sample Matrix*	Sampler's Initials	Can Size	I D Can	I D - Flow Controller	TO-15	TO-15	APH	Fixed	Sulfides		Sample Comments (i.e. PID)
		End Date	Start Time	End Time	Initial Vacuum	Final Vacuum													
05093.01	SV-07(20')	2/7/19	9:30	11:35	-30.03	-5.92	Soil vapor	MDB	6L	2632	01082	X	X						MAX PID 54 PPM.
.02	SV-08 (20')	2/7/19	9:50	11:45	-29.75	-5.63	Soil vapor	MDB	6L	6085	0803	X	X						MAX PID 39 PPM.

## \*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)  
SV = Soil Vapor/Landfill Gas/SVE  
Other = Please Specify

Container Type

Relinquished By:

Date/Time

Received By:

Date/Time:

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.



GZA GeoEnvironmental, Inc

**APPENDIX D**  
**CITIZEN PARTICIPATION PLAN**

## CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and the Institute of Community Living have established this Citizen Participation. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations, the Institute of Community Living will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Myrna Hanna, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

**Project Contact List:** OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov).

**Repositories:** A document repository is maintained online. Internet access to view OER's document repositories is available at public libraries. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. The library nearest the Site is:

Brooklyn Public Library – Pacific Branch  
25 4<sup>th</sup> Avenue, Brooklyn, New York 11217  
Phone Number: (718) 638-1531

Repository Hours of Operation:

Monday & Tuesday: 10AM-6PM

Wednesday: 1PM-8PM

Thursday: 10AM-8PM

Friday: 10AM-6PM

Saturday: 10AM-5PM

Sunday: Closed

**Digital Documentation:** NYC OER requires the use of digital documents in our repository as a means of minimizing paper use while also increasing convenience in access and ease of use.

**Issues of Public Concern:** There are no issues of public concern.

**Public Notice and Public Comment:** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be reviewed and approved by OER prior to distribution and mailed by the Enrollee. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work



plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

**Citizen Participation Milestones:** Public notice and public comment activities occur at several steps during an 'E'-Designation project. These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.
- **Public Notice announcing the approval of the RAWP and the start of remediation:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.
- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

**APPENDIX E**  
**SUSTAINABILITY STATEMENTS**

## SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

**Reuse of Clean, Recyclable Materials and Reduced Consumption of Non-Renewable Resources:** Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction. If possible, the Institute of Community Living will use clean, non-virgin materials; the results of which will be quantified and reported in the RAR.

**Reduced Energy Consumption and Promotion of Greater Energy Efficiency:** Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

**Conversion to Clean Fuels:** Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

**Recontamination Control:** Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

**Stormwater Retention:** Stormwater retention improves water quality by lowering the rate of combined stormwater and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced stormwater retention capability of the redevelopment project will be included in the RAR.

**Linkage with Green Building:** Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

**Paperless Voluntary Cleanup Program:** The Institute of Community Living is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

**Low-Energy Project Management Program:** The Institute of Community Living is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

**Trees and Plantings:** Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

## **APPENDIX F**

### **SOIL MATERIALS MANAGEMENT PLAN**

## **SOIL/MATERIALS MANAGEMENT PLAN**

### **1.1 Soil Screening Methods**

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the final remedial report. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of final signoff by OER.

### **1.2 Stockpile Methods**

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

### **1.3 Characterization of Excavated Materials**

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

### **1.4 Materials Excavation, Load-Out, and Departure**

The PE/QEP overseeing the remedial action will:



- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

## **1.5 Off-Site Materials Transport**

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are described in the remedial report. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the

facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

## **1.6 Materials Disposal Off-Site**

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in New York City under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the final remedial report.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the final remedial report.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the final remedial report. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the final remedial report. Hazardous wastes

derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

## **1.7 Materials Reuse On-Site**

Soil and fill that is derived from the property that meets the Soil Cleanup Objectives (SCOs) established in this plan may be reused on-Site. The SCOs for on-Site reuse are listed in Section 4.2 of this cleanup plan. ‘Reuse on-Site’ means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on land with comparable levels of contaminants in soil/fill material, compliant with applicable laws and regulations, and addressed pursuant to the agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this remedial plan are followed. The expected location for placement of reused material is shown in Section 4.2. Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

## **1.8 Demarcation**

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover

soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

## **1.9 Import of Backfill Soil From Off-Site Sources**

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. Imported soils will not exceed groundwater protection standards established in Part 375. Imported soils for Track 1 remedial action projects will not exceed Track 1 SCO's.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.
- All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this remedial plan. The final remedial report will report the source of the fill, evidence that an inspection was performed on the source, chemical

sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

- All material will be subject to source screening and chemical testing.
- Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:
  - Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
  - The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
  - Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the final remedial report. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

## **1.10 Fluids Management**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the

groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

### **1.11 Stormwater Pollution Prevention**

Applicable laws and regulations pertaining to stormwater pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this remedial plan (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

### **1.12 Contingency Plan for Unknown Contamination Sources**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical



analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

### **1.13 Odor, Dust, and Nuisance Control**

#### **Odor Control**

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying this remedial plan.

#### **Dust Control**

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying this remedial plan.

## **Other Nuisances**

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided during Site clearing and grubbing and during the remedial program, as necessary, to prevent nuisances.

**APPENDIX G**  
**QUALITY ASSURANCE PROJECT PLAN**

# **QUALITY ASSURANCE PROJECT PLAN**

## **1.00 INTRODUCTION**

GZA GeoEnvironmental, Inc. (GZA) has developed this Quality Assurance Project Plan (QAPP) to establish the procedures for sample collection, analysis and quality assurance for remediation activities associated with the Site located at 50 Nevins Street, Bronx, NY. This QAPP is associated with remedial action work associated with the NYC Voluntary Cleanup Program Site No. 18EHAN493K administered by the NYC Office of Environmental Remediation (OER). Sampling and analytical activities will be conducted in accordance with this QAPP, and the applicable regulatory requirements.

### **1.10 PROJECT SCOPE**

This QAPP describes field, analytical and reporting standard operating procedures (SOPs) that will be utilized during the remedial action. The information and data collected will be utilized to assess the environmental conditions at the Site. These procedures generally apply to the following activities:

- Equipment calibration and decontamination
- Soil sample collection and handling
- Groundwater monitoring well installation and abandonment
- Monitoring well gauging and sampling
- Laboratory analysis
- Data assessment

### **1.20 PROJECT OBJECTIVES**

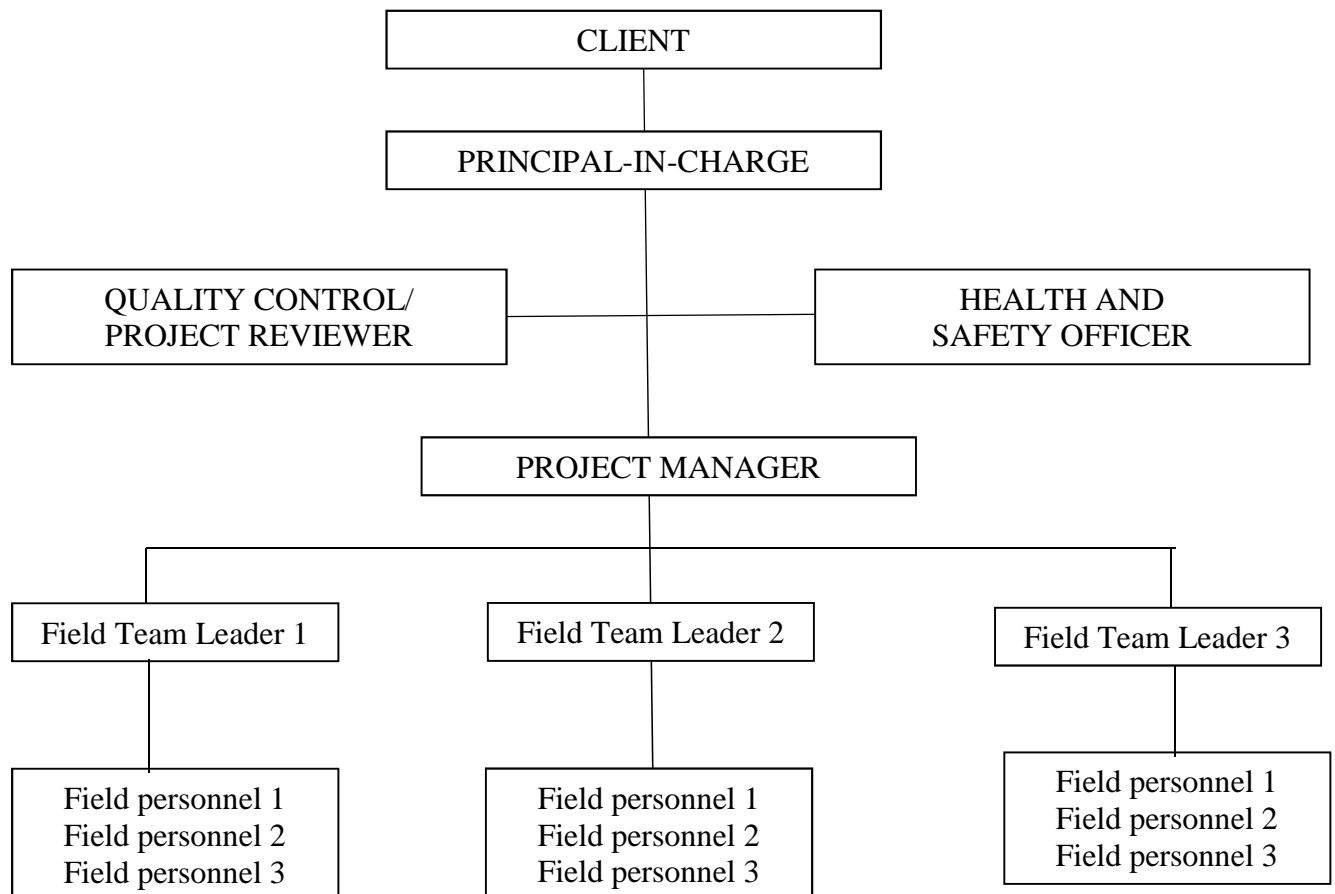
This QAPP was prepared to ensure that field sampling procedures, selected analytical methods, and chemical analytical data are of sufficient quality to meet the intended usage. As specific conditions and additional information warrant, this QAPP may be amended or revised to include site-specific quality assurance/quality control (QA/QC) procedures.

## **2.00 PROJECT ORGANIZATION AND RESPONSIBILITIES**

### **2.10 GZA CORPORATE QA/QC PHILOSOPHY**

GZA's corporate approach to QA/QC is based on two precepts:

1. Each employee is empowered, responsible and accountable for individual work product quality consistent with GZA's corporate philosophy.
2. A separate QC monitoring function is maintained for all work on a project with a direct reporting line to senior management outside the project line management organization. A typical project structure highlighting this relationship is provided below:



## 2.20 PROJECT SPECIFIC ROLES

A description of specific roles and responsibilities is provided below:

The **Project Manager** will be responsible for:

- Initiating project activities;
- Identifying project staff, equipment, and other resource requirements;
- Interfacing with client concerning technical matters and project progress;
- Monitoring task activities, and adjusting efforts or resources, as required to help ensure that established quality objectives are maintained;
- Internal project administration; and
- Oversight of report preparation.

The **Field Team Leader/Site Supervisor** will be responsible for:

- Supervising the technical performance of the project staff and field subcontractors;
- Ensuring compliance with Remedial Action Workplan;
- Coordinating data validation and quality assurance;
- Report preparation; and
- Working with the Project Manager in coordinating overall project quality assurance.

The field team will be comprised of various members of GZA staff based on their expertise and availability. The Health and Safety Coordinator will be responsible for working with the Project Manager and Field Team Leader/Site Supervisor in formulation of a Site-specific Health and Safety Plan. Quality Assurance will be accomplished through the GZA Consultant Reviewer project review process.



### **3.00 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA**

#### **3.10 DATA QUALITY PROTOCOLS**

A Department of Health New York Environmental Laboratory Approval Program (ELAP)-certified laboratory will provide analytical services.

Soil samples will be analyzed for the following compound class:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

If groundwater is encountered, samples will be analyzed for the following compound class:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

Soil vapor samples will be analyzed for the following:

- Volatile organic compounds by EPA Method TO-15;

Also, soil samples will be analyzed waste classification as per selected disposal facility. Sample containers, preservation, holding times and volumes will be in accordance with the particular EPA method.

#### **3.20 ACCURACY**

Accuracy is defined as the degree of agreement of a measurement or average of measurements with an accepted reference or true value. Accuracy will be evaluated by use of calibration and calibration verification procedures, laboratory control samples, and surrogate, matrix, and

analytical spikes at the frequencies specified in Section 4.40. Not all accuracy checks are incorporated into each analytical method.

### 3.30 PRECISION

Precision is defined as a measure of mutual agreement among individual measurements of the sample property. Precision will be evaluated by the analysis of laboratory and matrix spike duplicate samples at the rate specified in Section 4.40. We will also collect 5% duplicate samples in the field for comparison purposes.

### 3.40 DATA REPRESENTATIVENESS

Samples will be collected in a standardized manner designed to produce representative samples. This QAPP and the sampling program are designed so that the samples collected will present an accurate representation of actual Site conditions.

### 3.50 DATA COMPARABILITY

Data comparability will be ensured by control of sample collection methodology, analytical methodology, and data reporting and by the usage of USEPA-approved methodologies. The QAPP and sampling methodologies are designed so that comparability questions are minimized. Standardized sampling techniques and analytical methods will be used to attain stated project objectives. The required level of laboratory deliverables will maximize comparability of analytical results.

### 3.60 DATA COMPLETENESS

The number of samples to be collected is based on the need for data completeness. Data gaps will be addressed when/if they occur by systematic re-sampling and/or increasing the number of sampling points.

## **4.00 SAMPLING PROCEDURES**

Environmental sampling may include soil, groundwater, and soil vapor sampling. Hollow-stem auger and air rotary drilling will be the preferred methods for well installation; however, other drilling methods including direct push, mud rotary and drive and wash may also be used if warranted by Site conditions. Groundwater samples will be collected using EPA low-flow sampling methods.

### **4.10 SOIL SAMPLING**

Soil sampling will occur following excavation of impacted soils. Soils from the sidewall and bottom of the excavation will be screened in-situ for organic vapors using a calibrated photoionization detector (PID) equipped with a 10.6 electron volt lamp and logged utilizing a modified Burmister classification system. The samples will be examined for staining, discoloration, and odors. All field observations will be recorded in a field logbook (Section 5.1.1).

Post-excavation sidewall samples will be collected at a frequency of one per 30 linear feet (lf) of sidewall. Post-excavation bottom samples will be collected at a frequency of one per 900 square feet (sf). Based on the anticipated size of the excavation, four sidewall samples and one bottom sample will be collected.

Soil samples will be collected using 5 gram Encore™ samplers. Sampling personnel will wear nitrile gloves during sampling and make every effort to avoid contact of the gloves with the sample. VOC soil duplicates will not be mixed, but collected within as close proximity of each other as site conditions permit. Additional sample volume may be collected for samples slated for MS/MSD analysis.

Composite samples, as required for waste characterization by disposal facilities, will be collected using a stainless steel trowel. Discrete sample volumes will be placed in a clean stainless steel bowl and mixed to form the composite. The number of aliquots used to form the composite sample will depend on the requirements of the disposal facility.

Immediately upon collection, soil samples will be placed in laboratory provided shipping containers (i.e. coolers) and maintained at 4°C +/- 2°C using ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs.

#### 4.20 GROUNDWATER SAMPLING (PERMANENT WELL)

Groundwater sampling of permanent monitoring wells is described according to the following distinct phases of this work: well installation/construction/abandonment, well development, and well purging/sampling.

##### 4.2.1 Well Installation/Construction/Abandonment

Groundwater monitoring well installation will be performed by a licensed well driller. Wells will be constructed of threaded two-inch diameter PVC well casing and 10-slot well screen. Clean silica sand (Morie No. 1, or equivalent) will be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. Solid PVC riser, attached to the well screen, will extend to grade or above if the well is a stick-up. For a two-inch diameter well, the annular space for the filter pack should be between 2 to 4 inches thick. (The 4 ¼ inch inside diameter hollow stem augers will be retracted as the filter pack is installed to yield the required annular space.) A one to two-foot thick bentonite seal will be placed above the sand pack and moistened with potable water for a minimum of 15 minutes before backfilling the remaining space with a cement-bentonite grout. If warranted by depth, filling will be completed using a tremie pipe placed below the surface of the grout. A stick-up or flush-mount protective casing with a locking well cap will be installed and a measuring point marked on each PVC well riser. Soils will be logged utilizing a modified Burmister classification system. Boring logs/well construction diagrams will be prepared for each well.

Groundwater monitoring wells required to be abandoned will be abandoned by a licensed-driller in accordance with State requirements.

#### 4.2.2 Well Development

Following installation, the groundwater monitoring wells will be developed using a two-inch diameter submersible pump(s) (or equivalent) until the water is reasonably free of turbidity. The wells will be developed aggressively to remove fines from the formation and sand pack. The wells will be allowed to equilibrate for 7 days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the field logbook.

#### 4.2.3 Well Gauging

Upon opening each monitoring well, the headspace will be measured using a PID and water level measurements will be recorded using an electronic water level meter or oil-water interface probe, as appropriate. The depth to product (if present), depth to water, and the total depth will be measured from the top of the marked PVC casings to an accuracy of 0.01 feet.

#### 4.2.4 Low Flow Well Sampling

Before sampling, the wells will be purged utilizing a low-flow submersible stainless steel pump with dedicated Teflon® or Teflon®-lined polyethylene tubing connected to a transparent flow cell. Very low purging rates are proposed, on the order of 100 ml/minute to 500 ml/minute, to minimize suspension of particulate matter in the well.

Groundwater from each well will be purged until turbidity, pH, temperature, dissolved oxygen and specific conductivity have stabilized. As practical, all field measurements will be taken from the flow cell and will be recorded in the field logbook during and after purging, and before sampling.

Purging will be performed with the pump intake placed at the midpoint of the well screen or the midpoint of the water column (to be determined based on the depth and length of the screen interval) to insure that all stagnant water in the well is removed, while not stirring up sediment that may have accumulated on the bottom of the well. Equipment will be lowered into the well very carefully to prevent suspension of bottom sediment and subsequent entrainment onto sampling

equipment. Surging will be avoided. Dedicated tubing will be used for each well. Pumps will be carefully cleaned between wells according to the procedures specified in **Section 4.80**. Ideally, pumping rates will be at a rate so that no drawdown of the groundwater level occurs (i.e., pumping rate is less than recharge rate). During purging, the sampler will actively monitor and track the volume of water purged and the field parameter readings. Data will be recorded in the field logbook or well purge data sheet. Sampling personnel will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Only clean instruments will be allowed to touch the sample.

The samples will be collected in laboratory prepared sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter.

#### 4.30 SOIL VAPOR SAMPLING

A direct-drive rig will be utilized to drive rods with a decontaminated stainless steel probe through six-mil plastic sheeting to the desired sample depth, which will be approximately 1.5 feet above the capillary fringe. The soil gas probe will then be purged at a flow rate not greater than 0.2 liters/minute to evacuate one to three volumes using a photoionization detector (PID) with an integrated vacuum pump (PhotoVac 2020 or appropriate alternate). No PID readings will be taken prior to sample collection. Following the stabilization period, each probe will be connected to an evacuated laboratory-supplied SUMMA<sup>®</sup> canister. SUMMA<sup>®</sup> canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laboratory. Each SUMMA<sup>®</sup> canister will be shipped to the sampling site under a high vacuum (30" Hg) to ensure that the canister remains free of contaminants prior to use. After connecting the SUMMA<sup>®</sup> canister to the soil gas probe, a regulator valve on the canister will be opened and the vacuum will slowly draw the sample into the canister over a period of 30 minutes. The samples will not be drawn at greater than 0.2 liters per minute. Quantitation limits for all analytes range between 1.6 ppbV and 4.0 ppbV, depending on the compound. After collecting the soil gas sample, the valve



will be closed and disconnected from the soil gas probe. The soil-gas samples will be shipped overnight to a New York ELAP certified laboratory for TO-15 analysis.

A tracer gas (e.g., helium, butane, or sulfur hexafluoride) will be utilized prior to sample collection to evaluate the potential for infiltration of outdoor air into the sample. Subsequent rounds of soil gas sampling would include the use of tracer gas only if the initial round of sampling indicates that outdoor air has the potential to influence soil gas sample results.

When soil vapor samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

#### 4.40 FIELD DATA COLLECTION

Data to be collected in the field may include:

- Groundwater level and/or free product level measurements via electronic water level indicator, oil/water interface probe and/or pressure-based water level data loggers;
- Pumping rates (calculated based on gallons pumped in a measured time);
- Water quality parameters including temperature, pH, oxidation-reduction potential, dissolved oxygen, specific conductivity, turbidity, etc. via water quality field meter, and
- Volatile organic compound screening for soils and well headspace via PID.

#### 4.50 QC SAMPLE COLLECTION

QC samples will include equipment rinsate/field blanks, trip blanks, sample duplicates and matrix spike/matrix spike duplicates (MS/MSDs).

**Equipment Rinsate/Field Blanks** will be used to check for potential contamination from ambient air and/or field sampling equipment. Equipment rinsate/field blanks will be collected in the field by pouring laboratory-supplied deionized water over/through decontaminated sampling equipment prior to sample collection. Equipment rinsate/field blanks will be submitted to the laboratory at a frequency of one per 10 soil samples. For groundwater samples, an equipment/rinsate blank will be collected for each sampling day when more than one groundwater sample is collected. Equipment rinsate/field blank analytical parameters will match sample analytical parameters. Equipment rinsate/field blanks will not be collected for samples associated with waste disposal.

**Trip blanks** will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant migration during sample shipment and storage. Trip blanks will consist of laboratory-supplied deionized water. Trip blanks are never opened and travel to and from the Site with the empty and full sample bottles. Trip blanks are stored with the investigative samples and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler that contains groundwater samples for VOC analysis only.

**Sample duplicates** are an additional aliquot of the same sample submitted for the same parameters as the original sample. Sample duplicates will be used to assess sampling and analytical reproducibility. Duplicate samples consist of an actual sample taken in the field that has been split into two identical aliquots and put into two separate sampling containers. Each duplicate of a soil sample (except for the VOC fraction) will be homogenized in a dedicated stainless steel pan prior to alternately filling the sample containers. The volatile fraction for soils will be collected directly from the sampling device without homogenization. Sample duplicates will be analyzed as two separate samples and submitted at a frequency of one per 20 samples for all matrices and all parameters with the exception of parameters collected for waste characterization purposes.

**MSs and MSDs** are two additional aliquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs samples will be selected by the laboratory at a frequency of one per 20 investigative samples per matrix for organic parameters for soil, sediment, and groundwater. MSs will be submitted at a frequency of one per 20 investigative samples per matrix for inorganic parameters.

#### 4.60 SAMPLE PRESERVATION AND CONTAINERIZATION

The analytical laboratory will supply the sample containers for the applicable samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's *Specifications and Guidance for Contaminant-Free Sample Containers*. The containers will be pre-preserved, as required by the analytical method.

#### 4.70 EQUIPMENT DECONTAMINATION

Stainless steel, and aluminum sampling equipment will be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface
- Tap water rinse
- Wash and scrub with Alconox and water mixture
- Tap water rinse
- 10 percent HNO<sub>3</sub> rinse for non-dedicated, stainless steel groundwater sampling equipment for metals analysis only (excludes submersible pump and flow cell) and 1 percent HNO<sub>3</sub> rinse for non-dedicated, non-stainless steel equipment.
- Hexane rinse (optional, only if required to remove heavy petroleum coating)
- Distilled/deionized water rinse
- Air dry

Cleaned equipment will be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with distilled/deionized water. Bladder pumps will utilize dedicated bladders, o-rings and grab plates. Bladder pumps will be cleaned by taking apart the pump and washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with distilled/deionized water. Once the pump is clean, new dedicated parts (bladder, o-rings and grab plate) will be installed. Disposable, dedicated equipment (e.g. bailers, tubing, etc.) will be used to the extent feasible.

## **5.00 DOCUMENTATION AND CHAIN-OF-CUSTODY**

### **5.10 SAMPLE COLLECTION DOCUMENTATION**

The succeeding sections are intended as a general guide for the collecting samples and field documentation.

#### **5.1.1 Field Data Documentation/Field Logs**

A system of logging pertinent data collected during sampling operations will be maintained using bound field logbooks. Each page will be numbered, dated, and initialed or signed by the person making the entry. Entries will be made in ink. Errors will be crossed out with a single line, initialed, and dated. At the completion of the day, if a page is not complete, a diagonal line will be drawn through the remainder of the page with the signature at the bottom.

Sample locations will be recorded and referenced to the Site map so that each location is permanently established. Samples will be tagged or labeled with pertinent Site information at the time of sampling. Section 5.1.3 describes sample identification. Pertinent Site information to be supplied in the field log for each task is listed below:

- Initials or Signature of note taker
- Name and location of investigation

- Date and time of arrival and departure
- Names of all personnel on-Site and their affiliation
- Purpose of the visit
- Field instruments used, date and time of calibration and calibration checks, method of calibration, standards used
- Field measurement results
- Date, time, and location of all sampling points
- Method of sample collection
- Factors that could affect sample integrity
- Name of sampler(s)
- Sample identification and sample description
- Documentation of conversations with the client, regulatory personnel, field decisions, and approval
- Sample locations intervals
- Weather conditions
- Inventory of drum contents and storage location for each drum of waste material generated.

Field notebooks should contain only factual information entered as real-time notes, which will enable the user to recreate events on-Site. Drilling/boring logs and monitoring well construction details will be recorded in the field notebook and/or on a separate boring log/well construction form for each boring/monitoring well. Soil descriptions will be based on a modified Burmister soil classification system, where minor components and relative soil density will not be specified. Strata not sampled will be so indicated. Groundwater sampling field data will be recorded in the field notebook and/or on separate purge data sheet for each monitoring well sampled.

#### 5.1.2 Chain-of-Custody Records

Sample custody is discussed in detail in Sections 5.1.4 through 5.1.6 of this Plan. Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signature(s) of sampler(s); (3) the sample number, date and time of collection, and whether the sample is grab or composite; and (4) if

applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in Section 5.1.6 of this Plan.

Samples will be transferred to the custody of the respective laboratories via GZA staff, third-party commercial carriers or laboratory courier service within timeframes required by NJDEP field sampling procedures.

### 5.1.3 Sample Labeling

Immediately upon collection, each sample will be labeled with an adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier. The following identification scheme will be used:

- A. The sample ID number will include the monitoring well name for groundwater samples. Post-excavation sample ID's will include the identified PX and the location of the sample.

#### Example:

Sample MW-1 indicates the sample was collected from Monitoring Well MW-1.

Sample PX-E indicates the sample was collected from the eastern sidewall of the excavation.

Sample PX-BOT indicates that the sample was collected from the bottom of the excavation.

Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, e.g. Field Blank  
MS/MSDs will be noted in the Comments column of the COC.

- B. The analysis required will be indicated for each sample.

#### Example: VOC



C. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

Example: 03-22-12

D. Time will be the time the sample was collected, using military time.

Example: 14:30

E. The sampler's name will be printed in the "Sampled By" section.

F. Other information relevant to the sample.

Example: Equipment Blank

A sample label will contain the following information:

Job No.

Client:

Sample Number

Date \_\_\_\_\_ Sample Time

Sample Matrix

Grab or Composite (explain)

Preservatives

Analyses

Sampler Signature

An example sample label is presented below:

Job No: XXXXXXXXXX

Client: Name

Sample No: MW-1

Matrix: Groundwater

Date Taken: 3/22/12

Time Taken: 14:30

Sampler: B. Smith  
Analysis: VOC

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples.

#### 5.1.4 Sample Custody

A sample is considered to be under a person's custody if

- the item is in the actual possession of a person
- the item is in the view of the person after being in actual possession of the person
- the item was in the actual physical possession of the person but is locked up to prevent tampering
- the item is in a designated and identified secure area

#### 5.1.5 Field Custody Procedures

Samples will be collected following the sampling procedures documented in Section 4.00 of this Plan. Documentation of sample collection is described in Section 5.1.1 of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures are intended to ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.
- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample labeling system is presented in Section 5.1.3 of this Plan.
- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.

- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to the analytical laboratory courier, or to/from a secure storage location.
- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.
- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and/or secured to the inside top of each sample box or cooler. If using a commercial carrier service to ship sample containers to the laboratory, the containers will be secured with strapping tape and custody seals. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.
- If the samples are sent by commercial carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.
- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory sample custodian or laboratory courier, and signature of the laboratory sample custodian or courier on the chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

#### 5.1.6 Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact, if applicable,

- Examine all sample containers for damage,
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,
- Compare samples received against those listed on the chain-of-custody,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Determine sample pH (if applicable) and record on chain-of-custody forms
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting GZA,
- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

## 5.20 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for this program. If site conditions were to warrant field analysis, the responsible contractor will prepare an addendum establishing the field analytical procedures. Analyses of samples will be performed by a New York ELAP Certified laboratory, certified for the specific analyses to be performed.

## 5.30 SAMPLE PRESERVATION

### 5.3.1 Soil Samples

VOC samples will be collected in 5 gram Encore samplers. All samples will be placed immediately in the sample cooler to be maintained at 4°C.

### 5.3.2 Ground Water Samples

Samples collected for non-VOC analyses will be collected in 1000-ml amber glass containers with Teflon lined caps. VOC samples will be collected in 40 ml VOA vials with Teflon septum caps. All samples will be placed immediately in the sample cooler to be maintained at 4°C.

## 5.40 INVESTIGATION-DERIVED WASTE

Drill cuttings and purged well water will be containerized in DOT-approved or equivalent 55-gallon drums and stored on-Site pending analysis (as required) and proper off-Site disposal.

## **6.00 CALIBRATION/ANALYTICAL PROCEDURES**

### **6.10 LABORATORY CALIBRATION**

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies. The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

### **6.20 LABORATORY PREVENTIVE MAINTENANCE**

Preventative maintenance and periodic maintenance will be performed as needed and documented in laboratory notebooks, instrument maintenance logbooks, or work orders as appropriate in accordance with method-specific requirements.

### **6.30 FIELD CALIBRATION**

Field calibration and measurement results will be maintained in bound logbooks assigned to the specific instrument and/or field logbooks. Qualified personnel shall perform initial calibrations of field instruments prior to mobilization of equipment to the Site.

Electronic water level indicators will be calibrated when new, damaged, or repaired. The electronic water level indicator will be calibrated against a calibrated steel surveyor's tape to within 0.01 (one hundredth) of a foot per 10 feet of length.

Water quality meters used, including pH, dissolved oxygen, and conductivity probes, will be calibrated in accordance with the manufacturer's specifications in the field at the start of each days



sampling activities and throughout the day as required by regulatory agency's sampling requirements.

PID screening instruments will be calibrated daily prior to field activities according to the instrument manufacturer's specifications using certified calibration gases. Sampling personnel shall perform battery checks daily. The recorded calibration information includes date of calibration, standards used, and calibration results.

Pressure transducers will be calibrated in accordance with the manufacturer's specifications.

#### **6.40 FIELD PREVENTIVE MAINTENANCE**

Field instruments will be checked prior to use in the field according to the procedures and frequencies specified by the manufacturer. GZA utilizes a commercial instrument rental company to provide field instrumentation. Records of factory calibrations and instrument maintenance will be maintained by the instrument rental company. Field maintenance will be performed as needed and recorded in the field logbook.

### **7.00 DATA REPORTING AND VALIDATION**

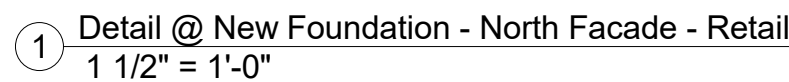
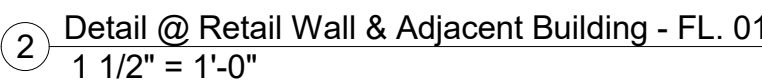
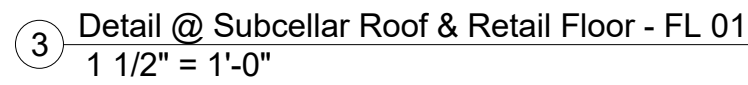
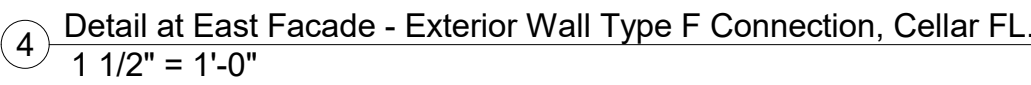
Laboratory deliverables will include, at a minimum:

1. A cover page, including facility name and address, laboratory name and address, laboratory certification number, date of analytical report preparation, and signature of laboratory director.
2. A contents page.
3. A non-conformance summary
4. A listing of all field sample identification numbers and corresponding laboratory sample identification numbers
5. A listing of the analytical methods used
6. Detection limits for each analyte
7. Tabulated sample results, including date of analysis









8. Method blank results
9. Chain-of-custody documents
10. Temperature of sample at receipt

Errors in reporting identified during the data review process must be corrected by the reporting laboratory.

**APPENDIX H**  
**VAPOR BARRIER SPECIFICATIONS**



KEYNOTES:

	EXISTING BUILDING
	SPRAY INSULATION
	ALUMINUM METAL PANEL
	SOLID GROUT
	EARTH
	GRAVEL
	RIGID INSULATION
	FIREPROOFING

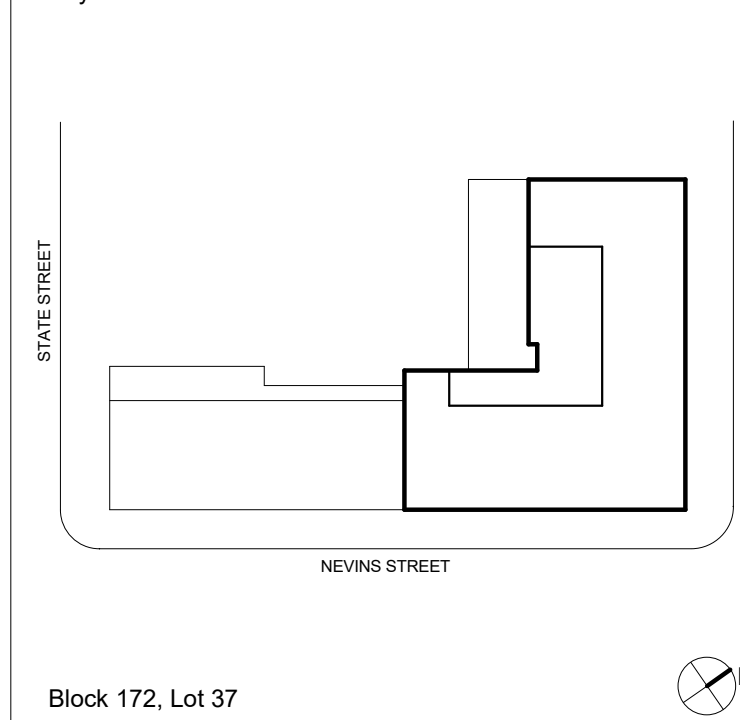
Conformance Set  
February 08, 2019

TBD

## Revisions

Issue: Conformance Set

**Key Plan:**



### Key Plan

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## Wall Section Details

Date 09/21/18

Scale 1 1/2" = 1'-0"

Drawn By \_\_\_\_\_ Author \_\_\_\_\_

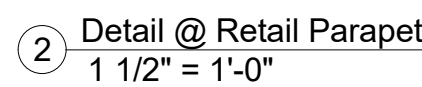
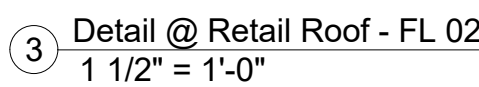
Checked By                      Checker

Project No. 1636 Sea

Sheet No.

No.: **A-310.00**

6 of 10



DOB Submission  
December 17, 2018

Sheet No.: **A-311.00**



C

A-109.00

1 Waterproofing Plan - Sub-Cellar  
1/8" = 1'-0"







# PREPRUFE® 300R PLUS & 160R PLUS

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

## Product Description

Preprufe® 300R Plus & 160R Plus membranes are unique composite sheets comprised of a thick HDPE film, pressure sensitive adhesive and weather resistant protective coating. Designed with Advanced Bond Technology™ and a dual adhesive ZipLap™, Preprufe Plus membranes form a unique, integral bond to poured concrete, preventing both the ingress and lateral migration of water while providing a robust barrier to water, moisture and gas.

Release liner free and designed for efficient, reliable installation, the Preprufe Plus ZipLap allows for an adhesive to adhesive bond at seam overlaps and delivers superior performance in harsh conditions without the need for specialized equipment, heat or power.

## The Preprufe R Plus System includes:

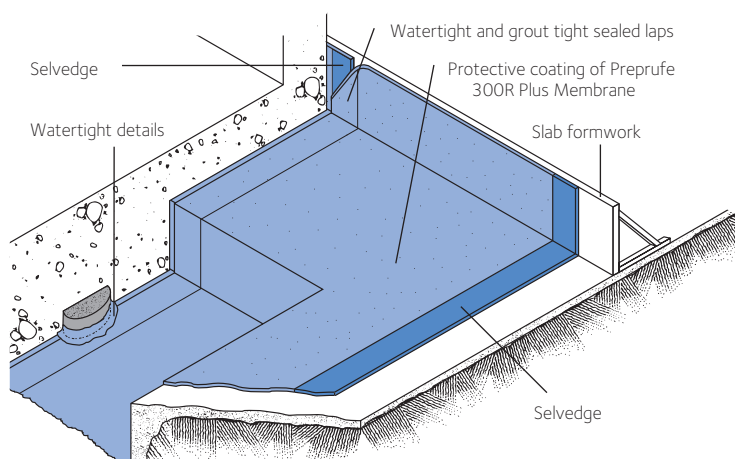
- **Preprufe 300R Plus** — heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers
- **Preprufe 160R Plus** — thinner grade for blindside, zero property line applications against soil retention systems. Vertical use only
- **Preprufe Tape LT** — for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C))
- **Preprufe Tape HC** — for covering cut edges, roll ends, penetrations and detailing (minimum 50°F (10°C))
- **Preprufe CJ Tape LT** — for construction joints, and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C))
- **Preprufe CJ Tape HC** — for construction joints, and detailing (minimum 50°F (10°C))
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor® ES** — waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers** — preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R Plus & 160R Plus membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid-applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

## Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it** – prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered adhesive to adhesive watertight ZipLaps** and easy to execute detailing
- **Provides a barrier to water, moisture and gas** – physically isolates the structure from the surrounding ground
- **Easy roll/kick out installation** – reduces installation time and cost
- **Release liner free** – expedites installation and reduces construction site waste
- **Solar reflective** – reduced temperature gain
- **Simple and quick to install** – requiring no priming or fillets
- **Can be applied to permanent formwork** – allows maximum use of confined sites
- **Self protecting** – can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions** – cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  1. Not reliant on confining pressures or hydration
  2. Unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant** – effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only.  
Please refer to [gcpat.com](http://gcpat.com) for specific application details.

## Installation

The most current application instructions, detail drawings and technical letters can be viewed at [gcpat.com](http://gcpat.com). For other technical information contact your local GCP representative.

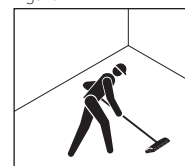
Preprufe Plus membranes have colored zip strips at the top and bottom of the seam area on the edge of the roll. Both zip strips cover an aggressive adhesive. Once the yellow zip strip on the top of the membrane and the blue zip strip on the bottom of the membrane

are removed, a strong adhesive to adhesive bond is achieved in the overlap area. This Preprufe ZipLap™ provides an enhanced sealing of the overlaps in harsh conditions combined with a fast and easy way of execution without specialized equipment, heat or power.

### Substrate Preparation

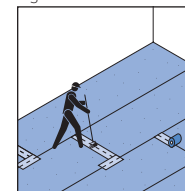
**All surfaces** – It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

Figure 1



**Horizontal** – The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

Figure 2



**Vertical** – Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

### Membrane Installation

Preprufe Plus membranes can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe Plus product in cold or marginal weather conditions <40°F (<4°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Plus Low Temperature (LT) membrane is available for low temperature applications. Refer to Preprufe Plus LT data sheet and GCP tech letter 16 for more information.

**Horizontal substrates** – Kick out or roll out the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave yellow and blue zip strips on the membrane until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.

Refer to GCP Tech Letter 15 for information on suitable rebar chairs for Preprufe products.

**Vertical substrates** – Mechanically fasten the membrane vertically using fasteners appropriate for the substrate with the yellow zip strip facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvedge using a small and low profile head fastener so that the membrane lays

flat and allows firmly rolled overlaps. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvage with the blue zip strip on top of the yellow zip strip.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges** – Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 2). Immediately remove tinted plastic release liner from the tape.

### Details

Detail drawings are available at [gcpat.com](http://gcpat.com).

### Membrane Repair

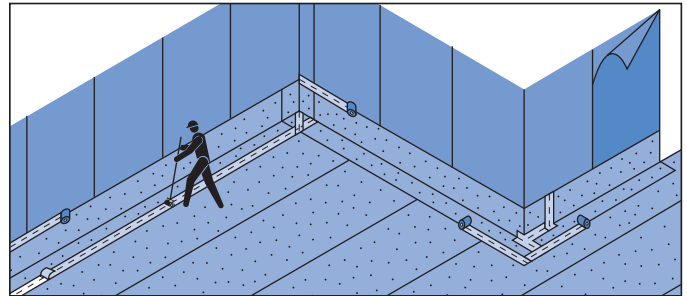
Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area. Repair holes and large punctures by applying a patch of Preprufe® Plus membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with

Preprufe Tape. Any areas of damaged adhesive should be covered with Preprufe Tape. Where exposed selvage has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape. All Preprufe Tape must be rolled firmly and the tinted release liner removed. Alternatively, use a hot air gun or similar to activate the adhesive using caution not to damage the membranes and firmly roll lap to achieve continuity.

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe Tape.

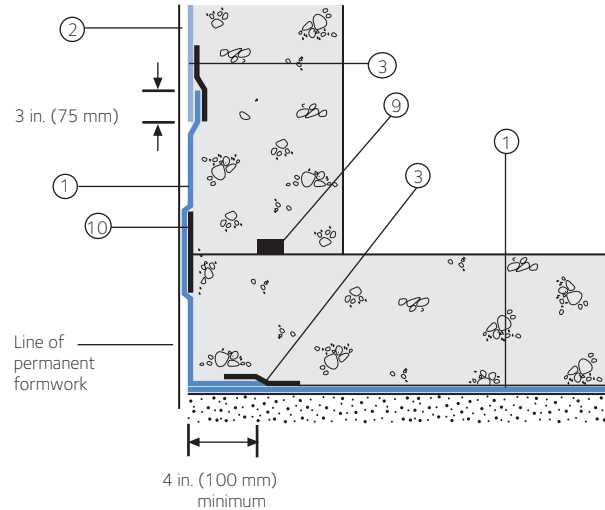
It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete. Provide temporary protection from concrete over splash for areas of the Preprufe membrane that are adjacent to a concrete pour.



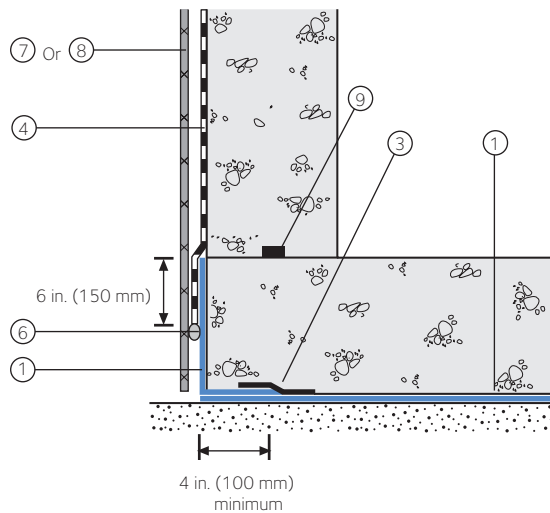
## Detail Drawings

Details shown are typical illustrations and not working details.  
For a list of the most current details, visit us at [gcpat.com](http://gcpat.com).  
For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

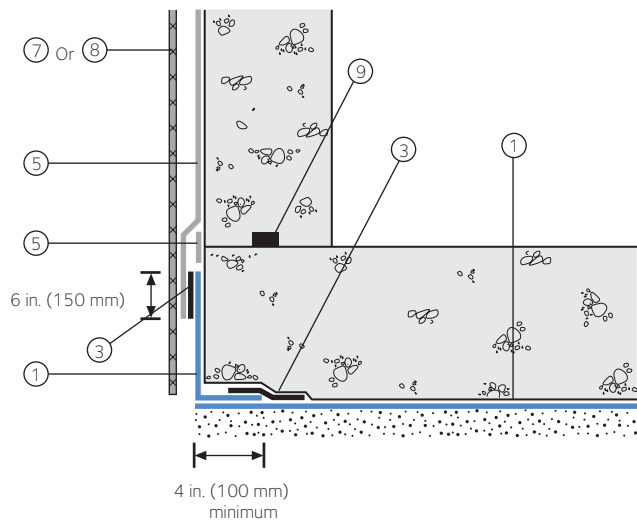
### Wall base detail against permanent shutter



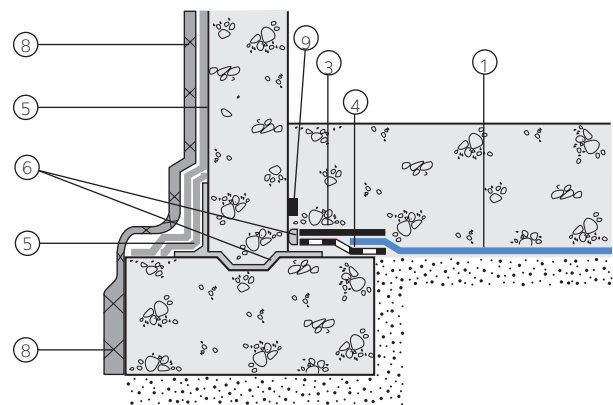
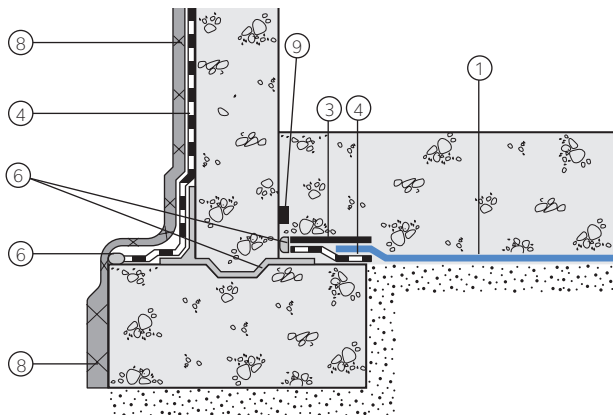
### Bituthene wall base detail (Option 1)



### Procor wall base detail (Option 1)



### Bituthene® wall base detail (Option 2)



- 1 Preprufe 300R Plus
- 2 Preprufe 160R Plus
- 3 Preprufe Tape
- 4 Bituthene

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Approved Protection Course

- 8 Hydroduct
- 9 Adcor ES
- 10 Preprufe CJ Tape

## Supply

Dimensions (Nominal)	Preprufe 300R Plus Membrane	Preprufe 160R Plus Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	3 ft. 10 in. x 102 ft. (1.17m x 31.15m)	3 ft. 10 in. x 120 ft. (1.17m x 36.6m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft <sup>2</sup> (36 m <sup>2</sup> )	460 ft <sup>2</sup> (42 m <sup>2</sup> )	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)

## Physical Properties

Property	Typical Value 300R Plus	Typical Value 160R Plus	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified <sup>1</sup>
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified <sup>2</sup>
Elongation	500%	500%	ASTM D412, modified <sup>3</sup>
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836 <sup>4</sup>
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified <sup>5</sup>
Lap peel adhesion at 72°F (22°C)	8 lbs/in. (1408 N/m)	8 lbs/in. (1408 N/m)	ASTM D1876, modified <sup>6</sup>
Lap peel adhesion at 40°F (4°C)	8 lbs/in. (1408 N/m)	8 lbs/in. (1408 N/m)	ASTM D1876, modified <sup>6</sup>
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa x s x m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa x s x m <sup>2</sup> ))	ASTM E96, method B

### Footnotes:

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
2. Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
3. Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
4. Concrete is cast against the Preprufe membrane and allowed to cure (7 days minimum).
5. Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
6. The test is conducted 15 minutes after the lap is formed (per GCP published recommendations) and run at a rate of 2 in. (50 mm) per minute at 72°F (22°C).

## Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems, see GCP Tech Letter 13 for information on forming systems used with Preprufe products.

A minimum concrete compressive strength of 3000 psi (20 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to GCP Tech Letter 17 for information on removal of formwork for Preprufe products.

## Specification Clauses

Preprufe 300R Plus or 160R Plus membranes shall be applied with its protective coating presented to receive fresh concrete to which it will integrally bond. Only GCP Applied Technologies approved membranes shall be bonded to Preprufe® products. All Preprufe system materials shall be supplied by GCP Applied Technologies, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

**NOTE:** Use Preprufe Tape to tie-in Procor® fluid-applied membrane with Preprufe product.

## Health and Safety

Refer to relevant SDS (Safety Data Sheet). Complete rolls should be lifted and carried by a minimum of two persons.

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## **Section 071324**

### **Pre-Applied Sheet Membrane Waterproofing**

#### **PART 1 — GENERAL**

##### **1.01 SUMMARY**

- A. The Work of this Section includes, but is not limited to, pre-applied sheet membrane waterproofing that forms an integral bond to poured concrete for the following applications:
  - 1. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
  - 2. Horizontal Applications: Membrane applied on prepared subbase prior to placement of concrete slabs.
- B. Related sections include, but are not limited to, the following:
  - 1. Section 031000 - Concrete Forming
  - 2. Section 312000 – Earth Moving
  - 3. Section 031500 – Concrete Accessories
  - 4. Section 031500 – Hydrophilic Waterstop
  - 5. Section 316200 - Driven Piles
  - 6. Section 316400 - Caissons
  - 1. Section 032000 - Concrete Reinforcing
  - 2. Section 033000 – Cast-In-Place Concrete
  - 3.

##### **1.02 SUBMITTALS**

- A. Submit manufacturer's product data, installation instructions and membrane samples for approval.

##### **1.03 REFERENCE STANDARDS**

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM):
  - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
  - D 412 Standard Test Methods for Rubber Properties in Tension
  - D 570 Standard Test Method for Water Absorption of Plastics
  - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
  - D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
  - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
  - D 3767 Standard Practice for Rubber - Measurements of Dimensions
  - D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes

- E 96 Standard Test Methods for Water Vapor Transmission of Materials
- E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- B. Installer: A firm which has at least 3 years experience in work of the type required by this section.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.
- E. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations.

#### **1.06 PROJECT CONDITIONS**

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

#### **1.07 WARRANTY**

- A. Sheet Membrane Waterproofing: Provide written five year material warranty issued by the membrane manufacturer upon completion of work.

## PART 2 — PRODUCTS

### 2.01 MATERIALS

- A. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe® 300R Membrane [or Preprufe 300LT Membrane for application temperatures between 25°F (-4°C) and 60°F (+16°C)] by Grace Construction Products, a 1.2mm (0.046 in) nominal thickness composite sheet membrane comprising 0.8 mm (0.030 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

#### PHYSICAL PROPERTIES FOR PREPRUFE 300R (or 300LT) MEMBRANE:

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767 Method A	1.2 mm (0.046 in.) nominal
Lateral Water Migration Resistance	ASTM D 5385 Modified <sup>1</sup>	Pass at 71 m (231 ft) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -29°C (-20°F)
Elongation	ASTM D 412 Modified <sup>2</sup>	500%
Crack Cycling at -23°C (-9.4°F), 100 Cycles	ASTM C 836	Unaffected, Pass
Tensile Strength, film	ASTM D 412	27.6 MPa (4,000 lbs/in. <sup>2</sup> )
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>3</sup>	880 N/m (5.0 lbs/in.)
Lap Adhesion	ASTM D 1876 Modified <sup>4</sup>	880 N/m (5.0 lbs/in.)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>5</sup>	71 m (231 ft)
Puncture Resistance	ASTM E 154	990 N (221 lbs)
Permeance	ASTM E 96 Method B	0.6 ng/Pa × s × m <sup>2</sup> (0.01 perms)
Water Absorption	ASTM D 570	0.5%

#### Footnotes:

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
2. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
3. Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
4. The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute.
5. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.

- B. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe® 160R Membrane [or Preprufe 160LT Membrane for application temperatures between 25°F (-4°C) and 60°F (+16°C)] by Grace Construction Products, a 1.0mm (0.032 in) nominal thickness composite sheet membrane comprising 0.4 mm (0.016 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

**PHYSICAL PROPERTIES FOR PREPRUFE 160R (or 160LT) MEMBRANE:**

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767 Method A	1.0 mm (0.032 in.) nominal
Lateral Water Migration Resistance	ASTM D5385, Modified <sup>1</sup>	Pass at 71 m (231 ft) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -29°C (-20°F)
Elongation	ASTM D 412 Modified <sup>2</sup>	500%
Crack Cycling at -23°C (-9.4°F), 100 Cycles	ASTM C 836	Unaffected, Pass
Tensile Strength, film	ASTM D 412	27.6 MPa (4,000 lbs/in. <sup>2</sup> )
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>3</sup>	880 N/m (5.0 lbs/in.)
Lap Adhesion	ASTM D 1876 Modified <sup>4</sup>	880 N/m (5.0 lbs/in.)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>5</sup>	Pass at 71 m (231 ft)
Puncture Resistance	ASTM E 154	445 N (100 lbs)
Permeance	ASTM E 96 Method B	0.6 ng/Pa x s x m <sup>2</sup> (0.01 perms)
Water Absorption	ASTM D 570	0.5%

*Footnotes:*

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
2. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
3. Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
4. The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute.
5. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.

- C. Waterstop: Adcor™ ES hydrophilic non-bentonite waterstop by Grace Construction Products for non-moving concrete construction joints.

**PHYSICAL PROPERTIES FOR GRACE ADCOR™ ES HYDROPHYLIC WATERSTOP:**

Property	Typical Value
Color	Green
Size	1.0 in. x ½ in. x 16 ft. rolls (25.4 mm x 12.7 mm x 4.9 m)
Hydrostatic Head Resistance	70 m (231 ft)
Wet - Dry Cycling [25 Cycles @ 231 ft. (70 m)]	No Effect
Adhesion to Concrete using Adcor ES Adhesive	Excellent

- D. Preformed Soil Retention Wall Tieback Cover: Preprufe Tieback Cover by Grace Construction Products as a prefabricated detail for soil retention wall tiebacks.
- E. Preformed Inside and Outside Corners: Preprufe Preformed Corners by Grace Construction Products as prefabricated inside and outside corners.
- F. Tape for covering cut edges, roll ends, penetrations and detailing: Preprufe Tape LT (for temperatures between 25°F (-4°C) and 86°F (+30°C)) and Preprufe Tape HC (for use in Hot Climates, minimum 50°F (10°C))
- G. Miscellaneous Materials: accessories specified or acceptable to manufacturer of pre-applied waterproofing membrane.

**PART 3 — EXECUTION**

**3.01 EXECUTION**

- A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

**3.02 SUBSTRATE PREPARATION**

- A. It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability.
1. Horizontal Surfaces - The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.
  2. Vertical Surfaces - Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

### **3.03 INSTALLATION, HORIZONTAL APPLICATIONS**

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  - 1. Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
  - 2. Leave the plastic release liner in position until overlap procedure is completed.
  - 3. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
  - 4. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
  - 5. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

### **3.04 INSTALLATION, VERTICAL APPLICATIONS**

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  - 1. Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length.
  - 2. Fastening through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
  - 3. Immediately remove the plastic release liner.
  - 4. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
  - 5. Roll firmly to ensure a watertight seal.
  - 6. Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary.
  - 7. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly.
  - 8. Immediately remove printed plastic release liner from the tape.

### **3.05 WATERSTOP INSTALLATION**

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  - 1. Secure Adcor ES using masonry nails 1½ in. - 2 in. (40 mm – 50 mm) long with a washer ¾ in. (20 mm) in diameter. Hilti EM6-20-12 FP8 shot fired fixings with ¼ in. (6 mm) nuts and ¾ in. (20 mm) diameter washers may also be used. Fixings should be spaced at a maximum of 12 in. (300 mm) centers with a minimum spacing that ensures proper contact to substrate.
  - 2. On irregular concrete faces, or on vertical surfaces, apply a ½ in. (12 mm) bead of Adcor ES Adhesive as bedding for Adcor ES.



3. Adcor ES joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.

### **3.06 PROTECTION**

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

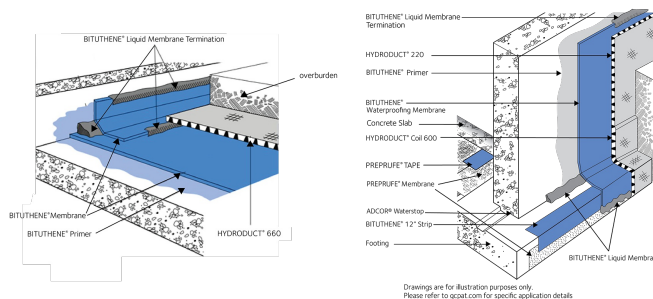
**END OF SECTION**

# BITUTHENE® 4000 Membrane

## Membrane and Surface Conditioner System

### Product Description

GCP Applied Technologies' ("GCP") BITUTHENE® 4000 Waterproofing Membrane System combines a 60 mil (1.5 mm) flexible, pre-formed Membrane of a high performance, cross laminated, HDPE carrier film with a unique, tacky, self-adhesive rubberized asphalt compound and BITUTHENE® 4000 Surface Conditioner. BITUTHENE® 4000 Membrane Surface Conditioner is water based primer and is specifically formulated to promote adhesion by binding dust and concrete efflorescence, to help provide a suitable surface for the BITUTHENE® 4000 Waterproofing Membrane. For convenience BITUTHENE® 4000 Surface Conditioner is packaged inside each roll of BITUTHENE® 4000 Membrane.



### Product Advantages

- Waterproofing combined with high hydrostatic head resistance
- Excellent adhesion—special adhesive compound engineered to work with BITUTHENE® 4000 Surface Conditioner
- Cross laminated, high density polyethylene carrier film— provides high tear strength, puncture and impact resistance
- Cold applied—simple application to substrates, including low temperature applications
- Reduced inventory and handling costs— BITUTHENE® 4000 Surface Conditioner is included with each roll of Membrane
- Wide application temperature range—excellent bond at temperatures as low as 25 °F (-4 °C) --and above
- Flexible—elongation in excess of 300% and designed to accommodate a wide range of building configuration details
- RIPCORDER® integrated filament —split release on demand feature allows the splitting of the release paper into two (2) pieces for ease of installation in detailed areas

### System Components

#### Membrane

BITUTHENE® 4000 Membrane – Self-adhered, rubberized asphalt waterproofing Membrane.

Ancillary Components (the most current Data Sheets for all system components are available on [gcpat.com](http://gcpat.com))

- BITUTHENE® 4000 Surface Conditioner – Water-based latex primer adhesive with added alcohol to allow application at low temperatures
- BITUTHENE® Adhesive Primer B2 LVC – Low VOC, solvent based primer to increase adhesion of BITUTHENE® 4000 Membrane to concrete surfaces
- BITUTHENE® Liquid Membrane – Two component, elastomeric, liquid applied detailing compound
- BITUTHENE® Mastic – Rubberized asphalt based mastic
- PREPRUFE® Detail Tape – Double sided self-adhesive tape
- HYDRODUCT® Drainage Composite– High impact and creep resistant geo-composite and protection layer
- BITUTHENE® Deck Prep– Surface leveler for application to uneven or rough concrete surfaces

## Limitations of Use

- BITUTHENE® 4000 Membrane and BITUTHENE® Surface Conditioner are specifically designed for use as detailed in this Product Data Sheet and are not intended for any other use. Contact GCPAT Technical Support if any other use is anticipated or intended.
- BITUTHENE® 4000 Membrane is designed for waterproofing surfaces where in service temperatures will not exceed 130 °F (54 °C).
- Special Note: When this information is printed from the [gcpat.com](http://gcpat.com) global website, a footer appearing on this document may contain wording restricting it's applicability to the United States. Note that the information and references in this document also apply to North, Central and South America.

## Safety and Handling Information

Read and understand the product label and Safety Data Sheet (SDS) for each system component. All users should acquaint themselves with this information prior to working with the products and follow the precautionary statements. SDSs can be obtained by contacting your local GCP representative or office, by calling GCP toll free at 1-866-333-3SBM (3726) and in some cases from our web site at [gcpat.com](http://gcpat.com).

## Storage

BITUTHENE® 4000 Membrane should be stored upright. Storage temperatures should not be below 25 °F (-4 °C) and should not exceed 90 °F (32 °C).

## Installation

### Technical Support, Details, and Technical Letters

The most up to date detail drawings and technical letters are available at [gcpat.com](http://gcpat.com). For complete application instructions, please refer to the current GCP Applied Technologies Contractor Handbook and Literature on ([www.gcpat.com](http://www.gcpat.com)). Documents in hardcopy as well as information found on websites other than [www.gcpat.com](http://www.gcpat.com) may be out of date or in error. Before using this product it is important that information be confirmed by accessing [www.gcpat.com](http://www.gcpat.com) and reviewing the most recent product information, including without limitation Product Data Sheets and Contractor Manuals, Technical Bulletins, Detail Drawings and detailing recommendations. Please review all materials prior to installation of BITUTHENE® 4000 Membrane. For technical assistance with detailing and problem solving please call toll-free at (866) 333-3SBM (3726).

### Temperature

- Apply BITUTHENE® 4000 Membrane and Conditioner only in dry weather and when air and surface temperatures are 25 °F (-4 °C) or above.
- BITUTHENE® Adhesive Primer B2 LVC and BITUTHENE® Surface Conditioner should only be applied in dry weather when the temperature is above 25 °F (-4 °C). (See separate product information sheets and applicable application instructions.)

### Surface Preparation

Surfaces must be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Concrete must be properly cured (minimum 7-days for normal weight structural concrete and 14-days for lightweight structural concrete).

Dry weather application of BITUTHENE® 4000 Membrane and BITUTHENE® Surface Conditioner is preferred. If time is critical and damp conditions are unavoidable, BITUTHENE® Adhesive Primer B2 LVC may be used in place of BITUTHENE® Surface Conditioner. The use of BITUTHENE® Adhesive Primer B2 LVC may allow priming and installation of BITUTHENE® 4000 Membrane on damp surfaces or green concrete. Using BITUTHENE® Adhesive Primer B2 LVC priming may begin as soon as the concrete will maintain structural integrity. Only use form release agents that will not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the Membrane. Cure concrete with clear, resin-based curing compounds which do not contain oil, wax or pigment. Except with BITUTHENE® Primer B2 LVC as noted above, before application of BITUTHENE® Surface Conditioner and BITUTHENE® 4000 Membrane allow concrete to thoroughly dry following any rain. Do not apply any products to frozen concrete.

Repair substrate defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form match lines. For rough or uneven deck surfaces use BITUTHENE® Deck Prep as a repair and leveling agent. See BITUTHENE® Deck Prep product information sheet for details. On masonry surfaces such as rough concrete block and brick walls, apply a parge and trowel cut mortar joints flush to the face of the concrete blocks and bricks.

## Surface Conditioning

BITUTHENE® 4000 Surface Conditioner is ready to use and can be applied by spray or roller. For best results, use a pump-type air sprayer with fan tip nozzle. Apply BITUTHENE® 4000 Surface Conditioner to clean, dry, frost-free surfaces at a coverage rate of 300 ft<sup>2</sup>/gal (7.4 m<sup>2</sup>/L). Coverage should be uniform. Surface conditioner should not be applied so heavily that it puddles or runs. Do not apply conditioner directly to BITUTHENE® 4000 Membrane. Allow BITUTHENE® 4000 Surface Conditioner to dry until the substrate returns to its original (dry) color. At low temperatures or in high humidity conditions, dry time may be extended to greater than one hour.

BITUTHENE® 4000 Surface Conditioner is clear when dry and may remain slightly tacky. In general, conditioning should be limited to what can be covered within 24-hours. In situations where long dry times may prevail, substrates may be conditioned up to 24-hours in advance. Substrates must be reconditioned if dirt or dust accumulates on the conditioned surface. Tools should be cleaned with water before surface conditioner dries.

## Application on Horizontal Surfaces

Note: GCP PREPRUFE® 300R and 300R Plus pre-applied Membranes are strongly recommended and are the preferred products for below slab applications or for any application where the Membrane is applied before concrete is poured. See PREPRUFE® Membrane waterproofing product information sheets at [gcpat.com](http://gcpat.com).

All horizontal surfaces to receive BITUTHENE® 4000 Membrane should be sloped to drain at least 1/8 in./ft. (11 mm/m). When a minimum slope of 1/8 in. /ft. (11 mm/m) cannot be achieved, 2 layers of BITUTHENE® 4000 Membrane or 8-mils of BITUTHENE® Deck Prep and 1-layer of BITUTHENE® 4000 Membrane may be an option. Under these conditions and prior to initiating application contact your local GCP representative.

Apply Membrane from the low point to the high point so that laps shed water. Overlap all seams at least 2 in. (50 mm). Stagger all end laps. Roll the entire Membrane firmly and completely as soon as possible. Use a linoleum roller or standard water-filled garden roller less than 30 in. (760 mm) wide, weighing a minimum of 75 lbs (34 kg) when filled. Cover the face of the roller with a “conforming” material such as 1/2 in. (13 mm) plastic foam sheeting or two wraps of indoor-outdoor carpet to allow the Membrane to fully contact the primed substrate. Seal all T-joints and Membrane terminations with BITUTHENE® Liquid Membrane by the end of the day of Membrane application.

## Application on Vertical Surfaces

Apply BITUTHENE® 4000 Membrane in lengths up to 8 ft (2.5 m). Overlap all seams at least 2 in. (50 mm). On walls higher than 8 feet apply Membrane in two or more “shingled” lifts with the upper sheet overlapping the lower by at least 2 in. (50 mm). Roll all Membrane with a hand roller.

Terminate the Membrane at grade level. Press the Membrane firmly to the wall with the butt end of a hardwood tool such as a hammer handle or secure into a reglet. Failure to use heavy pressure at terminations can result in a poor seal. A termination bar may be used to ensure a tight seal. Terminate the Membrane at the base of the wall if the bottom of the interior floor slab is at least 6 in. (150 mm) above the footing. Otherwise, use appropriate inside corner detail where the wall and footing meet. A 1/8 in. (3 mm) x 1 in. (25 mm) aluminum termination bar aligned with the top of the membrane is recommended for terminations on CMU, in earth covered decks, and in earth bermed applications where soil cannot be fully compacted. See Technical Letter 26 BITUTHENE® Membrane Terminations for additional information.

## Membrane Repairs

Patch tears and inadequately lapped seams with additional Membrane. Clean damaged Membrane with a damp cloth and dry. Slit fish-mouths and repair with a patch extending 6 in. (150 mm) in all directions from the slit and seal edges of the patch with BITUTHENE® Liquid Membrane. Inspect all Membrane thoroughly before covering and repair all damaged areas.

## Drainage

HYDRODUCT® Drainage composites are recommended for both active drainage and protection of the Membrane. See HYDRODUCT® Drainage composite Product Data Sheets at [gcpat.com](http://gcpat.com).

## Insulation

Always apply BITUTHENE® 4000 Membrane directly to primed or conditioned structural substrates. Insulation, if used, must be applied over the Membrane. Do not apply BITUTHENE® Membranes over insulation or lightweight insulating concrete.

## Flood Testing (Horizontal Surfaces Only)

Flood test all horizontal applications with a minimum 2 in. (51 mm) head of water for 24-hours. Mark any leaks and repair when the Membrane is dry. Before flood testing, be sure the structure will withstand the dead load of the water. For highly sloped decks, segment the flood test to avoid excessively deep water near drains. Conduct the flood test 24-hours after completing the application of BITUTHENE® 4000 Membrane Waterproofing System. Immediately after flood testing is completed, and all necessary repairs have been made, install HYDRODUCT® Drainage Composite to protect the BITUTHENE® and damage by other trades.

As an alternate to flood testing, appropriate, electronic leak detection may be used to check the integrity of the system.

## Protection of Membrane

To prevent damage from other trades, construction materials or backfill protect BITUTHENE® 4000 Membrane immediately after application. To avoid potential blisters place protection immediately where temperatures above 77°F (25°C).



- On vertical applications, use HYDRODUCT® 220 Drainage Composite. Adhere HYDRODUCT® 220 Drainage Composite to Membrane with PREPRUFE® Detail Tape. Alternative methods of protection are to use nominal 1.0 lb/ft<sup>3</sup> (16kg/m<sup>3</sup>), min. 1 in. (25 mm) expanded polystyrene or min. 1/4 in. (6 mm) extruded polystyrene that has a minimum compressive strength of 8 lbs/in<sup>2</sup> (55 kN/m<sup>2</sup>). Such alternatives do not provide positive drainage to the system. If 1/4 in. (6 mm) extruded polystyrene protection board is used, backfill must not contain sharp rock or aggregate over 2 in. (50 mm) in diameter. Or any debris that might puncture the protection board and/or the Membrane. See Technical 27 Letter Protection Courses Used with GCP Waterproofing Systems for additional information.
- In mud slab waterproofing, or other applications where positive drainage is not specified and/or where reinforced concrete slabs are placed over the Membrane, the use of 1/4 in. (6 mm) hardboard or 2 layers of 1/8 in. (3 mm) hardboard is required to protect the Membrane.

## Placing Steel

On horizontal applications when placing steel over properly protected Membrane, use concrete bar supports (dobies) or chairs with plastic tips or rolled feet to prevent damage from sharp edges. Use special care when using wire mesh, especially if the mesh is curled.

## Backfill

Place backfill as soon as possible. (see Protection of Membrane above) Use care during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added and compacted in 6 in. (150 mm) to 12 in. (300 mm) lifts.

## Approvals

- City of Los Angeles Research Report RR 24386
- Miami-Dade County Code Report NOA 15.0728.10
- U.S. Department of Housing and Urban Development (HUD) HUD Materials Release 628
- BITUTHENE® 4000 Membranes carry a Underwriters' Laboratory Class A Fire Rating (Building Materials Directory, File TFGU.R7910) when used in either of the following constructions:
  - Limited to noncombustible decks at inclines not exceeding 1/4 in. (6 mm) to the horizontal 1 ft (0.3 m). One layer of BITUTHENE® Waterproofing Membrane, followed by one layer of 1/8 in. (3 mm) protection board, encased in 2 in. (50 mm) minimum concrete monolithic pour.
  - Limited to noncombustible decks at inclines not exceeding 1/4 in. (6 mm) to the horizontal 1 ft (0.3 m). One layer of BITUTHENE® Waterproofing Membrane, followed by one layer of DOW Styrofoam PD Insulation Board [2 in. (50 mm) thick]. This is covered with one layer of 2 ft x 2 ft x 2 in. (0.6 m x 0.6 m x 50 mm) of concrete paver topping.

## Physical Properties for BITUTHENE® 4000 Membrane

PROPERTY	TYPICAL VALUE	TEST METHOD
Color	Dark gray-black	
Dimensions	3 ft x 66.7 ft roll (200 ft <sup>2</sup> )	
Thickness	60 mils (1.5 mm) nominal	ASTM D3767—method A
Flexibility, 180° bend over 1 in. (25 mm) mandrel at -25°F (-32°C)	Unaffected	ASTM D1970
Tensile strength, Membrane, die C	325 psi (2240 kPa) minimum	ASTM D412 <sup>1</sup>
Tensile strength, film	5,000 psi (34.5 MPa) minimum	ASTM D882 <sup>1</sup>
Elongation, ultimate failure of rubberized asphalt	300% minimum	ASTM D412 <sup>1</sup>
Crack cycling at -25°F (-32°C), 100 cycles	Unaffected	ASTM C836
Lap shear	20 lbs (89 N)	ASTM D1002 <sup>2</sup>
Peel strength	11 lbs/in. (1926 N/m)	ASTM D903 <sup>4</sup>
Puncture resistance, Membrane	50 lbs (222 N) minimum	ASTM E154
Resistance to hydrostatic head	>230 ft (>70m) of water	ASTM D5385
Permeance	<0.1 perms	ASTM E96, section 12—water method
Water absorption	<0.1%	ASTM D570

### Footnotes:

1. The test is run at a rate of 2 in. (50 mm) per minute.
2. The test is conducted at a speed of 4 in. (102 mm) per minute.
3. Individual Roll Length may vary +/- 1%
4. Test conducted with Bituthene Surface Conditioner at minimum application temperature

**gcpat.com | North America customer service: 1-866-333-3SBM (3726).**

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Last Updated: 2018-11-26

**[gcpat.com/solutions/products/bituthene-post-applied-waterproofing/bituthene-4000-membrane](http://gcpat.com/solutions/products/bituthene-post-applied-waterproofing/bituthene-4000-membrane)**

# LIQUID BOOT® TROWEL GRADE

## TROWEL-APPLIED GAS VAPOR BARRIER

### DESCRIPTION

LIQUID BOOT® is a trowel-applied, water based membrane containing no VOCs, which provides a barrier against vapor intrusion into structures. LIQUID BOOT® Trowel Grade is installed in conjunction with the LIQUID BOOT® gas vapor barrier to minimize vapor and nuisance water migration. LIQUID BOOT® Trowel Grade offers additional protection around penetrations, providing for a fully-adhered gas vapor barrier system.

### APPLICATIONS

LIQUID BOOT® Trowel Grade is used for detailing around penetrations and for repairs in LIQUID BOOT® gas vapor barrier applications.

### AVAILABILITY

*LIQUID BOOT® Trowel Grade is available from the following CETCO plant locations:*

- 1001 S Linwood Ave., Santa Ana, CA
- 218 NE Industrial Park Rd., Cartersville, GA

### BENEFITS

- Trowel application provides excellent sealing of penetrations
- Seamless, monolithic membrane means no mechanical fastening required
- Protection from methane gas, VOCs, chlorinated solvents and other contaminants
- Also protects against water vapor

### LIMITATIONS

- Do not allow materials to freeze in containers.
- Store LIQUID BOOT® Trowel
- Grade at site in strict compliance with manufacturer's instructions.
- When applying material below 45°F, contact your local technical sales manager.

### PACKAGING

*LIQUID BOOT® Trowel Grade is available in the following packaging options:*

- 1 Gallon Bucket (8 oz. bottle of catalyst included)



In addition to superior chemical resistance performance, LIQUID BOOT® Trowel Grade effectively seals penetrations, which are considered critical vapor intrusion pathways.

### TESTING DATA

CHEMICAL & PHYSICAL PROPERTIES		
PROPERTY	TEST METHOD	RESULT
Acid Exposure (10% H <sub>2</sub> SO <sub>4</sub> for 90 days)	ASTM D543	Less than 1% weight change
Benzene Diffusion Test	Tested at 43,000 ppm	2.90 x 10 <sup>-11</sup> m <sup>2</sup> /sec
Chemical Resistance: VOCs, BTEXs (tested at 20,000 ppm)	ASTM D543	Less than 1% weight change
Chromate Exposure (10% Chromium6+ salt for 31 days)	ASTM E96	Less than 1% weight change
Diesel (1000 mg/l), Ethylbenzene (1000 mg/l), Naphthalene (5000 mg/l) and Acetone (500 mg/l) Exposure for 7 days	ASTM D543	Less than 1% weight change; Less than 1% tensile strength change
Hydrogen Sulfide Gas Permeability	ASTM D1434	None Detected
Methane Permeability	ASTM 1434-82	Passed*
Microorganism Resistance	ASTM D4068-88	Passed*
Oil Resistance	ASTM D543-87	Passed*
PCE Diffusion Coefficient	Tested at 6,000 mg/m <sup>3</sup>	2.74 x 10 <sup>-14</sup> m <sup>2</sup> /sec
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
TCE Diffusion Coefficient	Tested at 20,000 mg/m <sup>3</sup>	8.04 x 10 <sup>-14</sup> m <sup>2</sup> /sec

# LIQUID BOOT®

## SPRAY-APPLIED GAS VAPOR BARRIER

### DESCRIPTION

LIQUID BOOT® is a seamless, spray-applied, water-based membrane containing no VOCs, which provides a barrier against vapor intrusion into structures. LIQUID BOOT® is installed under slab and on below grade vertical walls as a gas vapor barrier to minimize vapor and nuisance water migration into buildings. LIQUID BOOT® spray-application directly to penetrations, footings, grade beams, pile caps and other irregular surfaces, provides for a fully-adhered gas vapor barrier system.

### APPLICATIONS

LIQUID BOOT® is used as an underslab and below-grade vertical wall gas vapor barrier, used to minimize vapor and nuisance water (non-hydrostatic conditions) migration into buildings. LIQUID BOOT® is ideal for methane migration control. LIQUID BOOT® is also NSF® certified for use as a potable water liner in concrete water reservoirs and tanks greater than 300,000 gallons to protect the concrete from water seepage.

### BENEFITS

- Spray-application provides excellent sealing of penetrations, eliminating the need for mechanical fastening
- Seamless, monolithic membrane eliminates seaming-related membrane failures
- Unique formulation provides superior protection from methane gases and water vapor
- Fully adhered system reduces risk of gas migration
- Protection from methane gas, VOCs, chlorinated solvents and other contaminants

### INSTALLATION

Protect all adjacent areas not to receive gas vapor barrier. Ambient temperature shall be within manufacturer's specifications. All plumbing, electrical, mechanical and structural items to be under or passing through the gas vapor barrier shall be secured in their proper positions and appropriately protected prior to membrane application. Gas vapor barrier shall be installed before placement of reinforcing steel. Expansion joints must be filled with a conventional waterproof expansion joint material. Surface preparation shall be per manufacturer's specification. A minimum thickness of 60 dry mils. unless specified otherwise.

### LIMITED WARRANTY

CETCO warrants its products to be free of defects. This warranty only applies when the product is applied by Approved Applicators trained by CETCO. As factors which affect the result obtained from this product, including weather, equipment, construction, workmanship and other variables are all beyond CETCO's control, we warrant only that the material herein conforms to our product specifications. Under this warranty we will replace at no charge any product proved to be defective within 12 months of manufacture, provided it has been applied in accordance with our written directions for uses we recommend as suitable for this product. This warranty is in lieu of any and all other warranties expressed or implied (including any implied warranty of merchantability or fitness for a particular use), and the Manufacturer shall have no further liability of any kind including liability for consequential or incidental damages resulting from any defects or any delays caused by replacement or otherwise. This warranty shall become valid only when the product has been paid for in full.



In addition to superior chemical resistance performance, LIQUID BOOT® spray-application effectively seals penetrations, footings, grade beams and other irregular surfaces that are considered critical vapor intrusion pathways.

### EQUIPMENT

- COMPRESSOR: Minimum output of 155-185 cubic feet per minute (CFM)
- PUMPS: For "A" drum, an air-powered piston pump of 4:1 ratio (suggested model: Graco, 4:1 Bulldog). For "B" drum, an air-powered diaphragm pump (0-100 psi)
- HOSES: For "A" drum, ½" wire hose with a solvent resistant core (for diesel cleaning flush), hose rated for 500 psi minimum. For "B" drum, a 3/8" fluid hose rated at only 300 psi may be used.
- SPRAY WAND: Only the spray wand sold by CETCO is approved for the application of LIQUID BOOT®.
- SPRAY TIPS: Replacement tips can be purchased separately from CETCO.

### PACKAGING

**LIQUID BOOT® is available in the following packaging options:**

- 55 Gallon Drum
- 275 Gallon Tote

## LIQUID BOOT<sup>®</sup> SPRAY-APPLIED GAS VAPOR BARRIER

### TESTING DATA

CHEMICAL & PHYSICAL PROPERTIES		
CHEMICAL PROPERTY	TEST METHOD	RESULT
Acid Exposure (10% H <sub>2</sub> SO <sub>4</sub> for 90 days)	ASTM D543	Less than 1% weight change
Benzene Diffusion Test	Tested at 43,000 ppm	2.90 x 10 <sup>-14</sup> m <sup>2</sup> /day
Chemical Resistance: VOCs, BTEXs (tested at 20,000 ppm)	ASTM D543	Less than 1% weight change
Chromate Exposure (10% Chromium6+ salt for 31 days)	ASTM E96	Less than 1% weight change
Diesel (1000 mg/l), Ethylbenzene (1000 mg/l), Naphthalene (5000 mg/l) and Acetone (500 mg/l) Exposure for 7 days	ASTM D543	Less than 1% weight change; Less than 1% tensile strength change
Hydrogen Sulfide Gas Permeability	ASTM D1434	None Detected
Methane Permeability	ASTM 1434-82	Passed*
Microorganism Resistance	ASTM D4068-88	Passed*
Oil Resistance	ASTM D543-87	Passed*
PCE Diffusion Coefficient	Tested at 120 mg/L	1.32 x 10 <sup>-13</sup> m <sup>2</sup> /sec
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
TCE Diffusion Coefficient	Tested at 524 mg/L	9.07 x 10 <sup>-13</sup> m <sup>2</sup> /sec

	TEST METHOD	RESULT
Accelerated Weathering and Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Air Infiltration	ASTM E283-91	0 cm/sq. ft.
Bonded Seam Strength Tests	ASTM D6392	Passed*
Coefficient of Friction (with geotextile both sides)	ASTM D5321	0.72
Cold Bend Test	ASTM D146	Passed. 0 cracking at -25°F
Dead Load Seam Strength	City of Los Angeles	Passed*
Electric Volume Resistivity	ASTM D257	1.91 x 10 <sup>10</sup> ohms-cm
Elongation	ASTM D412	1,332% 0 reinforcement, 90% recovery
Elongation w/8 oz. non-woven geotextile both sides	ASTM D751	100% (same as geotextile tested separately)
Environmental Stress-Cracking	ASTM D1693-78	Passed*
Flame Spread	ASTM E108	Class A with top coat (comparable to UL790)
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. 0 spalling or disbondment
Heat Aging	ASTM D4068-88	Passed*
Hydrostatic Head Resistance	ASTM D751	Tested to 138 feet or 60 psi
Potable Water Containment	ANSI/NSF 61	NSF Certified for tanks >300,000 gal
Puncture Resistance w/8 oz. non-woven geotextile both sides	ASTM D4833	285 lbs. (travel of probe = 0.756 in)
Sodium Sulfate (2% water solution)	ASTM D543, D412, D1434	Less than 1% weight change
Soil Burial	ASTM E154-88	Passed
Tensile Bond Strength to Concrete	ASTM D413	2,556 lbs/ft <sup>2</sup> uplift force
Tensile Strength	ASTM D412	58 psi without reinforcement
Tensile Strength w/8 oz. non-woven geotextile both sides	ASTM D751	196 psi (same as geotextile tested separately)
Toxicity Test	22 CCR 86696	Passed
Water Penetration Rate	ASTM D2434	<7.75 x 10 <sup>-9</sup> cm/sec
Water Vapor Permeance	ASTM E96	0.069 perms

\*Passes all Los Angeles City and County Methane Criteria

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# BASEFABRIC™ T-60

## NON-WOVEN GEOTEXTILE FABRIC

### DESCRIPTION

BASEFABRIC™ T-60 is a long-lasting, durable, non-woven geotextile manufactured from high quality polypropylene. BASEFABRIC™ T-60 is a continuous filament, heat-bonded geotextile fabric with superior uniformity that reinforces and separates the membrane from soil particles. BASEFABRIC™ T-60 is manufactured to meet or exceed the minimum average roll values listed in the table below.

### APPLICATION

BASEFABRIC™ T-60 serves as the base layer to the LIQUID BOOT™ and LIQUID BOOT™ PLUS vapor intrusion mitigation systems.

### BENEFITS

Installed directly on the subgrade, BASEFABRIC™ T-60 provides a uniform substrate for the LIQUID BOOT™ vapor intrusion barrier to be spray applied to.

### INSTALLATION

Product should be installed in accordance with specific installation guide specifications.



BASEFABRIC™ T-60 is a needle-punched, non-woven geotextile with superior tensile strength and puncture resistance.

### PACKAGING

- 15.5 ft. x 300 ft. (4.7 m x 91 m) Rolls

### TESTING DATA

PHYSICAL PROPERTIES		
PROPERTY	TEST METHOD	RESULT
Grab Tensile Strength	ASTM D 4632	240 lbs. (1068 N)
Elongation	ASTM D 4632	60%
Trapezoid Tear	ASTM D 4533	90 lbs. (400 N)
CBR Puncture	ASTM D 6241	370 lbs. (1647 N)
UV Stability	ASTM D 4355	70%
A.O.S.	ASTM D 4751	140 US Sieve (0.1 mm)
Permittivity	ASTM D 4491	.1 sec. <sup>-1</sup>
Vertical Water Flow Rate	ASTM D 4491	15 GPM/ft <sup>2</sup> (1.0 x 10 <sup>-3</sup> m <sup>3</sup> /m <sup>2</sup> /s)
Area		517 yd <sup>2</sup> (432 m <sup>2</sup> )
Weight		209 lbs. (95 kg)
Diameter		10 in. (25.4 cm)

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# ULTRASHIELD™ G-1000

## NON-WOVEN GEOTEXTILE FABRIC

### DESCRIPTION

ULTRASHIELD™ G-1000 is a polypropylene, staple fiber, non-woven geotextile. The fibers are needle-punched, forming a stable network that retains dimensional stability relative to each other. The geotextile is resistant to ultraviolet degradation and biological and chemical environments found in soils. Manufacturing Quality Control tests have been performed and are accredited by the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP).

### APPLICATION

ULTRASHIELD™ G-1000 is designed for use as a underslab adhesion protection course specially designed and required for underslab LIQUID BOOT® applications where the membrane must

remain attached to the underslab of the building. This is to ensure the membrane remains in place despite soil settlement, which is common when building is on a landfill.

### BENEFITS

ULTRASHIELD™ G-1000 is installed directly over the finished LIQUID BOOT® vapor intrusion barrier, providing superior protection from other trades.

### PACKAGING

- 15 ft. x 180 ft. (4.5 m x 55 m) Rolls



ULTRASHIELD™ G-1000 is a needle-punched non-woven geotextile with superior tensile strength and puncture resistance.

### TESTING DATA

PHYSICAL PROPERTIES			
PROPERTY	TEST METHOD	RESULT (ENGLISH)	RESULT (METRIC)
Tensile Bond Strength to Concrete <sup>1</sup>	ASTM C 297-94	7 psi	
Mass/Unit Area	ASTM D 5261	10.0 oz/yd <sup>2</sup>	339 g/m <sup>2</sup>
Thickness	ASTM D 5199	105 mils	2.7 mm
Tensile Strength	ASTM D 4632	270 lbs.	1202 N
Elongation	ASTM D 4632	50%	50%
CBR Puncture Strength	ASTM D6241	725 lbs.	3226 N
Trapezoid Tear	ASTM D 4533	105 lbs.	467 N
UV Resistance	ASTM D 4355	70%	70%
A.O.S.	ASTM D 4751	100 U.S. Sieve	0.150 mm
Permittivity	ASTM D 4491	1.2 sec <sup>-1</sup>	1.2 sec <sup>-1</sup>
Permeability	ASTM D 4491	0.30 cm/sec	0.30 cm/sec
Water Flow Rate	ASTM D 4491	85 gal/min//ft <sup>2</sup>	3463 l/min/m <sup>2</sup>

#### Notes:

The property values listed above are effective 04/2011 and are subject to change without notice.

All values shown are in weaker principal direction and are Minimum average roll values (MARV), except for AOS, which is a Maximum average roll value.

Historical value, based on past testing.

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## **APPENDIX I**

### **CONSTRUCTION HEALTH AND SAFETY PLAN**

# CONSTRUCTION HEALTH AND SAFETY PLAN

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## **ATTACHMENTS**

Attachment H-A	Health and Safety Briefing/Site Orientation Record
Attachment H-B	Directions to Hospital
Attachment H-C	Material Safety Data Sheets

## 1.0 INTRODUCTION

### 1.1 Overview

This project-specific Construction Health and Safety Plan (CHASP) has been developed by GZA GeoEnvironmental of New York (GZA) on behalf of the Institute of Community Living (Client) to establish the procedures necessary for the protection from potential contaminated materials resulting from the remedial action activities at the property located at 50 Nevins Street in Brooklyn, New York (Site). This CHASP is intended to supplement the Contractor's Safety Program. The procedures in this plan have been developed based on current knowledge regarding the hazards which are known or anticipated for the operations to be conducted at this Site.

### 1.2 Site Hazards

This CHASP covers only the hazards associated with potential chemical exposures. Physical hazards such as injuries from typical excavation field work activities, including the operation of heavy equipment, noise exposure, heat and cold stress, electrical hazards, fire hazards, excavation hazards and general safety hazards associated with walking on working surfaces (trip and fall) are covered by the Contractor's safety program.

The Site is being remediated under a New York City Office of Environmental Remediation approved (18EHAN493K) Remedial Action Work Plan. The remedial action calls for the handling, transport and disposal of soil, fill, fluids and other materials removed from the property. Site activities may pose chemical exposure hazards. Potential chemical exposure hazards include skin contact, ingestion and inhalation hazards which may result from the presence of volatile organic compounds, semi-volatile organic compounds, pesticides, and inorganic metallic elements (metals) on-Site. The potential adverse health effects from these detected contaminants are diverse. Many of these compounds are known or suspected to result in chronic illness from long-term exposures. However, due to the limited nature of the proposed construction, only acute effects are a potential concern. See **Section 2.0** for detailed chemical hazard information.

### 1.3 Project Team

The organizational structure established for the implementation of construction health and safety requirements established by this CHASP, include identifying personnel who have been assigned specific authority to implement and enforce the provisions of this CHASP. Prior to the construction appropriate personnel will be identified in the table below:

Name	Project Title/Assigned Role	Phone Numbers
Reinbill Maniquez	Project Manager	Work: 212-594-8140
Paul Medovoy	Site Supervisor	Mobile: 347.231.0461
Paul Medovoy	Site Health and Safety Officer	Mobile: 347.231.0461

The control of Site hazards is dependent upon the degree to which management enforces compliance and employees cooperate with the specified health and safety requirements. Therefore, personnel at all levels of the organization must recognize their individual responsibility to comply. All activities covered by this CHASP must be conducted in compliance with this CHASP and with applicable federal, state, and local health and safety regulations, including 29 CFR 1910.120. Personnel covered by this CHASP who cannot or will not comply must be excluded from Site activities by the Project Superintendent.

## 2.0 HAZARD ASSESSMENT

The following hazard assessment applies only to the activities within the specified scope of this CHASP.

### 2.1 Chemical Hazards and Known/ Suspect Chemicals of Concern

The chemical hazard information provided below is based on data provided in the Phase I Environmental Site Assessment Report dated July 2018, the Remedial Investigation Report, dated November 2018, and information from the New York State Department of Environmental Conservation. During the investigations, representative Site soils and soil vapor samples were collected. Constituents with exceeding concentrations and their respective health effects are listed below for reference. Information presented is based upon established Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL) and The National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs) with time-weighted average (TWA). All other analytical parameters were reported within acceptable levels for Site urban residential land use. See Section 4.2 for a description of the PPE that should be used for this Site.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Methylene chloride	PEL = 25 ppm TWA STEL = 125 ppm TWA	The predominant means of exposure to methylene chloride is inhalation and skin exposure. Methylene chloride is considered a potential occupational carcinogen. Short-term exposures to high concentrations may cause mental confusion, lightheadedness, nausea, vomiting, and headache. Continued exposure may also cause eye and respiratory tract irritation. Exposure to methylene chloride may make symptoms of angina more severe. Skin exposure to liquid methylene chloride may cause irritation or chemical burns.
Benzo(a)anthracene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Benzo(a)pyrene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Benzo(b)fluoranthene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	No signs or symptoms of acute or chronic exposure have been reported in humans; suspect human carcinogen.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Benzo(k)fluoranthene	PEL = 0.2 mg/m <sup>3</sup> TWA	Highly flammable liquid and vapor. Causes serious eye irritation. May cause drowsiness or dizziness. May cause cancer.
Chrysene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Dibenzo(a,h)anthracene	No listed PEL or REL screening values	Suspected of causing cancer.
Indeno(1,2,3-cd) pyrene	No listed PEL or REL screening values	Vigorous reactions, sometimes amounting to explosions, can result from the contact between aromatic hydrocarbons, such as Indeno(1,2,3-Cd) pyrene, and strong oxidizing agents. They can react exothermically with bases and with diazo compounds. Substitution at the benzene nucleus occurs by halogenation (acid catalyst), nitration, sulfonation, and the Friedel-Crafts reaction.
4,4'-DDE	PEL = 0 mg/m <sup>3</sup> TWA REL = 0.5 mg/m <sup>3</sup> TWA	Harmful if swallowed. Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.
4,4'-DDT	PEL = 1 mg/m <sup>3</sup> TWA REL = 0.5 mg/m <sup>3</sup> TWA	Human health effects from DDT at low environmental doses are unknown. Following exposure to high doses, human symptoms can include vomiting, tremors or shakiness, and seizures. Laboratory animal studies showed effects on the liver and reproduction. DDT is considered a possible human carcinogen.
Dieldrin	PEL = 0.25 mg/m <sup>3</sup> [skin] TWA REL = 0.25 mg/m <sup>3</sup> [skin] TWA	Exposure routes include inhalation, skin absorption, ingestion, skin and/or eye contact. Symptoms include headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; in Animals: liver, kidney damage [potential occupational carcinogen]
Barium	PEL = 0.5 mg/m <sup>3</sup> TWA REL = 0.5 mg/m <sup>3</sup> TWA	Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia
Copper	PEL = 0.1 mg/m <sup>3</sup> REL = 0.1 mg/m <sup>3</sup>	Irritation eyes, upper respiratory system; metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough, lassitude (weakness, exhaustion); metallic or sweet taste; discoloration skin, hair.
Lead	PEL = 0.05 mg/m <sup>3</sup> REL = 0.05 mg/m <sup>3</sup>	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.
Mercury	PEL = 0.05 mg/m <sup>3</sup> REL = 0.1 mg/m <sup>3</sup>	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.
Nickel	PEL = 1 mg/m <sup>3</sup> REL = 0.015 mg/m <sup>3</sup>	Sensitization dermatitis, allergic asthma, cough, shortness of breath, pneumonitis; decreased sense of smell; Affects nasal cavities, lungs, skin; potential occupational carcinogen.



Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Zinc (oxide dust)	REL = 10 mg/m <sup>3</sup> TWA PEL = 5 mg/m <sup>3</sup> TWA	Exposure to zinc oxide can occur through inhalation, ingestion, and eye or skin contact; affects the respiratory system; Acute exposure to zinc oxide can result in coughing, substernal pain, upper respiratory tract irritation, rales, chills, fever, nausea, and vomiting; Chronic exposure to zinc oxide by skin contact may result in papular-pustular skin eruptions in the axilla, inner thigh, inner arm, scrotum and pubic areas.
Benzene	PEL = 1 ppm REL = 0.1 ppm STEL = 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen.
Toluene	REL = 100 ppm PEL = 200 ppm STEL = 300 ppm	Irritation eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Ethylbenzene	PEL = 100 ppm REL = 100 ppm	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Xylene	PEL = 100 ppm (435 mg/m <sup>3</sup> ) TWA REL = 100 ppm (435 mg/m <sup>3</sup> ) TWA STEL = 150 ppm (655 mg/m <sup>3</sup> )	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
n-hexane	PEL = 500 ppm (1800 mg/m <sup>3</sup> ) TWA REL = 50 ppm (180 mg/m <sup>3</sup> ) TWA	Irritation eyes, nose; nausea, headache; peripheral neuropathy: numb extremities, muscle weak; dermatitis; dizziness; chemical pneumonitis (aspiration liquid).
Tetrachloroethene (PCE)	PEL = 100 ppm TWA	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]
Trichloroethene (TCE)	PEL = 100 ppm TWA REL = 2 ppm TWA	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen].

## 2.2 Volatile Organic Compounds (VOCs)

In soil samples, only one VOC, methylene chloride, was detected at a concentration exceeding Unrestricted Use SCO. Soil vapor samples showed petroleum-related VOCs and chlorinated VOCs present at low concentrations. The highest reported concentration was for n-hexane at 19,500 µg/m<sup>3</sup>. The chlorinated VOC, PCE was detected in two of the six samples and TCE was detected in one sample. Concentrations of PCE and TCE are within the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

### 2.3 Semi-Volatile Organic Compounds (SVOCs)

Elevated levels of SVOC identified in soil, specifically Polycyclic Aromatic Hydrocarbons (PAHs), were detected at concentrations exceeding the New York State Department of Environmental Conservation (NYSDEC) standards promulgated in the Part 375 Restricted Residential SCOs.

### 2.4 Polychlorinated biphenyls (PCBs)

No PCB was detected exceeding SCOs.

### 2.5 Pesticides

Elevated levels of pesticide, including 4-4'-DDE, 4-4'-DDT and dieldrin, were detected at concentrations exceeding Unrestricted Use SCOs in soil samples. Due to the relatively low vapor pressure of pesticide compounds, vapor hazards at ambient temperatures are not expected to occur. However, if Site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting if necessary, as described in Section 3.2. In addition, exposure to high doses with certain pesticide compounds have been associated human symptoms including vomiting, tremors or shakiness, and seizures. Certain pesticides are also considered possible human carcinogens.

### 2.6 Metals

Various metals including barium, copper, lead, mercury, nickel and zinc were detected at concentrations exceeding Unrestricted Use SCOs. Barium, lead, and mercury all exceeded Restricted Residential SCOs. The elevated levels of metals are attributed to historic fill materials present throughout the Site. Overexposure to metal compounds has been associated with a variety of local and systemic health hazards, both acute and chronic in nature, including lung damage, neurological effects, gastrointestinal effects, kidney and liver damage, allergic dermatitis and other skin disorders. Exposure to metals is most commonly through inhalation and ingestion of dust. Metallic mercury is unique among metals, as it releases toxic vapors at normal room temperatures, and can be absorbed through the skin.

To estimate health risk, GZA calculated the airborne mercury exposure through dust for barium, lead, and mercury. The basis of comparison used was the more conservative nuisance dust standard of the ACGIH Threshold Limit Value, 8-hour time-weighted average of 10 milligrams per cubic meter of air (mg/m<sup>3</sup>). This nuisance dust is a general rule of thumb for the dust allowed before preventive measures, such as soil wetting of exposed soil, are used.

GZA believes that airborne mercury, barium and additional listed metals are not a significant risk to Site workers. GZA understands that mercury is a volatile element. GZA does not anticipate measurable mercury vapor concentrations, given the relatively low soil concentrations. However, if Site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting if necessary, as described in Section 3.2. For lead, due to the high concentrations detected in soil samples, a Community Air Monitoring Program (CAMP) should be implemented to monitor the total dust in air.

### 3.0 AIR MONITORING

Air monitoring falls into two separate categories: direct reading/environmental monitoring, and personal exposure monitoring. The following Sections summarize the types of environmental monitoring as well as the appropriate response actions applicable to the Site.

#### 3.1 Organic Vapor Monitoring

Volatile organic vapor hazards have been identified for the Site (see Section 2.0). Therefore, organic vapor monitoring with a photoionization detector (PID) is expected to be required for the Site.

#### AIR MONITORING INSTRUMENTS AND ACTION LEVELS

Photoionization Detector (PID), Organic Vapor Detector (H-Nu, OVM, OVA) - Breathing Zone Readings

0 to 10 ppm	Remain in Level D. Use colorimetric tubes or other chemical specific device to verify PID readings do not contain low PEL toxic materials (Benzene, Vinyl Chloride, etc.) where applicable. If benzene is present above 1 ppm withdraw from excavation and proceed to level C.
10 to 25 ppm	Withdraw from work area and contact Project Management. Proceed to Level C protection for re-entry, or discontinue operation
> 25 ppm	Secure operations, withdraw from work area, and discontinue work at that location until contaminants can be evaluated, and detailed plan implemented.

#### 3.2 Total Particulates

Due to the presence of metals and pesticides in soils on-Site, total respirable particulates may be a concern. Dust levels should be visually monitored and if levels become noticeable, soils should be wetted down to control dusty conditions. Wetting may be accomplished using various methods, including a hose connected to a fire hydrant or other on-Site source of water. The Client's Project Superintendent shall be responsible for determining when the wetting of soils is needed and the most appropriate method to use. In addition, recommended measurements for particulate monitoring are detailed below.

Upwind concentrations should be measured at the start of each work day during active handling of excavated materials (including stockpiling and truck loading) and periodically thereafter to establish background conditions. The particulate air monitoring work will be conducted using a pDR-1200 personal airborne particulate monitor (or approved equivalent) calibrated daily.

The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers (um) in size (PM-10) and capable of integrating over a period of 5-minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate excess of the action level.

Dust migration will be visually assessed during all work activities, and at no time will the downwind perimeter particulate levels be allowed to exceed a total standard of 10 mg/m<sup>3</sup> (or “nuisance” dust levels).

If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m<sup>3</sup>) greater than the background (upwind perimeter) for a 5-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 (e.g., soil wetting) provided the downwind PM-10 particulate levels do not exceed 150 ug/m<sup>3</sup> above the upwind level and no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/m<sup>3</sup> above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume if dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentrations to within 150 ug/m<sup>3</sup> of the upwind level and in preventing visible dust migration.

### 3.2 Particulate Monitoring, Response Levels, and Actions

Parameter	Monitoring Instrument	Response Levels (above background levels)	Action	Conditions Continuing Activities for Work
<b>Particulates &lt; 10 um (PM-10)</b>	<b>Dust Meter</b>	Fugitive dust migration	1. Implement dust suppression techniques	Dust suppression techniques are in place
		> 100 ug/m <sup>3</sup> but < 150 ug/m <sup>3</sup>	1. Implement dust suppression techniques	Levels must not exceed 150 ug/m <sup>3</sup> with dust suppression techniques in place
		> 150 ug/m <sup>3</sup>	1. Halt activity 2. Re-evaluate activities	Levels decrease below 150 ug/m <sup>3</sup> and fugitive dust migration is prevented

### 3.3 Personal Exposure Monitoring

No asbestos, no lead-based paint, and no radiological hazards have been identified within the vicinity of the proposed excavation area at the Site (see **Section 2.0**). Therefore, personal exposure monitoring is not required during soil excavations.

## **4.0 PERSONAL PROTECTIVE EQUIPMENT**

Personal protective equipment (PPE) will be donned as described below for the activities covered by this CHASP. Based on available analytical data and the proposed intrusive activities, the Contractor, anticipates that all activities will require Level D or Modified Level D PPE.

### **4.1 General Site Work**

General Site work conducted outside the excavation areas, operators of heavy equipment, and non-intrusive activities which do not generate dust will require Level D protective equipment. Level D is defined as:

- Hardhat
- Eye protection
- Hearing protection (with site workers at all times and donned when appropriate)
- Steel-toed work boots
- Work clothes

Workers shall wear appropriate hearing protection during designated hearing protection-required tasks (such as, jack hammering, pile driving etc.). To reduce the exposure to noise, personnel working in areas of excessive noise must use hearing protectors (earplugs or earmuffs).

Rule-of-Thumb: Wherever actual data from sound level meters or noise dosimeters is unavailable, if it is necessary to raise one's voice above a normal conversational level to communicate with others within 3 to 5 feet away, hearing protection should be worn.

### **4.2 Excavation Areas and Other Soil Handling**

Personnel working in the areas of active excavation, but not operating heavy equipment, and any other personnel potentially contacting contaminated materials will be required to wear Modified Level D PPE. Modified Level D is defined as:

- Hardhat
- Eye protection
- Hearing protection (as warranted see above)
- Steel-toed work boots
- Tyvek Coveralls
- Disposable nitrile chemically resistant gloves

Level C PPE and Level B are not expected to be required.

## 5.0 SITE CONTROL

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with personal protective equipment requirements will be clearly identified with signage. Pedestrian traffic will be managed to the extent possible by the Contractor's Traffic and Pedestrian Control Plan.

The Contractor will designate a work zone and support zone as defined below.

### 5.1 Work Zone

Work zones on Site will be temporary or dynamic, encompassing the work area(s) actively being worked in on that particular day(s). Site personnel will be advised of the current work area(s) as part of site safety meetings. The Contractor will have a hydrant permit or other water source available to wet down exposed soils to control dust.

### 5.2 Support Zone

The support zone will consist of an area outside the areas of active excavation and soil handling, where equipment and support vehicles will be located. Eating, drinking and smoking will be permitted only in this area. Sanitary facilities will be located on Site. In addition, potable water and water and soap for hand washing will be available at the Site.

### 5.3 Other Site Control and Safety Measures

The following measures are designed to augment the specific health and safety guidelines provided in this plan. These issues will form the basis of the Site ordination and daily safety meetings discussed in **Section 7.0**, below.

- The Site hazards will be evaluated by the Client's Project Superintendent using the Site Safety Checklist.
- No one is to perform field work alone. Team members must be intimately familiar with the procedures for initiating an emergency response.
- Avoidance of contamination is of the utmost importance. Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces or materials. Walk around (not through) puddles and dis-colored surfaces. Do not kneel on the ground or set equipment on the ground.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited except in the support zone after proper decontamination as defined in **Section 6.0**.
- The use of alcohol or drugs is prohibited during the conduct of field operations.

- Safety equipment (PPE) will be required for all field personnel unless otherwise approved by the subcontractor's health and safety representatives and/or the Project Superintendent.

#### 5.4 Site Security

The Site shall be unoccupied during Site work except for Contractor personnel and subcontractors. If possible, access to the work areas during field work will be limited by closing site gates to reduce unauthorized pedestrian traffic. The Client's Project Superintendent is responsible for identifying the presence of all employees on Site.

Equipment left on Site during off hours must be locked, immobilized and/or otherwise secured to prevent theft or unauthorized use or access. The Contractor and subcontractors' employees will not be permitted on Site during off-hours without specific client approval.

### 6.0 DECONTAMINATION

Proper decontamination will be performed for personnel and equipment before leaving the Site. All solid waste generated during decontamination will be bagged by the Contractor personnel and stored on Site for disposal. Water will be disposed of by on-Site infiltration into soil within an exclusion zone.

#### 6.1 Personal Decontamination

Personal decontamination will be accomplished by following a systematic procedure of cleaning and removal of personal protective equipment (PPE). The Contractor will supply decontamination equipment to allow PPE to be brushed to remove gross contamination and then scrubbed clean in a detergent solution and then rinsed clean. To facilitate this, a three-basin wash system will be set up on site by the Contractor.

Disposable PPE, such as Tyvek coveralls, gloves, and hearing protection, etc. will be placed in trash bags in an on-Site container pending a disposal. Alternative chemical decontamination procedures, such as steam-cleaning reusable rubber outer boots, may be used if necessary.

Steps required in a decontamination sequence will depend on the level of protection worn in accordance with **Section 4.0**:

1. Remove and wipe clean hard hat
2. Brush boots and gloves of gross contamination
3. Scrub boots and gloves clean
4. Remove boot covers (if in use)
5. Rinse boots and gloves
6. Dry non-disposable equipment with paper towels
7. Remove Tyvek coveralls
8. Remove eye protection
9. Remove chemically resistant gloves



## 6.2 Equipment Decontamination

Hand tools and portable equipment will be decontaminated upon leaving the active excavation areas using the same procedures for personal decontamination. Wooden tools are difficult to decontaminate because they absorb chemicals. Wooden hand tools will be kept on Site for the project duration and handled only by protected workers. At the end of the Site activities, wooden tools will be discarded if they cannot be decontaminated properly.

Large Equipment will be decontaminated in an area near the entrance to the Site. Decontamination of large equipment will mitigate the risk of spreading potentially-contaminated soil off-Site. The Contractor will use a combination of long-handled brushes, rods and shovels for general exterior cleaning and dislodging contaminated soil caught in tires and the undersides of vehicles and equipment.

Prior to leaving the Site, large equipment will be inspected to assure that excess material has not adhered to the equipment. If needed, the Contractor will clean the large equipment, including washing tires and undercarriages with a hose to remove excess adhered soil prior to leaving the Site.

Exposed excavated material will be covered on each truck after loading. The cover will be secured and remain in place until the container has reached the disposal facility.

## 7.0 MEDICAL MONITORING AND TRAINING REQUIREMENTS

Training records for Site personnel and subcontractors shall be provided by the Contractor prior to on-Site work and will be maintained on Site.

### 7.1 Medical Monitoring

Excavation areas and general Site work it is anticipated that respiratory protection is not required by the levels of soil contamination. Therefore, only the workers excavating the hazardous lead areas will require medical monitoring requirements on this project.

### 7.2 Training

All personnel covered by this HASP must have completed the appropriate training requirements specified in 29 CFR 1910.1200 Hazard Communication and 29 CFR 1910.120(e).

Workers requiring access to the excavation (laborers and operators) prior to completion of soil remedial activities will require 40-hour HAZWOPER training due to the presence of hazardous lead, mercury and barium in soil and the potential for gasoline contaminated soils.

Also, at least one Contractor employee must be on Site during all activities to act as the Site Foreman and will be responsible for identifying existing and predictable hazards in surroundings

or working conditions that are unsanitary, hazardous, or dangerous to Site workers and or the community, and will have the authorization to take prompt corrective measures to eliminate them. This individual must have documentation of at least three days of supervised field experience as well as completion of the specified 8-hour training course for managers and supervisors. Records of certifications and training should be kept by the Contractor.

### 7.3 Subcontractors

Subcontractors will be required to provide to the Contractor Project (Site) Manager specific written documentation that each individual assigned to this project has completed the medical monitoring and training requirements specified above. This information must be provided prior to their performing any work on site.

### 7.4 Site Safety Meetings

Prior to the commencement of on-Site investigative activities, a Site safety meeting will be held to review the specific requirements of this HASP. Sign-off sheets will be collected at this meeting (see **Attachment A**). Short safety refresher meetings will be conducted daily or as conditions or work activates change. In addition, the Project Superintendent will document that Site visitors have had the required training in accordance with 29 CFR 1910.120 and will provide documented pre-entry safety briefings.

## 8.0 EMERGENCY ACTION PLAN

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." The Contractor personnel covered by this CHASP may not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). The Contractor response actions will be limited to evacuation and medical/first aid as described within this Section, below.

The basic elements of an emergency evacuation plan include employee training, alarm systems, escape routes, escape procedures, critical operations or equipment, rescue and medical duty assignments, designation of responsible parties, emergency reporting procedures, and methods to account for all employees after evacuation.

### 8.1 Employee Information

General training regarding emergency evacuation procedures are included in the Contractor initial and refresher training courses. Also, as described, employees must be instructed in the specific aspects of emergency evacuation applicable to the Site as part of the site safety meeting prior to the commencement of all on-site activities. On-Site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed. This information

will be provided during the Site safety meetings (see Section 7.4) will be documented by the Contractor.

## 8.2 Emergency Signal and Alarm Systems

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial Site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment, trucks, etc.) and anytime a clear line-of-sight cannot be easily maintained amongst all personnel because of distance, terrain or other obstructions. The Contractor will maintain an air horn (or whistle) on-Site that will be used to signal an emergency so that it can be heard over other construction noises on-Site.

## 8.3 Emergency Contacts

Police:	911
Fire:	911
Ambulance:	911
Woodhull Medical Center:	(718) 963-8000

## 8.4 Hospital Location

The Brooklyn Hospital Center is located at 121 Dekalb Avenue, Brooklyn, NY. The most direct route to the hospital from the Site is to head southwest on Nevins Street toward State Street, turn left at the 1<sup>st</sup> cross street onto State Street, turn left at the 1<sup>st</sup> cross street onto 3<sup>rd</sup> Avenue (3<sup>rd</sup> Avenue turns slightly right and becomes Lafayette Avenue), turn left onto Ashland Place, and arrive at the hospital on the right. **Attachment B** presents a hospital route map.

## 8.5 Incident Reporting Procedures

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be initiated as soon as emergency conditions are under control. The purpose of this investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided.

The investigation should begin while details are still fresh in the mind of anyone involved. The person administering first aid may be able to start the fact gathering process if the injured can speak. Pertinent facts must be determined. Questions beginning with who, what, when, where, and how are usually most effective to discover ways to improve job performance in terms of efficiency and quality of work, as well as safety and health concerns.

**ATTACHMENT H-A**

**HEALTH AND SAFETY BRIEFING**

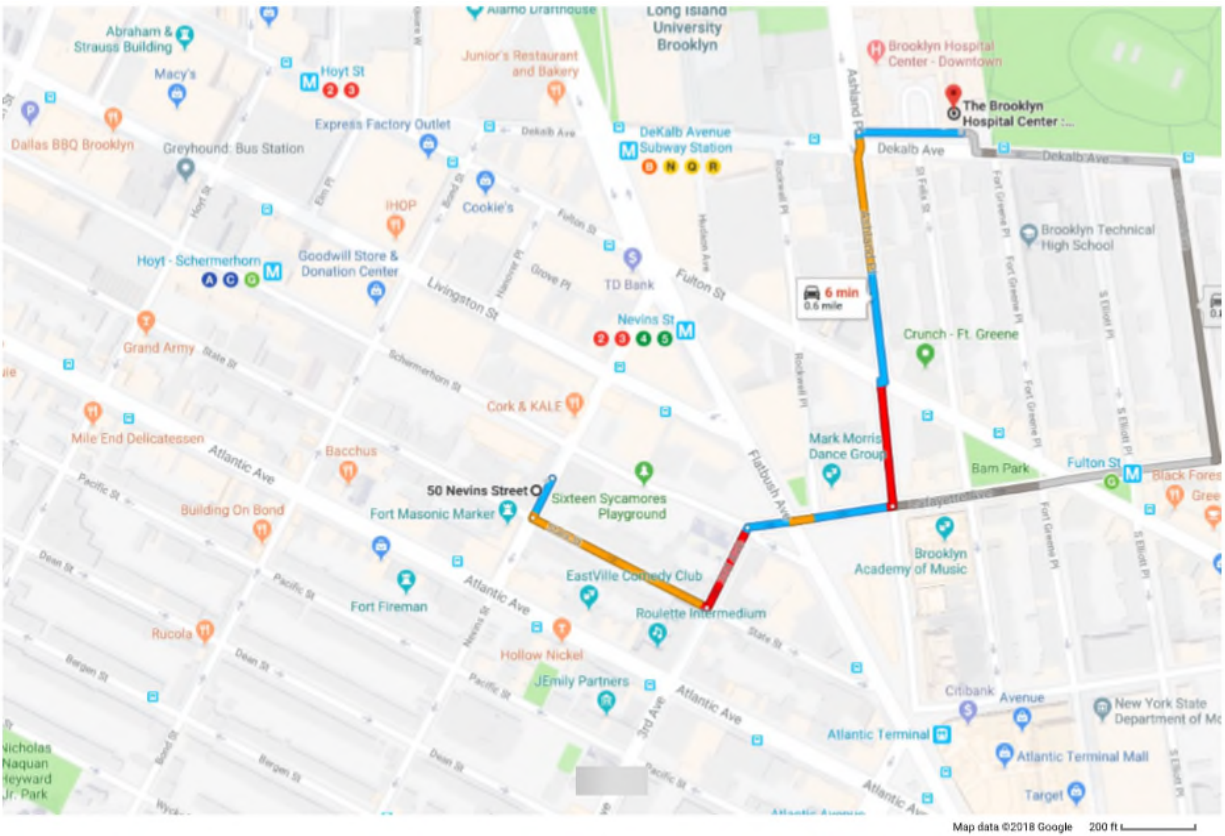
This is to verify that I, the undersigned, have been provided with a site (orientation) briefing, including hazard communication, regarding the safety and health considerations at the 50 Nevins Street in the Brooklyn, New York (Site). I agree to abide by my employer's Site-specific safety and health plan and other safety or health requirements applicable to the Site.

Date

[illegible]

## Health and Safety Briefing/Site Orientation Record

**ATTACHMENT H-B**  
**ROUTE TO HOSPITAL**



## 50 Nevins St

Brooklyn, NY 11217

- ↑ 1. Head southwest on Nevins St toward State St  
138 ft
- ↶ 2. Turn left at the 1st cross street onto State St  
0.1 mi
- ↶ 3. Turn left at the 1st cross street onto 3rd Ave  
279 ft
- ↷ 4. 3rd Ave turns slightly right and becomes Lafayette Ave  
449 ft
- ↶ 5. Turn left onto Ashland Pl  
0.2 mi
- ↷ 6. Turn right toward Brooklyn Hospital  
230 ft
- ↶ 7. Turn left onto Brooklyn Hospital  
118 ft

[Destination will be on the right](#)

## Brooklyn Hospital Center: Pierce Walter MD

121 Dekalb Ave, Brooklyn, NY 11201



**ATTACHMENT H-C**

**MATERIAL SAFETY DATA SHEETS**

## SAFETY DATA SHEET

Version 5.3  
Revision Date 01/02/2015  
Print Date 11/10/2018

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : 4,4'-DDE

Product Number : 35487

Brand : Sigma-Aldrich

CAS-No. : 72-55-9

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

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Acute toxicity, Oral (Category 4), H302  
Carcinogenicity (Category 2), H351  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H302

Harmful if swallowed.

H351

Suspected of causing cancer.

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.

P264

Wash skin thoroughly after handling.

P270

Do not eat, drink or smoke when using this product.

P273

Avoid release to the environment.

P281

Use personal protective equipment as required.

P301 + P312	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P330	Rinse mouth.
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 : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene

Formula : C<sub>14</sub>H<sub>8</sub>Cl<sub>4</sub>

Molecular weight : 318.03 g/mol

CAS-No. : 72-55-9

EC-No. : 200-784-6

#### Hazardous components

Component	Classification	Concentration
<b>2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene</b>		
	Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H410	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

## 5.4 Further information

No data available

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## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

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

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## 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

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	88.0 - 90.0 °C (190.4 - 194.0 °F)
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	< 0.00001 hPa (< 0.00001 mmHg)
l) Vapour density	No data available
m) Relative density	No data available
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	log Pow: 6.51
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

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**10. STABILITY AND REACTIVITY****10.1 Reactivity**

No data available

**10.2 Chemical stability**

Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**

No data available

**10.4 Conditions to avoid**

No data available

**10.5 Incompatible materials**

Strong oxidizing agents, Strong bases

## 10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - 880.0 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 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.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

#### Reproductive toxicity

No data available

No data available

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

No data available

#### Aspiration hazard

No data available

#### Additional Information

RTECS: Not available

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

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## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish                      LC50 - Lepomis macrochirus (Bluegill) - 0.2 - 0.3 mg/l - 96.0 h  
   LC50 - Oncorhynchus mykiss (rainbow trout) - 0.03 - 0.04 mg/l - 96.0 h  
   LC50 - Salmo salar (Atlantic salmon) - 0.05 - 0.18 mg/l - 96.0 h

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

Bioaccumulation                      Gambusia affinis (Mosquito fish) - 33 d  
   - 3.84 µg/l

Bioconcentration factor (BCF): 12,037

### 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.

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## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 3077                      Class: 9                                      Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant:yes  
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. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)  
Marine pollutant:yes

### IATA

UN number: 3077                      Class: 9                                      Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)

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## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components



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

#### **SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

#### **Massachusetts Right To Know Components**

No components are subject to the Massachusetts Right to Know Act.

#### **Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	1993-04-24

#### **New Jersey Right To Know Components**

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	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
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	2010-06-11

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	2010-06-11

---

## **16. OTHER INFORMATION**

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

#### **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**

Copyright 2014 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://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: 01/02/2015

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 5.6  
Revision Date 05/07/2018  
Print Date 11/10/2018

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**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : 4,4'-DDT

Product Number : 386340  
Brand : Aldrich  
Index-No. : 602-045-00-7

CAS-No. : 50-29-3

**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)

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**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, Dermal (Category 3), H311  
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)

H301 + H311

Toxic 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.
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.
P281	Use personal protective equipment as required.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P361	Remove/Take off immediately all contaminated clothing.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms : 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane  
1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane

Formula : C<sub>14</sub>H<sub>9</sub>Cl<sub>5</sub>  
Molecular weight : 354.49 g/mol  
CAS-No. : 50-29-3  
EC-No. : 200-024-3  
Index-No. : 602-045-00-7

#### Hazardous components

Component	Classification	Concentration
<b>1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane</b>		
	Acute Tox. 3; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H301 + H311, H351, H372, H410	90 - 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

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

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

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

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## 5. FIREFIGHTING MEASURES

- 5.1 Extinguishing media**  
**Suitable extinguishing media**  
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
- 5.2 Special hazards arising from the substance or mixture**  
No data available
- 5.3 Advice for firefighters**  
Wear self-contained breathing apparatus for firefighting if necessary.
- 5.4 Further information**  
No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

- 6.1 Personal precautions, protective equipment and emergency procedures**  
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.  
For personal protection see section 8.
- 6.2 Environmental precautions**  
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
- 6.3 Methods and materials for containment and cleaning up**  
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.
- 6.4 Reference to other sections**  
For disposal see section 13.

---

## 7. HANDLING AND STORAGE

- 7.1 Precautions for safe handling**  
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.  
Provide appropriate exhaust ventilation at places where dust is formed.  
For precautions see section 2.2.
- 7.2 Conditions for safe storage, including any incompatibilities**  
Keep container tightly closed in a dry and well-ventilated place.  
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects
- 7.3 Specific end use(s)**  
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	TWA	1 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	1 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: 107 - 110 °C (225 - 230 °F) - lit.
f) Initial boiling point and boiling range	260.0 °C (500.0 °F)
g) Flash point	72.0 - 77.0 °C (161.6 - 170.6 °F)
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	0.0000021 hPa (0.0000016 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	0.99 g/cm <sup>3</sup>
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	log Pow: 6.91
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

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## 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

Oxidizing agents, Iron and iron salts.

### 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



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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - 87.0 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 300.0 mg/kg

Remarks: Behavioral:Tremor. Behavioral:Muscle weakness. Behavioral:Ataxia.

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

Limited evidence of carcinogenicity in animal studies

IARC: 2A - Group 2A: Probably carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

IARC: 2A - Group 2A: Probably carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

#### Reproductive toxicity

No data available

No data available

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

Ingestion - Causes damage to organs through prolonged or repeated exposure.

#### Aspiration hazard

No data available

#### Additional Information

RTECS: KJ3325000

CNS stimulation.

Pancreas. -

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.01 mg/l - 96.0 h LC50 - Lepomis macrochirus (Bluegill) - 0.01 mg/l - 96.0 h LC50 - Oncorhynchus mykiss (rainbow trout) - 0.003400 mg/l - 96.0 h LOEC - Oncorhynchus mykiss (rainbow trout) - 150 mg/l - 3.0 d NOEC - Oncorhynchus mykiss (rainbow trout) - 113 mg/l - 3.0 d
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 0.00108 mg/l - 48 h
Toxicity to algae	LC100 - Scenedesmus quadricauda (Green algae) - > 20 mg/l - 7 d

### 12.2 Persistence and degradability

### 12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 20 d - 0.001 mg/l
Bioconcentration factor (BCF):	46,670

### 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.

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## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 2811      Class: 6.1      Packing group: III  
Proper shipping name: Toxic solids, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)  
Reportable Quantity (RQ): 1 lbsMarine pollutant:yes  
Poison Inhalation Hazard: No

### IMDG

UN number: 2811      Class: 6.1      Packing group: III      EMS-No: F-A, S-A  
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)  
Marine pollutant:yes

### IATA

UN number: 2811      Class: 6.1      Packing group: III  
Proper shipping name: Toxic solid, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

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## 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

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	CAS-No. 50-29-3	Revision Date 1993-02-16
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1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	CAS-No. 50-29-3	Revision Date 1993-02-16
---	--------------------	-----------------------------

### Pennsylvania Right To Know Components

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	CAS-No. 50-29-3	Revision Date 1993-02-16
---	--------------------	-----------------------------

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	CAS-No. 50-29-3	Revision Date 1993-02-16
---	--------------------	-----------------------------

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	CAS-No. 50-29-3	Revision Date 1993-02-16
---	--------------------	-----------------------------

### New Jersey Right To Know Components

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	CAS-No. 50-29-3	Revision Date 1993-02-16
---	--------------------	-----------------------------

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	CAS-No. 50-29-3	Revision Date 1993-02-16
---	--------------------	-----------------------------

### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No. 50-29-3	Revision Date 2008-06-17
---	--------------------	-----------------------------

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	CAS-No. 50-29-3	Revision Date 2008-06-17
---	--------------------	-----------------------------

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No. 50-29-3	Revision Date 2008-06-17
---	--------------------	-----------------------------

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	CAS-No. 50-29-3	Revision Date 2008-06-17
---	--------------------	-----------------------------

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane

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## 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	Toxic if swallowed.
H301 + H311	Toxic if swallowed or in contact with skin.
H311	Toxic 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:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

#### NFPA Rating

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

#### Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.  
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://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: 05/07/2018

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 4.5  
Revision Date 03/02/2015  
Print Date 05/24/2016

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**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Barium

Product Number : 237094  
Brand : Aldrich

CAS-No. : 7440-39-3

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

Identified uses : Laboratory chemicals, 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)**

Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

Skin irritation (Category 2), H315

Eye irritation (Category 2A), H319

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

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

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word

Danger

Hazard statement(s)

H261

In contact with water releases flammable gases.

H315

Causes skin irritation.

H319

Causes serious eye irritation.

H335

May cause respiratory irritation.

Precautionary statement(s)

P223

Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231 + P232

Handle under inert gas. Protect from moisture.

P261

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

P264

Wash skin thoroughly after handling.

P271

Use only outdoors or in a well-ventilated area.

P280	Wear protective gloves/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
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	: Ba
Molecular weight	: 137.33 g/mol
CAS-No.	: 7440-39-3
EC-No.	: 231-149-1

#### Hazardous components

Component	Classification	Concentration
<b>Barium</b>		
	Water-react. 2; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H261, H315, H319, H335	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

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

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

Dry powder

### 5.2 Special hazards arising from the substance or mixture

Barium oxide

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

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

Never allow product to get in contact with water during storage.

Store under inert gas.

Storage class (TRGS 510): Hazardous materials, which set free flammable gases upon contact with water

### 7.3 Specific end use(s)

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

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Barium	7440-39-3	TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen		



		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Eye irritation Muscular stimulation Skin irritation Gastrointestinal irritation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. NIOSH Recommended Exposure Limits

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

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use 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: Rods

	Colour: grey
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 725 °C (1,337 °F) - lit.
f) Initial boiling point and boiling range	1,640 °C (2,984 °F) - lit.
g) Flash point	Not applicable
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	No data available
l) Vapour density	No data available
m) Relative density	3.6 g/mL at 25 °C (77 °F)
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Reacts violently with water.

### 10.4 Conditions to avoid

Exposure to moisture

### 10.5 Incompatible materials

Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO<sub>2</sub>), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

### 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

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

#### Reproductive toxicity

No data available

No data available

#### Specific target organ toxicity - single exposure

Inhalation - May cause respiratory irritation.

#### Specific target organ toxicity - repeated exposure

No data available

#### Aspiration hazard

No data available

#### Additional Information

RTECS: CQ8370000

Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96 h

## 12.2 Persistence and degradability

No data available

## 12.3 Bioaccumulative potential

No data available

## 12.4 Mobility in soil

No data available

## 12.5 Results of PBT and vPvB assessment

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

## 12.6 Other adverse effects

No data available

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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: 1400 Class: 4.3

Packing group: II

Proper shipping name: Barium

Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1400 Class: 4.3

Packing group: II

EMS-No: F-G, S-O

Proper shipping name: BARIUM

### IATA

UN number: 1400 Class: 4.3

Packing group: II

Proper shipping name: Barium

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

### SARA 311/312 Hazards

Reactivity Hazard, Acute Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
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**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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**16. OTHER INFORMATION****Full text of H-Statements referred to under sections 2 and 3.**

Eye Irrit.	Eye irritation
H261	In contact with water releases flammable gases.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

**HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	1

**NFPA Rating**

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	1
Special hazard.I:	W

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://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: 4.5

Revision Date: 03/02/2015

Print Date: 05/24/2016

## SAFETY DATA SHEET

Version 5.4

Revision Date 07/24/2015

Print Date 05/01/2016

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Benzene

Product Number : 12540  
Brand : Sigma-Aldrich  
Index-No. : 601-020-00-8

CAS-No. : 71-43-2

## 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  
USATelephone : +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)**Flammable liquids (Category 2), H225  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Germ cell mutagenicity (Category 1B), H340  
Carcinogenicity (Category 1A), H350  
Specific target organ toxicity - repeated exposure (Category 1), H372  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 3), H412

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H225 : Highly flammable liquid and vapour.  
H304 : May be fatal if swallowed and enters airways.  
H315 : Causes skin irritation.  
H319 : Causes serious eye irritation.  
H340 : May cause genetic defects.  
H350 : May cause cancer.

H372	Causes damage to organs through prolonged or repeated exposure.
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.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
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	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
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.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>6</sub> H <sub>6</sub>
Molecular weight	: 78.11 g/mol
CAS-No.	: 71-43-2
EC-No.	: 200-753-7
Index-No.	: 601-020-00-8
Registration number	: 01-2119447106-44-XXXX

#### Hazardous components

Component	Classification	Concentration
<b>Benzene</b>		
	Flam. Liq. 2; Skin Irrit. 2; Eye Irrit. 2A; Muta. 1B; Carc. 1A; STOT RE 1; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H225, H304, H315, H319, H340, H350, H372, H412	<= 100 %

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



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## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

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

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

Carbon oxides

Flash back possible over considerable distance., Container explosion may occur under fire conditions.

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

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
Benzene	71-43-2	TWA	0.5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen Danger of cutaneous absorption		
		STEL	2.5 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen Danger of cutaneous absorption		
		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		Peak	50 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		See 1910.1028. See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028 The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.		
		TWA	0.1 ppm	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		ST	1 ppm	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

**Biological occupational exposure limits**

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzene	71-43-2	S-Phenylmercapturic acid	0.0300 mg/g	In urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		t,t-Muconic acid	0.5000 mg/g	In urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

**8.2 Exposure controls****Appropriate engineering controls**

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

**Personal protective equipment****Eye/face protection**

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

**Skin protection**

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

**Full contact**

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

**Splash contact**

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

**Body Protection**

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

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

a) Appearance	Form: liquid Colour: clear, colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 5.5 °C (41.9 °F)
f) Initial boiling point and boiling range	80 °C (176 °F)
g) Flash point	-10.99 °C (12.22 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 8 %(V) Lower explosion limit: 1.3 %(V)
k) Vapour pressure	221.3 hPa (166.0 mmHg) at 37.7 °C (99.9 °F) 99.5 hPa (74.6 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	0.874 g/mL at 25 °C (77 °F)
n) Water solubility	ca.1.88 g/l at 23.5 °C (74.3 °F) - soluble
o) Partition coefficient: n-octanol/water	log Pow: 2.13 at 25 °C (77 °F)
p) Auto-ignition temperature	562.0 °C (1,043.6 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

### 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

acids, Bases, Halogens, Strong oxidizing agents, Metallic salts

## 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 - male - > 5,960 mg/kg  
(OECD Test Guideline 401)

LC50 Inhalation - Rat - female - 4 h - 43.7 mg/l  
(OECD Test Guideline 403)

LD50 Dermal - Rabbit - 8,263 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 4 h  
(OECD Test Guideline 404)

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Eye irritation

#### Respiratory or skin sensitisation

Maximisation Test (GPMT) - Guinea pig

Result: Does not cause skin sensitisation.

#### Germ cell mutagenicity

Laboratory experiments have shown mutagenic effects.

In vivo tests showed mutagenic effects

Chinese hamster lung cells

Result: positive

OECD Test Guideline 475

Mouse - male

Result: positive

#### Carcinogenicity

Carcinogenicity - Human - male - Inhalation

Tumorigenic: Carcinogenic by RTECS criteria. Leukaemia Blood: Thrombocytopenia.

Carcinogenicity - Rat - Oral

Tumorigenic: Carcinogenic by RTECS criteria. Endocrine: Tumors. Leukaemia

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

Human carcinogen.

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

NTP: Known to be human carcinogen (Benzene)

OSHA: OSHA specifically regulated carcinogen (Benzene)

#### Reproductive toxicity

Reproductive toxicity - Mouse - Intraperitoneal

Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Rat - Inhalation

Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Developmental Toxicity - Mouse - Inhalation

Effects on Embryo or Fetus: Cytological changes (including somatic cell genetic material). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

May be fatal if swallowed and enters airways.

**Additional Information**

Repeated dose                      Rat - male and female - Oral - NOAEL : 100 mg/kg - OECD Test Guideline 408 toxicity

RTECS: CY1400000

Nausea, Dizziness, Headache, narcosis, Inhalation of high concentrations of benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation and/or giddiness, depression, drowsiness, or fatigue. The victim may experience tightness in the chest, breathlessness, and loss of consciousness. Tremors, convulsions, and death due to respiratory paralysis or circulatory collapse can occur in a few minutes to several hours following severe exposures. Aspiration of small amounts of liquid immediately causes pulmonary edema and hemorrhage of pulmonary tissue. Direct skin contact may cause erythema. Repeated or prolonged skin contact may result in drying, scaling dermatitis, or development of secondary skin infections. The chief target organ is the hematopoietic system. Bleeding from the nose, gums, or mucous membranes and the development of purpuric spots, pancytopenia, leukopenia, thrombocytopenia, aplastic anemia, and leukemia may occur as the condition progresses. The bone marrow may appear normal, aplastic or hyperplastic, and may not correlate with peripheral blood-forming tissues. The onset of effects of prolonged benzene exposure may be delayed for many months or years after the actual exposure has ceased., Blood disorders

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) - 15.00 - 32.00 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates                      EC50 - Ceriodaphnia dubia (water flea) - 17.2 mg/l - 48 h

Toxicity to algae                      Growth inhibition EC50 - Pseudokirchneriella subcapitata (green algae) - 100 mg/l - 72 h (OECD Test Guideline 201)

### 12.2 Persistence and degradability

Biodegradability                      aerobic - Exposure time 28 d  
Result: 96 % - Readily biodegradable (OECD Test Guideline 301F)

### 12.3 Bioaccumulative potential

Bioaccumulation                      Leuciscus idus (Golden orfe) - 3 d  
- 0.05 mg/l

Bioconcentration factor (BCF): 10

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

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

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life with long lasting effects.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1114      Class: 3      Packing group: II  
Proper shipping name: Benzene  
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1114      Class: 3      Packing group: II      EMS-No: F-E, S-D  
Proper shipping name: BENZENE

### IATA

UN number: 1114      Class: 3      Packing group: II  
Proper shipping name: Benzene

---

## 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
Benzene	71-43-2	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzene	71-43-2	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzene	71-43-2	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Benzene	71-43-2	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
Benzene	71-43-2	2009-02-01

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

	CAS-No.	Revision Date
Benzene	71-43-2	2009-02-01



---

## 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
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H340	May cause genetic defects.
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

### HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

### NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

### Further information

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### Preparation Information

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

Version: 5.4

Revision Date: 07/24/2015

Print Date: 05/01/2016

## SAFETY DATA SHEET

Version 5.9

Revision Date 05/07/2018

Print Date 11/10/2018

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Benz[a]anthracene

Product Number : B2209  
Brand : Aldrich  
Index-No. : 601-033-00-9

CAS-No. : 56-55-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

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

## 1.4 Emergency telephone number

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

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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.

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

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**3. COMPOSITION/INFORMATION ON INGREDIENTS****3.1 Substances**

Synonyms : 1,2-Benzanthracene  
Tetraphene

Formula : C<sub>18</sub>H<sub>12</sub>  
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
<b>Benz[a]anthracene</b>		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	90 - 100 %

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

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**4. FIRST AID MEASURES****4.1 Description of first aid measures****General advice**

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

**If inhaled**

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

**In case of skin contact**

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

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**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

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

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

No data available

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### 6. ACCIDENTAL RELEASE MEASURES

#### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

#### 6.2 Environmental precautions

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

#### 6.3 Methods and materials for containment and cleaning up

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

#### 6.4 Reference to other sections

For disposal see section 13.

---

### 7. HANDLING AND STORAGE

#### 7.1 Precautions for safe handling

Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

#### 7.2 Conditions for safe storage, including any incompatibilities

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

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

#### 7.3 Specific end use(s)

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

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### 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: Dermatrill® (KCL 740 / Aldrich Z677272, Size M)

###### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

#### **Body Protection**

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

#### **Respiratory protection**

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

#### **Control of environmental exposure**

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

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## **9. PHYSICAL AND CHEMICAL PROPERTIES**

### **9.1 Information on basic physical and chemical properties**

- |   |  |
|---|--|
| 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

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## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

Other decomposition products - No data available

In the event of fire: see section 5

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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - > 200 mg/kg

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

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

Possible human carcinogen

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

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

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

No component of this product present at levels greater than or equal to 0.1% is on OSHA's

list of regulated carcinogens.

**Reproductive toxicity**

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: Not available

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

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**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.

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**13. DISPOSAL CONSIDERATIONS**

**13.1 Waste treatment methods**

**Product**

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

**Contaminated packaging**

Dispose of as unused product.

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**14. TRANSPORT INFORMATION**

**DOT (US)**

Not dangerous goods

**IMDG**

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

**IATA**

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



**Further information**

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

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**15. REGULATORY INFORMATION****SARA 302 Components**

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

**SARA 313 Components**

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

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

**SARA 311/312 Hazards**

Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	2007-09-28

WARNING! This product contains a chemical known to the State of California to cause cancer.

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	2007-09-28

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**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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**Preparation Information**

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

Version: 5.9

Revision Date: 05/07/2018

Print Date: 11/10/2018

## SAFETY DATA SHEET

Revision Date 19-Jan-2018

Revision Number 3

### 1. Identification

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

**Cat No. :** AC105600010; AC105601000

**CAS-No** 50-32-8  
**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.** Cancer - <https://www.p65warnings.ca.gov/>.

### 3. Composition/Information on Ingredients

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

### 4. First-aid measures

<b>Eye Contact</b>	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
<b>Skin Contact</b>	Wash off immediately with plenty of water for at least 15 minutes.
<b>Inhalation</b>	Move to fresh air.
<b>Ingestion</b>	Do not induce vomiting.
<b>Most important symptoms and effects</b>	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
<b>Notes to Physician</b>	Treat symptomatically

### 5. Fire-fighting measures

<b>Unsuitable Extinguishing Media</b>	No information available
<b>Flash Point</b>	
<b>Method -</b>	No information available
<b>Autoignition Temperature</b>	No information available

**Explosion Limits**

<b>Upper</b>	No data available
<b>Lower</b>	No data available
<b>Sensitivity to Mechanical Impact</b>	No information available
<b>Sensitivity to Static Discharge</b>	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**  
2

**Flammability**  
0

**Instability**  
0

**Physical hazards**  
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.

Up

**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/m <sup>3</sup>		

**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
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#### 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
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<b>Reproductive Effects</b>	No information available.
<b>Developmental Effects</b>	No information available.
<b>Teratogenicity</b>	No information available.
<b>STOT - single exposure</b>	None known
<b>STOT - repeated exposure</b>	None known
<b>Aspiration hazard</b>	No information available
<b>Symptoms / effects, both acute and delayed</b>	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
<b>Endocrine Disruptor Information</b>	No information available

Component	EU - Endocrine Disruptors 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 See section 2 for more information

**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** 19-Jan-2018

**Print Date** 19-Jan-2018

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

**Disclaimer**

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

**End of SDS**

## SAFETY DATA SHEET

Version 5.7  
Revision Date 03/09/2018  
Print Date 11/10/2018

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Benzo[b]fluoranthene

Product Number : 275336  
Brand : Aldrich  
Index-No. : 601-034-00-4

CAS-No. : 205-99-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
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)

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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.

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none****3. COMPOSITION/INFORMATION ON INGREDIENTS****3.1 Substances**

Synonyms : 3,4-Benzofluoranthene  
Benz[e]acephenanthrylene  
2,3-Benzfluoranthene  
3,4-Benz[e]acephenanthrylene  
Benzo[b]fluoranthene  
Benzo[e]fluoranthene  
NSC 89265

Formula : C<sub>20</sub>H<sub>12</sub>  
Molecular weight : 252.31 g/mol  
CAS-No. : 205-99-2  
EC-No. : 205-911-9  
Index-No. : 601-034-00-4

**Hazardous components**

Component	Classification	Concentration
<b>Benz[e]acephenanthrylene</b>		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	90 - 100 %

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

**4. FIRST AID MEASURES****4.1 Description of first aid measures****General advice**

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

**If inhaled**

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

**In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

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

**4.2 Most important symptoms and effects, both acute and delayed**

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

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

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

## 5.2 Special hazards arising from the substance or mixture

No data available

## 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

## 5.4 Further information

No data available

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## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

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## 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): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

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

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Contains no substances with occupational exposure limit values.				
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
Benz[e]acephenanthrylene	205-99-2	PEL	0.2 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Hazardous components without workplace control parameters

**Biological occupational exposure limits**

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		3-hydroxybenzo(a)pyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

**8.2 Exposure controls****Appropriate engineering controls**

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

**Personal protective equipment****Eye/face protection**

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: Dermatrill® (KCL 740 / Aldrich Z677272, Size M)

**Splash contact**

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

**Body Protection**

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

**Respiratory protection**

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

**Control of environmental exposure**

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

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

- a) Appearance                      Form: solid

b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 163 - 165 °C (325 - 329 °F) - lit.
f) Initial boiling point and boiling range	No data available
g) Flash point	No data available
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	No data available
l) Vapour density	No data available
m) Relative density	No data available
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

## 9.2 Other safety information

No data available

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## 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

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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

TDLo Oral - Mouse - 7.57 mg/kg

Remarks: Liver:Changes in liver weight. Endocrine:Changes in thymus weight.

Inhalation: No data available

Dermal: No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

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

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[e]acephenanthrylene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[e]acephenanthrylene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

#### Reproductive toxicity

No data available

No data available

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

No data available

#### Aspiration hazard

No data available

#### Additional Information

RTECS: Not available

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

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

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## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates      Immobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h

## 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.

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## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

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## 14. TRANSPORT INFORMATION

### DOT (US)

Not dangerous goods

### IMDG

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

### IATA

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

### Further information

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

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## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

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

### SARA 311/312 Hazards

Chronic Health Hazard

### Massachusetts Right To Know Components

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

### Pennsylvania Right To Know Components

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



Benz[e]acephenanthrylene

CAS-No.  
205-99-2

Revision Date  
2007-03-01

#### New Jersey Right To Know Components

Benz[e]acephenanthrylene

CAS-No.  
205-99-2

Revision Date  
2007-03-01

#### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

Benz[e]acephenanthrylene

CAS-No.  
205-99-2

Revision Date  
2007-09-28

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

### NFPA Rating

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

### Further information

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### Preparation Information

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

Version: 5.7

Revision Date: 03/09/2018

Print Date: 11/10/2018



## Safety Data Sheet

Revision Date: 06/15/18

www.restek.com

2 Letter ISO country code/language code: US/EN

### 1. IDENTIFICATION

<b>Catalog Number / Product Name:</b>	<b>31274 / Benzo(k)fluoranthene Standard</b>
<b>Company:</b>	Restek Corporation
<b>Address:</b>	110 Benner Circle Bellefonte, Pa. 16823
<b>Phone#:</b>	814-353-1300
<b>Fax#:</b>	814-353-1309
<b>Emergency#:</b>	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
<b>Email:</b>	www.restek.com
<b>Revision Number:</b>	11
<b>Intended use:</b>	For Laboratory use only

### 2. HAZARD(S) IDENTIFICATION

#### Emergency Overview:

GHS Hazard  
Symbols:



**GHS Classification:** Carcinogenicity Category 1B  
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.  
May cause cancer.

**GHS Precautions:**

**Safety Precautions:** Obtain special instructions before use.  
Do not handle until all safety precautions have been read and understood.  
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.  
Ground/bond container and receiving equipment.  
Use explosion-proof electrical/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.  
IF exposed or concerned: Get medical advice/attention.  
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:** Specific target organ toxicity - Single exposure - STOT SE 3: H336 May cause drowsiness or dizziness.

**Repeated Exposure Target Organs:** No data available

### 3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.9
benzo (k) fluoranthene	207-08-9	205-916-6	0.1

### 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. 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 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

<b>Handling Technical Measures and Precautions:</b>	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
<b>Storage Technical Measures and Conditions:</b>	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)	750 ppm STEL; 1782 mg/m3 STEL	500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (k) fluoranthene	207-08-9	Not established	None Known	Not established	No data available

### Personal Protection:

#### Engineering Measures:

Local exhaust ventilation is recommended when generating excessive levels of vapours 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

<b>Appearance, color:</b>	Depends upon product selection
<b>Odor:</b>	Strong
<b>Physical State:</b>	No data available
<b>pH:</b>	Not applicable
<b>Vapor Pressure:</b>	No data available
<b>Vapor Density:</b>	2.0 (air = 1)
<b>Boiling Point (°C):</b>	480 °C 56.05 °C at 1013.25 hPa
<b>Melting Point (°C):</b>	-95.4 °C Melting Point
<b>Flash Point (°F):</b>	39
<b>Flammability:</b>	Highly Flammable
<b>Upper Flammable/Explosive Limit, % in air:</b>	No data available
<b>Lower Flammable/Explosive Limit, % in air:</b>	No data available
<b>Autoignition Temperature (°C):</b>	465 deg C
<b>Decomposition Temperature (°C):</b>	No data available
<b>Specific Gravity:</b>	0.7845 g/cm3 at 25 °C
<b>Evaporation Rate:</b>	No data available
<b>Odor Threshold:</b>	ND
<b>Solubility:</b>	Complete; 100%
<b>Partition Coefficient: n-octanol in water:</b>	No data available
<b>VOC % by weight:</b>	0
<b>Molecular Weight:</b>	58.08

## 10. STABILITY AND REACTIVITY

<b>Stability:</b>	Stable under normal conditions.
<b>Conditions to Avoid:</b>	None known.
<b>Materials to Avoid / Chemical Incompatibility:</b>	Strong oxidizing agents Strong acids
<b>Hazardous Decomposition Products:</b>	Carbon dioxide Carbon monoxide

## 11. TOXICOLOGICAL INFORMATION

<b>Routes of Entry:</b>	Inhalation, Skin Contact, Eye Contact, Ingestion
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**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; Inhalation LC50 Rat 50100 mg/m <sup>3</sup> 8 h; Oral LD50 Rat 5800 mg/kg

**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.
Monograph 92 [2010]; Supplement 7 [1987]; Monograph 32 [1983]	207-08-9	Group 2B

**12. ECOLOGICAL INFORMATION**

<b>Overview:</b>	This material is not expected to be harmful to the ecology.
<b>Mobility:</b>	No data
<b>Persistence:</b>	No data
<b>Bioaccumulation:</b>	No data
<b>Degradability:</b>	No data
<b>Ecological Toxicity Data:</b>	No data available

**13. DISPOSAL CONSIDERATIONS**

<b>Waste Description of Spent Product:</b>	Spent or discarded material is a hazardous waste. Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.
<b>Disposal Methods:</b>	Dispose of by incineration following Federal, State, Local,

**Waste Disposal of Packaging:**

or Provincial regulations.  
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**

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:** 12/30/16

**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

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## 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<sub>18</sub>H<sub>12</sub>  
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
<b>Chrysene</b>		
	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
<b>Pennsylvania Right To Know Components</b>		
Chrysene	CAS-No. 218-01-9	Revision Date 1994-04-01
<b>New Jersey Right To Know Components</b>		
Chrysene	CAS-No. 218-01-9	Revision Date 1994-04-01
<b>California Prop. 65 Components</b>		
WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No. 218-01-9	Revision Date 2007-09-28
Chrysene		

## 16. OTHER INFORMATION

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

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

### HMIS Rating

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

### NFPA Rating

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

### Further information

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### Preparation Information

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

Version: 5.3

Revision Date: 03/04/2015

Print Date: 05/13/2016

## SAFETY DATA SHEET

Version 4.7  
Revision Date 02/27/2015  
Print Date 05/24/2016

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Copper

Product Number : 12816  
Brand : Aldrich

CAS-No. : 7440-50-8

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

Identified uses : Laboratory chemicals, 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

Not a hazardous substance or mixture.

## 2.2 GHS Label elements, including precautionary statements

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

---

3. COMPOSITION/INFORMATION ON INGREDIENTS

## 3.1 Substances

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

**Hazardous components**

Component	Classification	Concentration
Copper		
		<= 100 %

---

4. FIRST AID MEASURES

## 4.1 Description of first aid measures

**If inhaled**

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

**In case of skin contact**

Wash off with soap and plenty of water.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

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

**4.2 Most important symptoms and effects, both acute and delayed**

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

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

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

**5.2 Special hazards arising from the substance or mixture**

Copper oxides

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

No data available

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Avoid dust formation. Avoid breathing vapours, mist or gas.

For personal protection see section 8.

**6.2 Environmental precautions**

No special environmental precautions required.

**6.3 Methods and materials for containment and cleaning up**

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

**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.

Store under inert gas. Air sensitive.

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
Copper	7440-50-8	TWA	1.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Irritation Gastrointestinal metal fume fever		
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Irritation Gastrointestinal metal fume fever		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.100000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

## 8.2 Exposure controls

### Appropriate engineering controls

General industrial hygiene practice.

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatrill® (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**

No special environmental precautions required.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: Foil Colour: light red
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 1,083.4 °C (1,982.1 °F)
f) Initial boiling point and boiling range	2,567 °C (4,653 °F)
g) Flash point	No data available
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	No data available
l) Vapour density	No data available
m) Relative density	8.940 g/cm <sup>3</sup>
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

**9.2 Other safety information**

No data available

---

**10. STABILITY AND REACTIVITY****10.1 Reactivity**

No data available

**10.2 Chemical stability**

Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**

No data available

#### 10.4 Conditions to avoid

No data available

#### 10.5 Incompatible materials

Strong acids, Strong oxidizing agents, Acid chlorides, Halogens

#### 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 - 3.5 mg/kg

##### Skin corrosion/irritation

No data available

##### Serious eye damage/eye irritation

No data available

##### Respiratory or skin sensitisation

No data available

##### Germ cell mutagenicity

No data available

##### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

##### Reproductive toxicity

No data available

No data available

##### Specific target organ toxicity - single exposure

No data available

##### Specific target organ toxicity - repeated exposure

No data available

##### Aspiration hazard

No data available

##### Additional Information

RTECS: GL5325000

Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

No data available

### 12.2 Persistence and degradability

### 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)

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. (Copper)  
Marine pollutant: yes

### IATA

UN number: 3077      Class: 9      Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Copper)

### Further information

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

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

### Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

### Pennsylvania Right To Know Components

Copper	CAS-No. 7440-50-8	Revision Date 1989-08-11
--------	----------------------	-----------------------------

### New Jersey Right To Know Components

Copper	CAS-No. 7440-50-8	Revision Date 1989-08-11
--------	----------------------	-----------------------------

### 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

### HMIS Rating

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

### NFPA Rating

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

### Further information

Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://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: 02/27/2015

Print Date: 05/24/2016

## SAFETY DATA SHEET

Revision Date 23-Jan-2018

Revision Number 3

### 1. Identification

**Product Name** Dibenz[a,h]anthracene, 99% (UV-Vis)  
**Cat No. :** AC406430010; AC406432500  
**Synonyms** 1,2:5,6-Dibenz(a)anthracene.  
**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)

Carcinogenicity

Category 1B

#### Label Elements

##### **Signal Word**

Danger

##### **Hazard Statements**

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

**Response**

IF exposed or concerned: Get medical attention/advice

**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.** Cancer - <https://www.p65warnings.ca.gov/>.

### 3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Dibenzo(a,h)anthracene	53-70-3	99

### 4. First-aid measures

<b>Eye Contact</b>	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
<b>Skin Contact</b>	Wash off immediately with plenty of water for at least 15 minutes.
<b>Inhalation</b>	Move to fresh air.
<b>Ingestion</b>	Do not induce vomiting.
<b>Most important symptoms and effects</b>	No information available.
<b>Notes to Physician</b>	Treat symptomatically

### 5. Fire-fighting measures

<b>Unsuitable Extinguishing Media</b>	No information available
<b>Flash Point</b>	
<b>Method -</b>	No information available
<b>Autoignition Temperature</b>	No information available
<b>Explosion Limits</b>	
<b>Upper</b>	No data available
<b>Lower</b>	No data available
<b>Sensitivity to Mechanical Impact</b>	No information available
<b>Sensitivity to Static Discharge</b>	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**

<b>Health</b>	<b>Flammability</b>	<b>Instability</b>	<b>Physical hazards</b>
1	1	0	N/A

### 6. Accidental release measures

<b>Personal Precautions</b>	Ensure adequate ventilation. Use personal protective equipment.
<b>Environmental Precautions</b>	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

<b>Handling</b>	Ensure adequate ventilation.
<b>Storage</b>	Keep containers tightly closed in a dry, cool and well-ventilated place.

## 8. Exposure controls / personal protection

<b>Exposure Guidelines</b>	This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.
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<b>Engineering Measures</b>	Ensure adequate ventilation, especially in confined areas.
-----------------------------	--

### Personal Protective Equipment

<b>Eye/face Protection</b>	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.
<b>Skin and body protection</b>	Wear appropriate protective gloves and clothing to prevent skin exposure.
<b>Respiratory Protection</b>	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.
<b>Hygiene Measures</b>	Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

<b>Physical State</b>	Solid
<b>Appearance</b>	Off-white
<b>Odor</b>	No information available
<b>Odor Threshold</b>	No information available
<b>pH</b>	
<b>Melting Point/Range</b>	265 °C
<b>Boiling Point/Range</b>	
<b>Flash Point</b>	
<b>Evaporation Rate</b>	No information available
<b>Flammability (solid,gas)</b>	No information available
<b>Flammability or explosive limits</b>	
<b>Upper</b>	No data available
<b>Lower</b>	No data available
<b>Vapor Pressure</b>	No information available
<b>Vapor Density</b>	No information available
<b>Specific Gravity</b>	No information available
<b>Solubility</b>	No information available
<b>Partition coefficient; n-octanol/water</b>	No data available
<b>Autoignition Temperature</b>	No information available
<b>Decomposition Temperature</b>	No information available
<b>Viscosity</b>	No information available
<b>Molecular Formula</b>	C <sub>22</sub> H <sub>14</sub>
<b>Molecular Weight</b>	278.34



## 10. Stability and reactivity

<b>Reactive Hazard</b>	None known, based on information available
<b>Stability</b>	Stable under normal conditions.
<b>Conditions to Avoid</b>	Incompatible products.
<b>Incompatible Materials</b>	Strong oxidizing agents
<b>Hazardous Decomposition Products</b>	None under normal use conditions
<b>Hazardous Polymerization</b>	Hazardous polymerization does not occur.
<b>Hazardous Reactions</b>	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

<b>Irritation</b>	No information available
<b>Sensitization</b>	No information available
<b>Carcinogenicity</b>	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Dibenzo(a,h)anthracene	53-70-3	Group 2A	Reasonably Anticipated	Not listed	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** No information available

**Endocrine Disruptor Information** No information available

**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
Dibenzo(a,h)anthracene	6.50

### 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
Dibenzo(a,h)anthracene - 53-70-3	U063	-

### 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
Dibenzo(a,h)anthracene	X	-	X	200-181-8	-		-	-	-	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 %
Dibenzo(a,h)anthracene	53-70-3	99	0.1

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

#### CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Dibenzo(a,h)anthracene	-	-	-	X

**Clean Air Act** Not applicable

OSHA Occupational Safety and Health Administration  
Not applicable

CERCLA Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Dibenzo(a,h)anthracene	1 lb	-

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

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Dibenzo(a,h)anthracene	53-70-3	Carcinogen	0.2 µg/day	Carcinogen

**U.S. State Right-to-Know Regulations**

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Dibenzo(a,h)anthracene	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** 23-Jan-2018

**Print Date** 23-Jan-2018

**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 23-Jan-2018

Revision Number 3

### 1. Identification

**Product Name** Dibenz[a,h]anthracene, 99% (UV-Vis)  
**Cat No. :** AC406430010; AC406432500  
**Synonyms** 1,2:5,6-Dibenz(a)anthracene.  
**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)

Carcinogenicity

Category 1B

#### Label Elements

##### **Signal Word**

Danger

##### **Hazard Statements**

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

**Response**

IF exposed or concerned: Get medical attention/advice

**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.** Cancer - <https://www.p65warnings.ca.gov/>.

### 3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Dibenzo(a,h)anthracene	53-70-3	99

### 4. First-aid measures

<b>Eye Contact</b>	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
<b>Skin Contact</b>	Wash off immediately with plenty of water for at least 15 minutes.
<b>Inhalation</b>	Move to fresh air.
<b>Ingestion</b>	Do not induce vomiting.
<b>Most important symptoms and effects</b>	No information available.
<b>Notes to Physician</b>	Treat symptomatically

### 5. Fire-fighting measures

<b>Unsuitable Extinguishing Media</b>	No information available
<b>Flash Point</b>	
<b>Method -</b>	No information available
<b>Autoignition Temperature</b>	No information available
<b>Explosion Limits</b>	
<b>Upper</b>	No data available
<b>Lower</b>	No data available
<b>Sensitivity to Mechanical Impact</b>	No information available
<b>Sensitivity to Static Discharge</b>	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**

<b>Health</b>	<b>Flammability</b>	<b>Instability</b>	<b>Physical hazards</b>
1	1	0	N/A

### 6. Accidental release measures

<b>Personal Precautions</b>	Ensure adequate ventilation. Use personal protective equipment.
<b>Environmental Precautions</b>	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

<b>Handling</b>	Ensure adequate ventilation.
<b>Storage</b>	Keep containers tightly closed in a dry, cool and well-ventilated place.

## 8. Exposure controls / personal protection

<b>Exposure Guidelines</b>	This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.
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<b>Engineering Measures</b>	Ensure adequate ventilation, especially in confined areas.
-----------------------------	--

### Personal Protective Equipment

<b>Eye/face Protection</b>	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.
<b>Skin and body protection</b>	Wear appropriate protective gloves and clothing to prevent skin exposure.
<b>Respiratory Protection</b>	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.
<b>Hygiene Measures</b>	Handle in accordance with good industrial hygiene and safety practice.

## 9. Physical and chemical properties

<b>Physical State</b>	Solid
<b>Appearance</b>	Off-white
<b>Odor</b>	No information available
<b>Odor Threshold</b>	No information available
<b>pH</b>	
<b>Melting Point/Range</b>	265 °C
<b>Boiling Point/Range</b>	
<b>Flash Point</b>	
<b>Evaporation Rate</b>	No information available
<b>Flammability (solid,gas)</b>	No information available
<b>Flammability or explosive limits</b>	
<b>Upper</b>	No data available
<b>Lower</b>	No data available
<b>Vapor Pressure</b>	No information available
<b>Vapor Density</b>	No information available
<b>Specific Gravity</b>	No information available
<b>Solubility</b>	No information available
<b>Partition coefficient; n-octanol/water</b>	No data available
<b>Autoignition Temperature</b>	No information available
<b>Decomposition Temperature</b>	No information available
<b>Viscosity</b>	No information available
<b>Molecular Formula</b>	C <sub>22</sub> H <sub>14</sub>
<b>Molecular Weight</b>	278.34

## 10. Stability and reactivity

<b>Reactive Hazard</b>	None known, based on information available
<b>Stability</b>	Stable under normal conditions.
<b>Conditions to Avoid</b>	Incompatible products.
<b>Incompatible Materials</b>	Strong oxidizing agents
<b>Hazardous Decomposition Products</b>	None under normal use conditions
<b>Hazardous Polymerization</b>	Hazardous polymerization does not occur.
<b>Hazardous Reactions</b>	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

<b>Irritation</b>	No information available
<b>Sensitization</b>	No information available
<b>Carcinogenicity</b>	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Dibenzo(a,h)anthracene	53-70-3	Group 2A	Reasonably Anticipated	Not listed	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** No information available

**Endocrine Disruptor Information** No information available

**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
Dibenzo(a,h)anthracene	6.50

### 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
Dibenzo(a,h)anthracene - 53-70-3	U063	-

### 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
Dibenzo(a,h)anthracene	X	-	X	200-181-8	-		-	-	-	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 %
Dibenzo(a,h)anthracene	53-70-3	99	0.1

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

#### CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Dibenzo(a,h)anthracene	-	-	-	X

**Clean Air Act** Not applicable



OSHA Occupational Safety and Health Administration  
Not applicable

CERCLA Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Dibenzo(a,h)anthracene	1 lb	-

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

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Dibenzo(a,h)anthracene	53-70-3	Carcinogen	0.2 µg/day	Carcinogen

**U.S. State Right-to-Know  
Regulations**

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Dibenzo(a,h)anthracene	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 23-Jan-2018

Print Date 23-Jan-2018

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

**Disclaimer**

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

**End of SDS**

## SAFETY DATA SHEET

Version 5.5  
Revision Date 05/27/2016  
Print Date 07/04/2016

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**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<sub>12</sub>H<sub>8</sub>Cl<sub>6</sub>O  
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
<b>Dieldrin</b>		
	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/m <sup>3</sup>	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      Immobilization EC50 - Daphnia magna (Water flea) - 79.5 µg/l - 48 h  
other aquatic  
invertebrates

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

No data available

**12.4 Mobility in soil**

No data available

**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

Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Dieldrin)

EMS-No: F-A, S-A



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

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## 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.

	CAS-No.	Revision Date
Dieldrin	60-57-1	2007-09-28

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## 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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**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 05/23/2016  
Print Date 06/23/2016

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Ethylbenzene

Product Number : 03079  
Brand : Sigma-Aldrich  
Index-No. : 601-023-00-4

CAS-No. : 100-41-4

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

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

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

## 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Flammable liquids (Category 2), H225  
Acute toxicity, Inhalation (Category 4), H332  
Carcinogenicity (Category 2), H351  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 2), H401  
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)

H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.
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.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 100-41-4
EC-No.	: 202-849-4
Index-No.	: 601-023-00-4

#### Hazardous components

Component	Classification	Concentration
<b>Ethylbenzene</b>		
	Flam. Liq. 2; Acute Tox. 4; Carc. 2; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 3; H225, H304, H332, H351, H373, H401, H412	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**

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

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

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

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

Use water spray to cool unopened containers.

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

**6.2 Environmental precautions**

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

**6.3 Methods and materials for containment and cleaning up**

Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

hygroscopic

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
Ethylbenzene	100-41-4	TWA	20.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Cochlear impair Kidney damage (nephropathy) Upper Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	125.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125.000000 ppm 545.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Cochlear impair Kidney damage (nephropathy) Upper Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		TWA	100 ppm 435 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125 ppm 545 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

		TWA	100 ppm 435 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	125 ppm 545 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	5 ppm 22 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	30 ppm 130 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Ethylbenzene	100-41-4	Sum of mandelic acid and phenyl glyoxylic acid	0.7g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Ethylbenzene		In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		Not critical			
		Sum of mandelic acid and phenyl glyoxylic acid	0.15g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

**Body Protection**

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

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid Colour: colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -95 °C (-139 °F) - lit.
f) Initial boiling point and boiling range	136 °C (277 °F) - lit.
g) Flash point	15.0 °C (59.0 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 6.7 %(V) Lower explosion limit: 1 %(V)
k) Vapour pressure	13.3 hPa (10.0 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	0.867 g/mL at 25 °C (77 °F)
n) Water solubility	0.2 g/l at 25 °C (77 °F) - slightly soluble
o) Partition coefficient: n-octanol/water	log Pow: 3.6 at 20 °C (68 °F)
p) Auto-ignition temperature	432.0 °C (809.6 °F)
q) Decomposition temperature	No data available
r) Viscosity	0.773 mm <sup>2</sup> /s at 20 °C (68 °F) -
s) Explosive properties	No data available
t) Oxidizing properties	No data available

**9.2 Other safety information**

Surface tension	71.2 mN/m at 23 °C (73 °F)
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## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male and female - 3,500 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 15,433 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Moderate skin irritation - 24 h

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Mild eye irritation

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

Hamster

ovary

Result: negative

Mouse - male and female

Result: negative

#### Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Ethylbenzene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

#### Reproductive toxicity

No data available

#### Specific target organ toxicity - single exposure

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

May be fatal if swallowed and enters airways.

**Additional Information**

Repeated dose toxicity      Rat - male and female - NOAEL : 75 mg/kg - OECD Test Guideline 407  
RTECS: DA0700000

Central nervous system depression, Nausea, Headache, Vomiting, Ataxia., Tremors

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish      flow-through test LC50 - Menidia menidia (Atlantic silverside) - 5.1 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates      static test EC50 - Daphnia magna (Water flea) - 1.8 - 2.4 mg/l - 48 h

Reproduction Test NOEC - Ceriodaphnia dubia (water flea) - 0.96 mg/l - 7 d

Toxicity to algae      static test EC50 - Skeletonema costatum (marine diatom) - 4.9 mg/l - 72 h

**12.2 Persistence and degradability**

Biodegradability      aerobic - Exposure time 28 d  
Result: 70 - 80 % - Readily biodegradable

**12.3 Bioaccumulative potential**

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

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

---

**13. DISPOSAL CONSIDERATIONS****13.1 Waste treatment methods****Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 1175      Class: 3      Packing group: II  
Proper shipping name: Ethylbenzene  
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

**IMDG**

UN number: 1175      Class: 3  
Proper shipping name: ETHYLBENZENE

Packing group: II

EMS-No: F-E, S-D

**IATA**

UN number: 1175      Class: 3  
Proper shipping name: Ethylbenzene

Packing group: II

---

**15. REGULATORY INFORMATION**

**SARA 302 Components**

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

**SARA 313 Components**

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

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

**SARA 311/312 Hazards**

Fire Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-07-01

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.

	CAS-No.	Revision Date
Ethylbenzene	100-41-4	2007-09-28

---

**16. OTHER INFORMATION**

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.

**HMIS Rating**

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

**NFPA Rating**

Health hazard:	2
Fire Hazard:	3

Reactivity Hazard: 0

**Further information**

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**Preparation Information**

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

Version: 5.7

Revision Date: 05/23/2016

Print Date: 06/23/2016

## SAFETY DATA SHEET

Version 5.6  
Revision Date 12/11/2017  
Print Date 11/10/2018

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : Indeno[1,2,3-*cd*]pyrene

Product Number : 48499

Brand : Supelco

CAS-No. : 193-39-5

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

Identified uses : Laboratory chemicals, Synthesis of substances

#### 1.3 Details of the supplier of the safety data sheet

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

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

#### 1.4 Emergency telephone number

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

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

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

Carcinogenicity (Category 2), H351

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

#### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H351

Suspected of causing cancer.

Precautionary statement(s)

P201

Obtain special instructions before use.

P202

Do not handle until all safety precautions have been read and understood.

P281

Use personal protective equipment as required.

P308 + P313

IF exposed or concerned: Get medical advice/ attention.

P405

Store locked up.

P501

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

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

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Formula : C<sub>22</sub>H<sub>12</sub>  
Molecular weight : 276.33 g/mol  
CAS-No. : 193-39-5  
EC-No. : 205-893-2

#### Hazardous components

Component	Classification	Concentration
Indeno[1,2,3-cd]pyrene	Carc. 2; H351	90 - 100 %

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

---

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

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

##### If inhaled

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

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Flush eyes with water as a precaution.

##### If swallowed

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

#### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

##### Suitable extinguishing media

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

#### 5.2 Special hazards arising from the substance or mixture

No data available

#### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

No data available

---

### 6. ACCIDENTAL RELEASE MEASURES

#### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

## 6.2 Environmental precautions

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

## 6.3 Methods and materials for containment and cleaning up

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

## 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

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

Store at room temperature.

Storage class (TRGS 510): 13: Non Combustible Solids

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Hazardous components without workplace control parameters

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Indeno[1,2,3-cd]pyrene	193-39-5	1-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.

##### 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)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)

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

#### Reproductive toxicity

No data available

No data available

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

No data available

#### Aspiration hazard

No data available

#### Additional Information

RTECS: Not available

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

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

No data available

## 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

Indeno[1,2,3-cd]pyrene

CAS-No.  
193-39-5

Revision Date  
1993-04-24

### Pennsylvania Right To Know Components

Indeno[1,2,3-cd]pyrene

CAS-No.  
193-39-5

Revision Date  
1993-04-24

Indeno[1,2,3-cd]pyrene

CAS-No.  
193-39-5

Revision Date  
1993-04-24

### New Jersey Right To Know Components

Indeno[1,2,3-cd]pyrene

CAS-No.  
193-39-5

Revision Date  
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

---

## 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](http://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: 12/11/2017

Print Date: 11/10/2018

## 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 : Lead

Product Number : 695912

Brand : Aldrich

CAS-No. : 7439-92-1

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

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

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

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : (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  
Carcinogenicity (Category 2), H351  
Reproductive toxicity (Category 2), H361  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

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

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word

Warning

Hazard statement(s)

H302 Harmful if swallowed.  
H351 Suspected of causing cancer.  
H361 Suspected of damaging fertility or the unborn child.  
H373 May cause damage to organs through prolonged or repeated exposure.  
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.  
P202 Do not handle until all safety precautions have been read and

	understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: Pb
Molecular weight	: 207.20 g/mol
CAS-No.	: 7439-92-1
EC-No.	: 231-100-4

#### Hazardous components

Component	Classification	Concentration
<b>Lead</b>		
	Acute Tox. 4; Carc. 2; Repr. 2; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H361, H373, 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

Lead 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.

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
	Remarks	See 1910.1025		
Lead	7439-92-1	TWA	0.05 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.05 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.05 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		See Appendix C		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Lead	7439-92-1	Lead	30µg/ 100 ml	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			
		Lead	30µg/ 100 ml	In blood	ACGIH - Biological Exposure Indices (BEI)
		Not critical			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

#### Body Protection

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

#### Respiratory protection

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

#### Control of environmental exposure

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

a) Appearance	Form: Shot
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 327.4 °C (621.3 °F) - lit.
f) Initial boiling point and boiling range	1,740 °C (3,164 °F) - lit.
g) Flash point	Not applicable
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	No data available
l) Vapour density	No data available
m) Relative density	No data available
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

### 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong acids

### 10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5



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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

Rat

Cytogenetic analysis

#### Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Lead)

NTP: Reasonably anticipated to be a human carcinogen (Lead)

Reasonably anticipated to be a human carcinogen The reference note has been added by TD based on the background information of the NTP. (Lead)

OSHA: 1910.1025 (Lead)

OSHA specifically regulated carcinogen (Lead)

#### Reproductive toxicity

Suspected human reproductive toxicant

Reproductive toxicity - Rat - Inhalation

Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral

Effects on Newborn: Behavioral.

Reproductive toxicity - Mouse - Oral

Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated). Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Developmental Toxicity - Rat - Inhalation

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Developmental Toxicity - Rat - Oral

Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Developmental Toxicity - Rat - Oral

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Mouse - Oral

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

#### Specific target organ toxicity - single exposure

No data available

**Specific target organ toxicity - repeated exposure**

May cause damage to organs through prolonged or repeated exposure.

**Aspiration hazard**

No data available

**Additional Information**

RTECS: OF7525000

anemia

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish	mortality LOEC - <i>Oncorhynchus mykiss</i> (rainbow trout) - 1.19 mg/l - 96.0 h
	LC50 - <i>Micropterus dolomieu</i> - 2.2 mg/l - 96.0 h
	mortality NOEC - <i>Salvelinus fontinalis</i> - 1.7 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	mortality LOEC - <i>Daphnia</i> (water flea) - 0.17 mg/l - 24 h
	mortality NOEC - <i>Daphnia</i> (water flea) - 0.099 mg/l - 24 h
Toxicity to algae	mortality EC50 - <i>Skeletonema costatum</i> - 7.94 mg/l - 10 d

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

Bioaccumulation	<i>Oncorhynchus kisutch</i> - 2 Weeks - 150 µg/l
	Bioconcentration factor (BCF): 12

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

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

---

**13. DISPOSAL CONSIDERATIONS****13.1 Waste treatment methods****Product**

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

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 3077	Class: 9	Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Lead)		
Reportable Quantity (RQ): 10 lbs		

Poison Inhalation Hazard: No

#### IMDG

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

#### IATA

UN number: 3077      Class: 9      Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)

#### Further information

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

---

### 15. REGULATORY INFORMATION

#### SARA 302 Components

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

#### SARA 313 Components

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

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

#### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	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
Lead	7439-92-1	1989-07-10

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

	CAS-No.	Revision Date
Lead	7439-92-1	1989-07-10

---

### 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
Carc.	Carcinogenicity
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.

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

**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](http://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

Version 3.12  
Revision Date 12/02/2015  
Print Date 05/01/2016

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Mercury

Product Number : 215457  
Brand : Sigma-Aldrich  
Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

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

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

## 1.4 Emergency telephone number

Emergency Phone # : (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, Inhalation (Category 2), H330  
Reproductive toxicity (Category 1B), H360  
Specific target organ toxicity - repeated exposure (Category 1), H372  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H330 Fatal if inhaled.  
H360 May damage fertility or the unborn child.  
H372 Causes damage to organs through prolonged or repeated exposure.  
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.  
P202 Do not handle until all safety precautions have been read and understood.

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: Hg
Molecular weight	: 200.59 g/mol
CAS-No.	: 7439-97-6
EC-No.	: 231-106-7
Index-No.	: 080-001-00-0

#### Hazardous components

Component	Classification	Concentration
<b>Mercury</b>		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, 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

Mercury/mercury 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 breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method. Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.

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

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	0.1 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		

		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Mercury	7439-97-6	Mercury	0.0400 mg/g	In urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to shift (16 hours after exposure ceases)			
		Mercury	15.0000 µg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

#### Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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



**Body Protection**

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

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

- |   |  |
|---|--|
| a) Appearance                                   | Form: liquid<br>Colour: silver, white  |
| b) Odour  | odourless  |
| c) Odour Threshold                              | No data available  |
| d) pH   | No data available  |
| e) Melting point/freezing point                 | Melting point/range: -38.87 °C (-37.97 °F) - lit.                              |
| f) Initial boiling point and boiling range      | 356.6 °C (673.9 °F) - lit.   |
| g) Flash point                                  | Not applicable   |
| h) Evaporation rate                             | No data available  |
| i) Flammability (solid, gas)                    | No data available  |
| j) Upper/lower flammability or explosive limits | No data available  |
| k) Vapour pressure                              | < 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F)<br>1 hPa (1 mmHg) at 126 °C (259 °F) |
| l) Vapour density                               | 6.93 - (Air = 1.0)   |
| m) Relative density                             | 13.55 g/cm <sup>3</sup> at 25 °C (77 °F)                                       |
| n) Water solubility                             | 0.00006 g/l at 25 °C (77 °F)   |
| o) Partition coefficient: n-octanol/water       | No data available  |
| p) Auto-ignition temperature                    | No data available  |
| q) Decomposition temperature                    | No data available  |
| r) Viscosity                                    | No data available  |
| s) Explosive properties                         | No data available  |
| t) Oxidizing properties                         | No data available  |

**9.2 Other safety information**

Relative vapour density 6.93 - (Air = 1.0)

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

### 10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m<sup>3</sup>

Dermal: No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Mercury)

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

Presumed human reproductive toxicant

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

#### Aspiration hazard

No data available

**Additional Information**

RTECS: OV4550000

Mercury accumulates in almost all tissues, especially in the: Kidney, Effects due to ingestion may include: Nausea, Vomiting, Diarrhoea, intestinal bleeding

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**Bioaccumulation Carassius auratus (goldfish) - 1,789 d  
- 0.25 µg/l

Bioconcentration factor (BCF): 155,986

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

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

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.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 2809 Class: 8 (6.1) Packing group: III  
Proper shipping name: A,W Mercury  
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

**IMDG**

UN number: 2809 Class: 8 (6.1) Packing group: III EMS-No: F-A, S-B  
Proper shipping name: MERCURY  
Marine pollutant: yes

**IATA**

UN number: 2809 Class: 8 (6.1) Packing group: III  
Proper shipping name: Mercury

---

**15. REGULATORY INFORMATION****SARA 302 Components**

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

### SARA 313 Components

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

### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2007-07-01

### California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

CAS-No.	Revision Date
7439-97-6	2013-12-20

Mercury

---

## 16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

### HMIS Rating

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

### NFPA Rating

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

### Further information

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**Preparation Information**

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

Version: 3.12

Revision Date: 12/02/2015

Print Date: 05/01/2016



# SAFETY DATA SHEET

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## METHYLENE CHLORIDE

SDS Revision Date: 03-Sep-2015

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### SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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**Product Name:** Methylene Chloride

**Synonyms:** Dichloromethane, Methylene Dichloride

**Uses:** Paint remover formulations, vapor depressant in aerosol applications, general cleaning solvent, foam blowing agent.

**Uses Advised Against:** Bathtub stripping. Not for use in residential home or workshop areas not properly ventilated or not designed to accommodate the safe use of this chemical.

**Chemical Family:** Saturated aliphatic halogenated solvent

**Details of the supplier of the safety data sheet**

**Distributor**

Silver Fern Chemical, Inc.  
2226 Queen Anne Avenue North, Suite C  
Seattle WA 98109, USA  
Phone: 1-866-282-3384

**Business Contact**

Customer Service: 1-866-282-3384  
info@silverfernchemical.com

**Emergency phone number**

**24 Hour Emergency Contact**

**Infotrac 1-800-535-5053 (USA & Canada)**

**Outside USA & Canada 1-352-323-3500**

# SAFETY DATA SHEET

## METHYLENE CHLORIDE

SDS Revision Date: 03-Sep-2015

**Note:** The Special, Aerosol, and Degreasing Grades contain small amounts of a propylene oxide stabilizer. The Technical and Decaffeination Grades do not.

## SECTION 2. HAZARDS IDENTIFICATION

**OSHA REGULATORY STATUS:** This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

\*\*\*\*\*

### EMERGENCY OVERVIEW:

**Color:** Colorless  
**Physical State:** Liquid  
**Appearance:** Clear  
**Odor:** Mildly sweet odor, Chloroform-like odor

**Signal Word:** **WARNING**

**MAJOR HEALTH HAZARDS:** MAY CAUSE DROWSINESS OR DIZZINESS. CAUSES SKIN IRRITATION. CAUSES EYE IRRITATION. MAY CAUSE RESPIRATORY IRRITATION. CAUSES DAMAGE TO CARDIOVASCULAR SYSTEM INCLUDING ELEVATED CARBOXYHEMOGLOBIN LEVELS. MAY CAUSE DAMAGE TO BLOOD AND LIVER THROUGH PROLONGED OR REPEATED EXPOSURES. SUSPECTED OF CAUSING CANCER.

**PRECAUTIONARY STATEMENTS:** Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Do not breathe gas, fumes, vapor, mist, or spray. Wear protective gloves, protective clothing, eye, and face protection. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.

**ADDITIONAL HAZARD INFORMATION:** Exposure in an enclosed or poorly-ventilated area may be very harmful. Methylene chloride can be metabolized to carbon monoxide (CO), which is then very tightly bound to hemoglobin. This complex is called carboxyhemoglobin (COHb) and results in a reduction in the oxygen carrying capacity of the blood. This product may be absorbed through the skin, causing systemic effects.

\*\*\*\*\*

### GHS CLASSIFICATION:

GHS: CONTACT HAZARD - SKIN:	Category 2 - Causes skin irritation.
GHS: CONTACT HAZARD - EYE:	Category 2B - Causes eye irritation
GHS: TARGET ORGAN TOXICITY (SINGLE EXPOSURE):	Category 1 - Causes damage to cardiovascular system including elevated carboxyhemoglobin levels Category 3 - May cause drowsiness or dizziness Category 3 - May cause respiratory tract irritation

# SAFETY DATA SHEET

## METHYLENE CHLORIDE

SDS Revision Date: 03-Sep-2015

GHS: TARGET ORGAN TOXICITY (REPEATED EXPOSURE):	Category 2 - May cause damage to Blood, Liver through prolonged or repeated exposure
GHS: CARCINOGENICITY:	Category 2 - Suspected of causing cancer.

**UNKNOWN ACUTE TOXICITY:** Not applicable. 100% of this product consists of ingredient(s) of known acute toxicity.

**GHS SYMBOL:** Exclamation mark, Health hazard



**GHS SIGNAL WORD:** WARNING

### GHS HAZARD STATEMENTS:

#### GHS - Health Hazard Statement(s)

Causes skin irritation  
Causes eye irritation  
May cause drowsiness or dizziness  
May cause respiratory irritation  
Causes damage to cardiovascular system including elevated carboxyhemoglobin levels  
May cause damage to Blood, Liver through prolonged or repeated exposure  
Suspected of causing cancer

#### GHS - Precautionary Statement(s) - Prevention

Obtain special instructions before use  
Do not handle until all safety precautions have been read and understood  
Do not breathe gas, fumes, vapor, mist, or spray  
Use only outdoors or in a well-ventilated area  
Wear protective gloves, protective clothing, eye, and face protection  
Wash thoroughly after handling  
Do not eat, drink or smoke when using this product

#### GHS - Precautionary Statement(s) - Response

IF INHALED: Remove person to fresh air and keep comfortable for breathing  
Call a POISON CENTER or doctor/physician if you feel unwell  
IF ON SKIN: Wash with plenty of water  
If skin irritation occurs: Get medical advice/attention  
Take off contaminated clothing and wash it before reuse  
Specific treatment (see First Aid information on product label and/or Section 4 of the SDS)  
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.  
Continue rinsing  
If eye irritation persists: Get medical advice/attention  
IF exposed or concerned: Get medical advice/attention  
Get medical advice/attention if you feel unwell



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## METHYLENE CHLORIDE

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### GHS - Precautionary Statement(s) - Storage

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

### GHS - Precautionary Statement(s) - Disposal

Dispose of contents and container in accordance with applicable local, regional, national, and/or international regulations.

### Hazards Not Otherwise Classified (HNOC)

Exposure in an enclosed or poorly-ventilated area may be very harmful  
This material may be absorbed across the skin causing systemic effects

See Section 11: TOXICOLOGICAL INFORMATION

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Synonyms:** Dichloromethane, Methylene Dichloride

Contains Methylene chloride (Dichloromethane), Propylene oxide

Component	Percent [%]	CAS Number
Methylene chloride (Dichloromethane)	99.97 - 100	75-09-2
Propylene oxide	Proprietary	75-56-9

## SECTION 4. FIRST AID MEASURES

**INHALATION:** If inhalation of this material occurs and adverse effects result, move person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician. See Notes to Physician below and Section 11 for more information.

**SKIN CONTACT:** If on skin, wash with plenty of water. If skin irritation occurs, get medical advice/attention. Take off contaminated clothing and wash before reuse. Treat any skin irritation symptomatically. The specific treatment is flushing affected area with plenty of water.

**EYE CONTACT:** If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical attention.

**INGESTION:** If swallowed, rinse mouth. Contact a poison center or doctor/physician if you feel unwell.

**Most Important Symptoms/Effects (Acute and Delayed) :**

**Acute Symptoms/Effects:** Listed below.

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**Inhalation (Breathing):** Respiratory System Effects: Pulmonary irritation, cough, chest discomfort, shortness of breath, headache, euphoria, nausea and vomiting, respiratory irritation. Changes in heart rate, paresthesias, sleepiness and seizures are described. Heavy exposure can result in muscle weakness or hypotonia, syncope, stupor followed by loss of consciousness. Complications include cardiac abnormalities and elevations of carboxyhemoglobin. Coma with respiratory depression may result in death.

**Skin:** Skin Irritation. Skin exposure may cause intense burning sensation, mild redness and numbness. Severe burns may develop following prolonged exposures.

**Eye:** Eye Irritation. Mild eye irritation may occur when exposed to vapor. Splash of liquid in the eye can cause conjunctival irritation and burning pain. Prolonged contact can cause severe corneal burns.

**Ingestion (Swallowing):** Ingesting this material may cause nausea, vomiting, mucosal irritation with burning sensation. System effects include central nervous system depression, headache, syncope, seizures, and coma. Ingesting concentrated solutions of this material can cause corrosion of the GI tract and perforation.

**Delayed Symptoms/Effects:**

- May cause cancer
- Repeated or prolonged exposure may cause blood and liver damage

**Interaction with Other Chemicals Which Enhance Toxicity:** May potentiate other agents that cause central nervous system (CNS) and respiratory system depression, such as alcohol, opiates.

**Medical Conditions Aggravated by Exposure:** May increase potential for cardiac arrhythmia. May increase carboxyhemoglobin levels. May worsen respiratory system disorders such as asthma and other breathing disorders. May worsen central nervous system disorders such as seizure disorders or impair central nervous system functions. May worsen ischemic heart disease.

**Protection of First-Aiders:** Protect against vapor/gas exposure. Protect against liquid contamination. Most cases of serious toxicity or death have been associated with stripping operations and or use in enclosed spaces.

**Notes to Physician:** Acute symptoms from low airborne levels are generally mild and self limiting following removal from exposure, and should require no specific treatment. The primary exposure route is inhalation. Symptomatic exposure should be treated with oxygen. The primary toxicity is central nervous system depression. May cause cardiac arrhythmias. Treatment with non-catecholamine agent is theoretically preferred. Treat seizures with benzodiazepines. Methylene chloride is metabolized to carbon monoxide. Carbon monoxide levels may increase after exposure has ceased. Treat following carbon monoxide recommendations. For ingestion, protect the airway and do not administer fluids or attempt to decontaminate due to the risk of vomiting and aspiration. Protect the airway. May dissolve some medical grade plastics. Systemic toxicity from skin absorption is unlikely. There is no antidote.

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## SECTION 5. FIRE-FIGHTING MEASURES

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**Fire Hazard:** Slight fire hazard. This material may burn, but does not readily ignite.

**Extinguishing Media:** Use foam, dry chemical, CO<sub>2</sub>, or water spray.

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**Fire Fighting:** Wear NIOSH approved positive-pressure self-contained breathing apparatus operated in pressure demand mode. Concentrated vapors may be ignited by high intensity source. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Keep water runoff out of water supplies and sewers (see Section 6 of the MSDS).

Component	Immediately Dangerous to Life/ Health (IDLH)
Methylene chloride (Dichloromethane) 75-09-2	2300 ppm IDLH
Propylene oxide 75-56-9	400 ppm IDLH

**Hazardous Combustion Products:** Hydrogen chloride, Chlorine, Phosgene, Oxides of carbon

**Sensitivity to Mechanical Impact:** Not sensitive.

**Sensitivity to Static Discharge:** Not sensitive.

**Lower Flammability Level (air):** 12% @ 100°C

**Upper Flammability Level (air):** 19% @100°C

**Flash point:** None

**Auto-ignition Temperature:** 1033 °F (556.1 °C)

## SECTION 6. ACCIDENTAL RELEASE MEASURES

### Personal Precautions:

Most vapors are heavier than air and will spread along ground and collect in low or confined areas (drains, basements, tanks). Do not breathe vapors, mist, or spray. Ventilate closed spaces before entering. Exposure in an enclosed or poorly-ventilated area may be very harmful. Keep unnecessary people away, isolate hazard area and deny entry. Evacuation of surrounding area may be necessary for large spills. Shut off ventilation system if needed. Do not get in eyes, on skin or on clothing. Wear appropriate personal protective equipment recommended in Section 8 of the SDS.

### Methods and Materials for Containment and Cleaning Up:

Stop leak if possible without personal risk. Ventilate closed spaces before entering. Completely contain spilled materials with dikes, sandbags, etc. Remove contaminated soil or collect with appropriate absorbent and place into suitable container. Keep container tightly closed and properly labeled. Liquid material may be removed with a properly rated vacuum truck. Properly dispose of in accordance with all applicable regulations. See Section 13, Disposal considerations, for additional information.

### Environmental Precautions:

Keep out of water supplies, sewers and soil. Avoid discharge into drains, surface water or groundwater. Releases should be reported, if required, to appropriate regulatory agencies.

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### SECTION 7. HANDLING AND STORAGE

#### Precautions for Safe Handling:

Do not breathe gas, vapors, or spray mist. Most vapors are heavier than air and will spread along ground and collect in low or confined areas (drains, basements, tanks). Avoid contact with skin, eyes and clothing. Wear personal protective equipment as described in Exposure Controls/Personal Protection (Section 8) of the SDS. Wash thoroughly after handling. Do not taste or swallow. When using, do not eat, drink or smoke.

#### Safe Storage Conditions:

Store and handle in accordance with all current regulations and standards. Keep container tightly closed and properly labeled. Store in a cool, dry area. Store in a well-ventilated area. Prevent water or moist air from entering storage tanks or containers. Do not enter confined spaces unless adequately ventilated. Do not store in aluminum container or use aluminum fittings or transfer lines. To minimize the decomposition of dichloromethane, storage containers should be galvanized or lined with a phenolic coating. Protect from sunlight. Do not reuse drum without recycling or reconditioning in accordance with any applicable federal, state or local laws. Do not use cutting or welding torches, open flames or electric arcs on empty or full containers. Keep separated from incompatible substances (see below or Section 10 of the Safety Data Sheet).

#### Incompatibilities/ Materials to Avoid:

Aluminum, magnesium, zinc, and their alloys, Bases, Oxygen, Amines, Reactive metals, Sodium, Potassium, Strong oxidizing agents, Alkali metals

### SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Regulatory Exposure Limit(s):** Listed below for the product components that have regulatory occupational exposure limits (OEL's) established.

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Methylene chloride (Dichloromethane) 75-09-2	25 ppm	125 ppm	-----
Propylene oxide 75-56-9	100 ppm 240 mg/m <sup>3</sup>	-----	-----

OEL: Occupational Exposure Limit; OSHA: United States Occupational Safety and Health Administration;  
PEL: Permissible Exposure Limit; TWA: Time Weighted Average; STEL: Short Term Exposure Limit

**NON-REGULATORY EXPOSURE LIMIT(S):** Listed below for the product components that have advisory (non-regulatory) occupational exposure limits (OEL's) established.

Component	CAS Number	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)
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Methylene chloride (Dichloromethane)	75-09-2	50 ppm	-----	-----	500 ppm	2000 ppm	1000 ppm
Propylene oxide	75-56-9	2 ppm	-----	-----	20 ppm 50 mg/m <sup>3</sup>	-----	-----

- The Non-Regulatory United States Occupational Safety and Health Administration (OSHA) limits, if shown, are the Vacated 1989 PEL's (vacated by 58 FR 35338, June 30, 1993).

- The American Conference of Governmental Industrial Hygienists (ACGIH) is a voluntary organization of professional industrial hygiene personnel in government or educational institutions in the United States. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemicals, physical agents, and biological exposure indices.

**ENGINEERING CONTROLS:** Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits. Monitoring should be performed regularly in accordance with 29 CFR 1910.1052(d) to determine exposure level(s).

### PERSONAL PROTECTIVE EQUIPMENT:

**Eye Protection:** Wear safety glasses with side-shields. Wear chemical safety goggles and/or a face-shield to protect against skin and eye contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**Skin and Body Protection:** Wear chemical resistant clothing and footwear to prevent skin contact.

**Hand Protection:** Wear appropriate chemical resistant gloves. Consult a glove supplier for assistance in selecting an appropriate chemical resistant glove.

**Protective Material Types:** Trelchem®, Tychem®, Viton®, Polyvinyl alcohol (PVA)

**Respiratory Protection:** Respiratory protection requirements for methylene chloride are in 29 CFR 1910.1052(f). When concentrations are above the IDLH, or are unknown, or during spills and/or emergencies, use any supplied-air respirator that has a facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Component	Immediately Dangerous to Life/ Health (IDLH)
Methylene chloride (Dichloromethane) 75-09-2	2300 ppm IDLH
Propylene oxide 75-56-9	400 ppm IDLH

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid  
Appearance: Clear  
Color: Colorless

# SAFETY DATA SHEET

## METHYLENE CHLORIDE

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<b>Odor:</b>	Mildly sweet odor, Chloroform-like odor
<b>Odor Threshold [ppm]:</b>	200-300 ppm (causes olfactory fatigue).
<b>Molecular Weight:</b>	84.94
<b>Chemical Family:</b>	Saturated aliphatic halogenated solvent
<b>Boiling Point/Range:</b>	104 °F (40 °C)
<b>Freezing Point/Range:</b>	-139 °F (-95 °C).
<b>Melting Point/Range:</b>	-95 (°C)
<b>Vapor Pressure:</b>	350 mmHg @ 20°C and 435 mmHG @ 25°C
<b>Vapor Density (air=1):</b>	2.9
<b>Relative Density/Specific Gravity (water=1):</b>	1.31 - 1.32 @ 25°C
<b>Water Solubility:</b>	1.32% @ 25 C or 13,000 mg/l at 25 °C
<b>pH:</b>	Not applicable
<b>Volatility:</b>	100% by volume
<b>Evaporation Rate (ether=1):</b>	0.7
<b>Flash point:</b>	None
<b>Lower Flammability Level (air):</b>	12% @ 100°C
<b>Upper Flammability Level (air):</b>	19% @100°C
<b>Auto-ignition Temperature:</b>	1033 °F (556.1 °C)
<b>Viscosity:</b>	- 0.41 (cps) @ 77°F

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## SECTION 10. STABILITY AND REACTIVITY

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**Reactivity:** Reacts violently with active metals.

**Chemical Stability:** Stable at normal temperatures and pressures.

**Possibility of Hazardous Reactions:**

Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Reacts violently with active metals. Avoid contact with incompatible substances and conditions due to generation of phosgene and other toxic and irritating substances.

**Conditions to Avoid:**

(e.g., static discharge, shock, or vibration) -. None known.

**Incompatibilities/ Materials to Avoid:**

Aluminum, magnesium, zinc, and their alloys. Bases. Oxygen. Amines. Reactive metals. Sodium. Potassium. Strong oxidizing agents. Alkali metals.

**Hazardous Decomposition Products:** hydrogen chloride, chlorine, phosgene, oxides of carbon

**Hazardous Polymerization:** Will not occur.

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## SECTION 11. TOXICOLOGICAL INFORMATION

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**IRRITATION DATA:** Methylene Chloride: 810 mg/24 hour(s) skin-rabbit severe; 100 mg/24 hour(s) skin-rabbit moderate; 162 mg eyes-rabbit moderate; 10 mg eyes-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild

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# SAFETY DATA SHEET

## METHYLENE CHLORIDE

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### TOXICITY DATA:

#### PRODUCT TOXICITY DATA: Methylene Chloride

<b>LD50 Oral:</b> 985 mg/kg (rat) mg/kg (Rat)	<b>LD50 Dermal:</b> > 2,000 mg/kg (Rat)	<b>LC50 Inhalation:</b> 76000 mg/m <sup>3</sup> (4 hr-Rat)
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#### COMPONENT TOXICITY DATA:

**Note:** The component toxicity data is populated by the LOLI database and may differ from the product toxicity data given.

Component	LD50 Oral:	LD50 Dermal:	LC50 Inhalation:
Methylene chloride (Dichloromethane) 75-09-2	1600 mg/kg (Rat)	-----	53 mg/L (6 hr-Rat)
Propylene oxide 75-56-9	520 mg/kg (Rat)	1244 mg/kg (Rabbit)	0.948 mg/L (4 hr-Rat)

\*\*\*\*\*

### POTENTIAL HEALTH EFFECTS:

- Eye contact:** Vapors may cause eye irritation. Contact may cause tearing, redness, a stinging or burning feeling, swelling, and blurred vision.
- Skin contact:** May cause effects ranging from mild irritation to severe pain, and possibly burns, depending on the intensity of contact. Skin absorption may occur.
- Inhalation:** May cause upper respiratory tract irritation and central nervous system depression with symptoms such as confusion, lightheadedness, nausea, vomiting, headache, and fatigue. Causes formation of carbon monoxide in blood which may affect the cardiovascular system and central nervous system. Continued exposure may cause unconsciousness and even death.
- Ingestion:** May cause nausea or vomiting. If vomiting results in aspiration, chemical pneumonia could occur. Absorption through the gastrointestinal tract may produce central nervous system depression.
- Chronic Effects:** May cause liver damage. May cause cancer based on animal data.

### SIGNS AND SYMPTOMS OF EXPOSURE:

**Inhalation (Breathing):** Respiratory System Effects: Pulmonary irritation, cough, chest discomfort, shortness of breath, headache, euphoria, nausea and vomiting, respiratory irritation. Changes in heart rate, paresthesias, sleepiness and seizures are described. Heavy exposure can result in muscle weakness or hypotonia, syncope, stupor followed by loss of consciousness. Complications include cardiac abnormalities and elevations of carboxyhemoglobin. Coma with respiratory depression may result in death.

**Skin:** Skin Irritation. Skin exposure may cause intense burning sensation, mild redness and numbness. Severe burns may develop following prolonged exposures.

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**Eye:** Eye Irritation. Mild eye irritation may occur when exposed to vapor. Splash of liquid in the eye can cause conjunctival irritation and burning pain. Prolonged contact can cause severe corneal burns.

**Ingestion (Swallowing):** Ingesting this material may cause nausea, vomiting, mucosal irritation with burning sensation. System effects include central nervous system depression, headache, syncope, seizures, and coma. Ingesting concentrated solutions of this material can cause corrosion of the GI tract and perforation.

### TOXICITY:

Dermal exposure results in absorption but at a slower rate than via the oral or inhalation routes of exposure.

### CHRONIC TOXICITY:

Liver effects have not been reported in humans, but liver changes have been observed in several long-term studies with laboratory animals. Inhalation of 500 to 3,500 ppm methylene chloride for two years produced only minimal, nonproliferative changes in the liver of Sprague Dawley rats (the no-observed-effect level was equal to 200 ppm) and no liver effects in hamsters. Nonproliferative changes were noted in rats in another study after exposure to 1,000 to 4,000 ppm. Liver enlargement has been observed in mice exposed to 2,000 and 4,000 ppm of methylene chloride for 11 days.

**Interaction with Other Chemicals Which Enhance Toxicity:** May potentiate other agents that cause central nervous system (CNS) and respiratory system depression, such as alcohol, opiates.

\*\*\*\*\*

### GHS HEALTH HAZARDS:

**GHS: CONTACT HAZARD - EYE:** Category 2B - Causes eye irritation

**GHS: CONTACT HAZARD - SKIN:** Category 2 - Causes skin irritation

**Skin Absorbent / Dermal Route?** Yes.

### GHS: CARCINOGENICITY:

Category 2 - Suspected of causing cancer.

**Carcinogenicity comment:** Methylene chloride is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure. Available epidemiological studies do not confirm an increased risk of cancer in humans. Available evidence suggests that this material is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

Component	NTP:	IARC (GROUP 1):	IARC (GROUP 2):	OSHA:
Methylene chloride (Dichloromethane)	Reasonably Anticipated To Be A Human Carcinogen	Not listed	Group 2	Listed
Propylene oxide	Reasonably Anticipated To Be A Human Carcinogen	Not listed	Group 2	Listed

### SPECIFIC TARGET ORGAN TOXICITY (Single Exposure):

Category 1 - Causes damage to cardiovascular system including elevated carboxyhemoglobin levels

Category 3 - Narcotic Effects

Category 3 - Respiratory Tract Irritation



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### SPECIFIC TARGET ORGAN TOXICITY (Repeated or Prolonged Exposure):

Category 2 - Blood, Liver

### MUTAGENIC DATA:

Not classified as a mutagen per GHS criteria. Positive results have been observed in the Ames test. In mammalian systems, responses have generally been negative.

### DEVELOPMENTAL TOXICITY:

Not classified as a developmental or reproductive toxin per GHS criteria. May cross the placenta. May be excreted in breast milk. No significant developmental effects were observed in female rats and mice exposed to 1,250 ppm during gestation. A similar result was observed in rats exposed to 4,500 ppm before and during gestation. A two-generation inhalation study showed no adverse reproductive effects in rats exposed to as much as 1,500 ppm for 14 weeks.

### IMMUNOTOXICITY:

A study found there was no evidence of harm to the immune system of laboratory animals or reduced ability to combat disease.

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## SECTION 12. ECOLOGICAL INFORMATION

### ECOTOXICITY DATA:

#### Freshwater Fish Toxicity:

LC50 (Static) Fathead minnow = 310 mg/L 96 hour(s)

LC50 (Static) Bluegill sunfish = 220 mg/L 96 hour(s)

#### Invertebrate Toxicity:

LC50 Mysid Shrimp = 256 mg/L 96 hour(s); 224 mg/L 48 hour(s) LC50 Daphnia Magna

### FATE AND TRANSPORT:

**BIODEGRADATION:** Biodegradation may occur in groundwater, but will be very slow compared with evaporation

**PERSISTENCE:** AIR: This material released to the atmosphere will degrade by reaction with hydroxyl radicals with a half-life of several months. It is not subject to direct photooxidation. SOIL: On land is expected to evaporate rapidly into the atmosphere due to its high vapor pressure. It is poorly adsorbed to soil and can leach into the groundwater. Calculated Adsorption Coefficient (log KOC) is 1. WATER: This material is subject to rapid evaporation, with estimated evaporative half-lives ranging from 3 to 5.6 hours under moderate mixing condition. This material has a negligible rate of hydrolysis

**BIOCONCENTRATION:** Bioconcentration potential in aquatic organisms is low with BCF of 2.

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## SECTION 13. DISPOSAL CONSIDERATIONS

### **Waste from material:**

Reuse or reprocess, if possible. Keep out of water supplies, sewers and soil. Dispose in accordance with all applicable regulations. May be subject to disposal regulations.

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### Container Management:

Dispose of container in accordance with applicable local, regional, national, and/or international regulations. Container rinsate must be disposed of in compliance with applicable regulations.

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## SECTION 14. TRANSPORT INFORMATION

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### LAND TRANSPORT

#### U.S. DOT 49 CFR 172.101:

UN NUMBER: UN1593  
PROPER SHIPPING NAME: Dichloromethane  
HAZARD CLASS/ DIVISION: 6.1  
PACKING GROUP: III  
LABELING REQUIREMENTS: 6.1  
RQ (lbs): RQ 1,000 Lbs. (Dichloromethane)  
RQ 100 Lbs. (Propylene oxide)

#### CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

UN NUMBER: UN1593  
SHIPPING NAME: Dichloromethane  
CLASS OR DIVISION: 6.1  
PACKING/RISK GROUP: III  
LABELING REQUIREMENTS: 6.1

### MARITIME TRANSPORT (IMO / IMDG) Regulated

UN NUMBER: UN1593  
PROPER SHIPPING NAME: Dichloromethane  
HAZARD CLASS / DIVISION: 6.1  
Packing Group: III  
LABELING REQUIREMENTS: 6.1

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## SECTION 15. REGULATORY INFORMATION

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### U.S. REGULATIONS

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# SAFETY DATA SHEET

## METHYLENE CHLORIDE

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### OSHA REGULATORY STATUS:

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

### CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):

If a release is reportable under CERCLA section 103, notify the state emergency response commission and local emergency planning committee. In addition, notify the National Response Center at (800) 424-8802 or (202) 426-2675.

Component	CERCLA Reportable Quantities:
Methylene chloride (Dichloromethane)	1000 lb (final RQ)
Propylene oxide	100 lb (final RQ)

### SARA EHS Chemical (40 CFR 355.30)

If a release is reportable under EPCRA, notify the state emergency response commission and local emergency planning committee. If the TPQ is met, facilities are subject to reporting requirements under EPCRA Sections 311 and 312.

Component	EPCRA RQs	Section 302 Threshold Planning Quantity (TPQs)
Propylene oxide	100 lb (EPCRA RQ)	10000 lb TPQ

### EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10):

Acute Health Hazard, Chronic Health Hazard, Extremely Hazardous

### EPCRA SECTION 313 (40 CFR 372.65):

The following chemicals are listed in 40 CFR 372.65 and may be subject to Community Right-to Know Reporting requirements.

Component	Status:
Methylene chloride (Dichloromethane)	Listed - 0.1 %
Propylene oxide	0.1 %

### OSHA SPECIFICALLY REGULATED SUBSTANCES:

OSHA 29 CFR 1910.1052 (Methylene chloride); The U.S. Department of Labor, Occupational Safety and Health Administration specifically regulates manufacturing, handling and processing of methylene chloride. Such regulations have been published at 29 CFR 1910.1052.

### OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119):

Not regulated

## NATIONAL INVENTORY STATUS

**U.S. INVENTORY STATUS: Toxic Substance Control Act (TSCA):** All components are listed or exempt.

**TSCA 12(b):** This product is not subject to export notification.

**Canadian Chemical Inventory:** All components of this product are listed on either the DSL or the NDSL.

## STATE REGULATIONS

# SAFETY DATA SHEET

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### California Proposition 65:

This product contains a chemical known to the State of California to cause cancer, and/or birth defects, and/or other reproductive harm as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act.

Component	California Proposition 65 Cancer WARNING:	California Proposition 65 CRT List - Male reproductive toxin:	California Proposition 65 CRT List - Female reproductive toxin:	Massachusetts Right to Know Hazardous Substance List	New Jersey Right to Know Hazardous Substance List	New Jersey Special Health Hazards Substance List
Methylene chloride (Dichloromethane) 75-09-2	Listed	Not Listed	Not Listed	Listed	1255	Not Listed
Propylene oxide 75-56-9	Listed	Not Listed	Not Listed	Listed	1615	flammable - fourth degree; mutagen; reactive - second degree

Component	New Jersey - Environmental Hazardous Substance List	Pennsylvania Right to Know Hazardous Substance List	Pennsylvania Right to Know Special Hazardous Substances	Pennsylvania Right to Know Environmental Hazard List	Rhode Island Right to Know Hazardous Substance List
Methylene chloride (Dichloromethane) 75-09-2	Listed	Listed	Present	Present	Listed
Propylene oxide 75-56-9	Listed	Listed	Present	Present	Not Listed

### CANADIAN REGULATIONS

• This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations

### WHMIS - Classifications of Substances:

- D1B - Poisonous and Infectious Material; Materials causing immediate and serious toxic effects - Toxic material
- D2A - Poisonous and Infectious Material; Materials causing other toxic effects - Very toxic material
- D2B - Poisonous and Infectious Material; Materials causing other toxic effects - Toxic material

## SECTION 16. OTHER INFORMATION

Prepared by: OxyChem Corporate HESS - Product Stewardship

Rev. Date: 03-Sep-2015

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)

Health Rating: 2\*

Flammability Rating: 1

Reactivity Rating: 0

NFPA 704 - Hazard Identification Ratings (SCALE 0-4)

Health Rating: 2

Flammability: 1

Reactivity Rating: 0

# **SAFETY DATA SHEET**

## **METHYLENE CHLORIDE**

**SDS Revision Date:** 03-Sep-2015

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### **DISCLAIMER OF RESPONSIBILITY**

The information on this SDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied, regarding its correctness. Some information presented and conclusions drawn herein are from sources other than direct test data on the substance itself. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with handling, storage, use, or disposal of this product. If the product is used as a component in another product, this SDS information may not be applicable.

**<end of document>**

## SAFETY DATA SHEET

Version 5.5  
Revision Date 06/02/2016  
Print Date 06/21/2016

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : *m*-Xylene

Product Number : 95670  
Brand : Sigma-Aldrich  
Index-No. : 601-022-00-9

CAS-No. : 108-38-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
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

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Flammable liquids (Category 3), H226  
Acute toxicity, Dermal (Category 4), H312  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 3), H412

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H226 : Flammable liquid and vapour.  
H304 : May be fatal if swallowed and enters airways.  
H312 : Harmful in contact with skin.  
H315 : Causes skin irritation.  
H319 : Causes serious eye irritation.  
H335 : May cause respiratory irritation.

H412	Harmful to aquatic life with long lasting effects.
Precautionary statement(s)	
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms	: 1,3-Dimethylbenzene
Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 108-38-3
EC-No.	: 203-576-3
Index-No.	: 601-022-00-9

#### Hazardous components

Component	Classification	Concentration
<b>m-Xylene</b>		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312, H315, H319, H335, H412	<= 100 %

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

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## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

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

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.



## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Flammable liquids

## 7.3 Specific end use(s)

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

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
m-Xylene	108-38-3	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		

		Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
m-Xylene	108-38-3	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1,500.000 0 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 30 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

#### **Body Protection**

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

#### **Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### **Control of environmental exposure**

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

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## **9. PHYSICAL AND CHEMICAL PROPERTIES**

### **9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid Colour: colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -48 °C (-54 °F) - lit.
f) Initial boiling point and boiling range	138 - 139 °C (280 - 282 °F) - lit.
g) Flash point	25.0 °C (77.0 °F) - closed cup
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k) Vapour pressure	8.0 hPa (6.0 mmHg) at 20.0 °C (68.0 °F) 21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)
l) Vapour density	No data available
m) Relative density	0.868 g/mL at 25 °C (77 °F)
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	log Pow: 3.2 at 20 °C (68 °F)
p) Auto-ignition temperature	465.0 °C (869.0 °F) 528.0 °C (982.4 °F)
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available

t) Oxidizing properties      No data available

## 9.2 Other safety information

No data available

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## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male - 6,602 mg/kg  
(OECD Test Guideline 401)

LC50 Inhalation - Rat - male - 4 h - 6700 ppm  
(Directive 67/548/EEC, Annex V, B.2.)

LD50 Dermal - Rabbit - male - 12,126 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 24 h

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Severe eye irritation - 24 h

#### Respiratory or skin sensitisation

- Mouse

Result: Does not cause skin sensitisation.  
(OECD Test Guideline 429)

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:      3 - Group 3: Not classifiable as to its carcinogenicity to humans (m-Xylene)

IARC:      No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP:      No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

OSHA: No component of this product present at levels greater than or equal to 0.1% is 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**

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

### **Specific target organ toxicity - single exposure**

Inhalation - May cause respiratory irritation.

### **Specific target organ toxicity - repeated exposure**

No data available

### **Aspiration hazard**

May be fatal if swallowed and enters airways.

### **Additional Information**

RTECS: ZE2275000

Liver injury may occur., Kidney injury may occur., Blood disorders, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance

Kidney -

---

## **12. ECOLOGICAL INFORMATION**

### **12.1 Toxicity**

Toxicity to fish                      mortality LC50 - Fish - 11.23 mg/l - 96 h  
(OECD Test Guideline 203)

Toxicity to daphnia and      Remarks: No data available  
other aquatic  
invertebrates

Toxicity to algae                  Remarks: No data available

### **12.2 Persistence and degradability**

No data available

### **12.3 Bioaccumulative potential**

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

### **12.4 Mobility in soil**

No data available

### **12.5 Results of PBT and vPvB assessment**

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

### **12.6 Other adverse effects**

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

No data available

---

## **13. DISPOSAL CONSIDERATIONS**

### **13.1 Waste treatment methods**

#### **Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**  
Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes  
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1307      Class: 3      Packing group: III      EMS-No: F-E, S-D  
Proper shipping name: XYLENES

### IATA

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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## 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
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.

H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

**HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

**NFPA Rating**

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

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

Version: 5.5

Revision Date: 06/02/2016

Print Date: 06/21/2016

## SAFETY DATA SHEET

Version 4.7  
Revision Date 12/28/2015  
Print Date 05/01/2016

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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

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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
<b>Nickel</b>		
	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

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## 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**

Nickel	CAS-No. 7440-02-0	Revision Date 2007-07-01
<b>Pennsylvania Right To Know Components</b>		
Nickel	CAS-No. 7440-02-0	Revision Date 2007-07-01
<b>New Jersey Right To Know Components</b>		
Nickel	CAS-No. 7440-02-0	Revision Date 2007-07-01
<b>California Prop. 65 Components</b>		
WARNING! This product contains a chemical known to the State of California to cause cancer.		
Nickel	CAS-No. 7440-02-0	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
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

### HMIS Rating

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

### NFPA Rating

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

### Further information

Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://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

Version 5.5  
Revision Date 06/02/2016  
Print Date 06/21/2016

---

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : o-Xylene

Product Number : 95660  
Brand : Sigma-Aldrich  
Index-No. : 601-022-00-9

CAS-No. : 95-47-6

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

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

Company : Sigma-Aldrich  
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)**

Flammable liquids (Category 3), H226  
Acute toxicity, Inhalation (Category 4), H332  
Acute toxicity, Dermal (Category 4), H312  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 3), H412

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

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word : Danger

Hazard statement(s)

H226 : Flammable liquid and vapour.  
H304 : May be fatal if swallowed and enters airways.  
H312 + H332 : Harmful in contact with skin or if inhaled  
H315 : Causes skin irritation.  
H319 : Causes serious eye irritation.



H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.
Precautionary statement(s)	
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Synonyms	: 1,2-Dimethylbenzene
Formula	: C <sub>8</sub> H <sub>10</sub>
Molecular weight	: 106.17 g/mol
CAS-No.	: 95-47-6
EC-No.	: 202-422-2
Index-No.	: 601-022-00-9

#### Hazardous components

Component	Classification	Concentration
<b>o-Xylene</b>		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312 + H332, H315, H319, H335, H412	<= 100 %

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

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

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

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Flammable liquids

## 7.3 Specific end use(s)

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

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
o-Xylene	95-47-6	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment		

		Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
o-Xylene	95-47-6	Methylhippuric acids	1,500.000 0 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm  
Break through time: 30 min  
Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

### Body Protection

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

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |  |
|---|--|
| a) Appearance                                   | Form: liquid<br>Colour: colourless                                 |
| b) Odour  | No data available  |
| c) Odour Threshold                              | No data available  |
| d) pH   | No data available  |
| e) Melting point/freezing point                 | Melting point/range: -26 - -23 °C (-15 - -9 °F) - lit.             |
| f) Initial boiling point and boiling range      | 143 - 145 °C (289 - 293 °F) - lit.                                 |
| g) Flash point                                  | 31.0 °C (87.8 °F) - closed cup                                     |
| h) Evaporation rate                             | No data available  |
| i) Flammability (solid, gas)                    | No data available  |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 6.7 %(V)<br>Lower explosion limit: 0.9 %(V) |
| k) Vapour pressure                              | 21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)                          |
| l) Vapour density                               | No data available  |
| m) Relative density                             | 0.879 g/mL at 20 °C (68 °F)  |
| n) Water solubility                             | 0.1705 g/l at 25 °C (77 °F) - partly soluble                       |
| o) Partition coefficient: n-octanol/water       | log Pow: 3.12 at 20 °C (68 °F)                                     |
| p) Auto-ignition temperature                    | 464.0 °C (867.2 °F)  |
| q) Decomposition temperature                    | No data available  |
| r) Viscosity                                    | No data available  |

- s) Explosive properties      No data available  
t) Oxidizing properties      No data available

## 9.2 Other safety information

Surface tension      29.8 mN/m at 25.0 °C (77.0 °F)

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

LC50 Inhalation - Rat - male - 6 h - 18,800 mg/m<sup>3</sup>

Dermal: No data available

LD50 Intraperitoneal - Mouse - 1,364 mg/kg

#### Skin corrosion/irritation

Skin - Rabbit

Result: Irritating to skin. - 24 h

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

- Mouse

Result: Does not cause skin sensitisation.

(OECD Test Guideline 429)

#### Germ cell mutagenicity

Ames test

Salmonella typhimurium

Result: negative

#### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:      3 - Group 3: Not classifiable as to its carcinogenicity to humans (o-Xylene)

IARC:      No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.  
No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is 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**

May be fatal if swallowed and enters airways.

**Additional Information**

RTECS: ZE2450000

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

Nerves. -

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish LC50 - Lepomis macrochirus (Bluegill) - 16.10 mg/l - 96 h

### 12.2 Persistence and degradability

Biodegradability aerobic - Exposure time 28 d  
Result: 69.67 % - Not readily biodegradable.  
(OECD Test Guideline 301F)  
Remarks: The 10 day time window criterion is not fulfilled.

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

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

### 12.6 Other adverse effects

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

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes  
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 1307      Class: 3      Packing group: III      EMS-No: F-E, S-D  
Proper shipping name: XYLENES

### IATA

UN number: 1307      Class: 3      Packing group: III  
Proper shipping name: Xylenes

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

## 16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.



H312 + H332	Harmful in contact with skin or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.

**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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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](http://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: 06/02/2016

Print Date: 06/21/2016

## SAFETY DATA SHEET

Version 4.10  
Revision Date 09/05/2018  
Print Date 12/10/2018

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : 1,1,2,2-Tetrachloroethane

Product Number : 46259

Brand : Sigma-Aldrich

Index-No. : 602-015-00-3

CAS-No. : 79-34-5

## 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)

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Acute toxicity, Inhalation (Category 2), H330  
Acute toxicity, Dermal (Category 1), H310  
Acute aquatic toxicity (Category 2), H401  
Chronic aquatic toxicity (Category 2), H411

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H310 + H330  
H411

Fatal in contact with skin or if inhaled.  
Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P260  
P262  
P264  
P270  
P271  
P273  
P280

Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
Do not get in eyes, on skin, or on clothing.  
Wash skin thoroughly after handling.  
Do not eat, drink or smoke when using this product.  
Use only outdoors or in a well-ventilated area.  
Avoid release to the environment.  
Wear protective gloves/ protective clothing.

P284	Wear respiratory protection.
P302 + P350 + P310	IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Rapidly absorbed through skin.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms : Acetylene tetrachloride

Formula :  $C_2H_2Cl_4$   
Molecular weight : 167.85 g/mol  
CAS-No. : 79-34-5  
EC-No. : 201-197-8  
Index-No. : 602-015-00-3

#### Hazardous components

Component	Classification	Concentration
<b>1,1,2,2-Tetrachloroethane</b>		
	Acute Tox. 2; Acute Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H310 + H330, H411	90 - 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

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

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

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## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

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## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

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## 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.

Recommended storage temperature 2 - 8 °C

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

### 7.3 Specific end use(s)

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

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,1,2,2-Tetrachloroethane	79-34-5	TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	1 ppm 7 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix C See Appendix A		

		Potential for dermal absorption		
		TWA	5 ppm 35 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation The value in mg/m <sup>3</sup> is approximate.		
		PEL	1 ppm 7 mg/m <sup>3</sup>	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: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 30 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

#### Body Protection

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

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

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

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |                    |                     |
|--------------------|---------------------|
| a) Appearance      | Form: liquid, clear |
| b) Odour           | No data available   |
| c) Odour Threshold | No data available   |

d) pH	No data available
e) Melting point/freezing point	Melting point/range: -43 °C (-45 °F) - lit.
f) Initial boiling point and boiling range	147 °C (297 °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	10.7 hPa (8.0 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	1.586 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	log Pow: 5
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

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## 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, Strong bases, Potassium, Nitrates, 2,4-dinitrophenyl disulfide

### 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

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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - 200.0 mg/kg

LC50 Inhalation - Mouse - 2 h - 4,500 mg/m<sup>3</sup>

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.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (1,1,2,2-Tetrachloroethane)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: KI8575000

Headache, Nausea, Vomiting, Tremors, Incoordination., fatigue, Dizziness, Anorexia.

Blood -

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 20 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates Immobilization EC50 - Daphnia magna (Water flea) - 23 mg/l - 48 h

### 12.2 Persistence and degradability

### 12.3 Bioaccumulative potential

Bioaccumulation Lepomis macrochirus (Bluegill) - 14 d  
- 0.00962 mg/l

Bioconcentration factor (BCF): 8

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

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

---

**13. DISPOSAL CONSIDERATIONS****13.1 Waste treatment methods****Product**

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

**Contaminated packaging**

Dispose of as unused product.

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**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 1702      Class: 6.1      Packing group: II  
Proper shipping name: 1,1,2,2-Tetrachloroethane  
Reportable Quantity (RQ): 100 lbs  
Poison Inhalation Hazard: No

**IMDG**

UN number: 1702      Class: 6.1      Packing group: II      EMS-No: F-A, S-A  
Proper shipping name: 1,1,2,2-TETRACHLOROETHANE  
Marine pollutant: yes

**IATA**

UN number: 1702      Class: 6.1      Packing group: II  
Proper shipping name: 1,1,2,2-Tetrachloroethane

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**15. REGULATORY INFORMATION****SARA 302 Components**

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

**SARA 313 Components**

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

	CAS-No.	Revision Date
1,1,2,2-Tetrachloroethane	79-34-5	2007-07-01

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
1,1,2,2-Tetrachloroethane	79-34-5	2007-07-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
1,1,2,2-Tetrachloroethane	79-34-5	2007-07-01

**California Prop. 65 Components**

, which is/are known to the State of California to cause cancer.  
For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

	CAS-No.	Revision Date
1,1,2,2-Tetrachloroethane	79-34-5	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
H310	Fatal in contact with skin.
H310 + H330	Fatal in contact with skin or if inhaled.
H330	Fatal if inhaled.

### 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](http://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: 4.10

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## SAFETY DATA SHEET

Version 5.6  
Revision Date 05/24/2016  
Print Date 06/21/2016

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Toluene

Product Number : 89680  
Brand : Sigma-Aldrich  
Index-No. : 601-021-00-3

CAS-No. : 108-88-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
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

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Flammable liquids (Category 2), H225  
Skin irritation (Category 2), H315  
Reproductive toxicity (Category 2), H361  
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Aspiration hazard (Category 1), H304  
Acute aquatic toxicity (Category 2), H401

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.  
H304 May be fatal if swallowed and enters airways.  
H315 Causes skin irritation.  
H336 May cause drowsiness or dizziness.  
H361 Suspected of damaging fertility or the unborn child.  
H373 May cause damage to organs through prolonged or repeated exposure.  
H401 Toxic to aquatic life.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>7</sub> H <sub>8</sub>
Molecular weight	: 92.14 g/mol
CAS-No.	: 108-88-3
EC-No.	: 203-625-9
Index-No.	: 601-021-00-3
Registration number	: 01-2119471310-51-XXXX

### Hazardous components

Component	Classification	Concentration
<b>Toluene</b>		
	Flam. Liq. 2; Skin Irrit. 2; Repr. 2; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; H225, H304, H315, H336, H361, H373, H401	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

**If inhaled**

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

**In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**

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

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

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**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

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

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

Use water spray to cool unopened containers.

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

**6.2 Environmental precautions**

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

**6.3 Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

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
Toluene	108-88-3	TWA	100 ppm 375 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	150 ppm 560 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z37.12-1967		
		CEIL	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		Peak	500 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Visual impairment Female reproductive Pregnancy loss 2015 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 375 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 560 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Toluene	108-88-3	Toluene	0.0200 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Toluene	0.0300 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		o-Cresol	0.3000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

### 8.2 Exposure controls

#### Appropriate engineering controls

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

## Personal protective equipment

### Eye/face protection

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

### Skin protection

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

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

### Body Protection

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

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |  |                                       |
|--|---------------------------------------|
| a) Appearance                              | Form: liquid<br>Colour: colourless    |
| b) Odour                                   | aromatic                              |
| c) Odour Threshold                         | No data available                     |
| d) pH                                      | No data available                     |
| e) Melting point/freezing point            | Melting point/range: -93 °C (-135 °F) |
| f) Initial boiling point and boiling range | 110 - 111 °C (230 - 232 °F)           |
| g) Flash point                             | 4.0 °C (39.2 °F) - closed cup         |
| h) Evaporation rate                        | No data available                     |
| i) Flammability (solid, gas)               | No data available                     |

j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.2 %(V)
k)	Vapour pressure	29.1 hPa (21.8 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.865 g/mL at 25 °C (77 °F)
n)	Water solubility	0.5 g/l at 15 °C (59 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	535.0 °C (995.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - > 5,580 mg/kg

LC50 Inhalation - Rat - 4 h - 12,500 - 28,800 mg/m<sup>3</sup>

LD50 Dermal - Rabbit - 12,196 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 24 h

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: No eye irritation

(OECD Test Guideline 405)

### **Respiratory or skin sensitisation**

No data available

### **Germ cell mutagenicity**

Rat

Liver

DNA damage

### **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**

Damage to fetus possible

Suspected human reproductive toxicant

Reproductive toxicity - Rat - Inhalation

Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Experiments have shown reproductive toxicity effects in male and female laboratory animals.

Developmental Toxicity - Rat - Oral

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

### **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: XS5250000

Lung irritation, chest pain, pulmonary edema, Inhalation studies on toluene have demonstrated the development of inflammatory and ulcerous lesions of the penis, prepuce, and scrotum in animals., Central nervous system

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

## **12. ECOLOGICAL INFORMATION**

### **12.1 Toxicity**

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 7.63 mg/l - 96 h
	NOEC - Pimephales promelas (fathead minnow) - 5.44 mg/l - 7 d
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 8.00 mg/l - 24 h
	Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h
Toxicity to algae	EC50 - Chlorella vulgaris (Fresh water algae) - 245.00 mg/l - 24 h
	EC50 - Pseudokirchneriella subcapitata (green algae) - 10.00 mg/l - 24 h

### **12.2 Persistence and degradability**

Biodegradability Result: - Readily biodegradable

### **12.3 Bioaccumulative potential**



Bioconcentration factor (BCF): 90

No data available

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

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Toxic to aquatic life.

### 13.1 Waste treatment methods

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.

Dispose of as unused product.

UN number: 1294      Class: 3  
Proper shipping name: Toluene  
Reportable Quantity (RQ): 100 lbs

Packing group: II

Poison Inhalation Hazard: No

UN number: 1294      Class: 3  
Proper shipping name: TOLUENE

Packing group: II

EMS-No: F-E, S-D

UN number: 1294      Class: 3  
Proper shipping name: Toluene

Packing group: II

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

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

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
---------	---------------------	-----------------------------

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
---------	---------------------	-----------------------------

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
---------	---------------------	-----------------------------

## CAS-No. Revision Date

Toluene

108-88-3

2007-07-01

**California Prop. 65 Components**

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

Revision Date  
2009-02-01

---

**16. OTHER INFORMATION**

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

Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.
Repr.	Reproductive toxicity
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

Version: 5.6

Revision Date: 05/24/2016

Print Date: 06/21/2016

## SAFETY DATA SHEET

Version 4.11

Revision Date 05/17/2018

Print Date 11/10/2018

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : 1,1,1-Trichloroethane

Product Number : 402877  
Brand : Sigma-Aldrich  
Index-No. : 602-013-00-2

CAS-No. : 71-55-6

## 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  
USATelephone : +1 800-325-5832  
Fax : +1 800-325-5052

## 1.4 Emergency telephone number

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

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Acute toxicity, Inhalation (Category 4), H332

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

Warning

Hazard statement(s)

H315

Causes skin irritation.

H332

Harmful if inhaled.

Precautionary statement(s)

P261

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

P264

Wash skin thoroughly after handling.

P271

Use only outdoors or in a well-ventilated area.

P280

Wear protective gloves.

P302 + P352

IF ON SKIN: Wash with plenty of soap and water.

P304 + P340

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P312

Call a POISON CENTER/doctor if you feel unwell.

P321

Specific treatment (see supplemental first aid instructions on this label).

P332 + P313  
P362

If skin irritation occurs: Get medical advice/ attention.  
Take off contaminated clothing and wash before reuse.

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

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Synonyms : 'Chlorothene'  
Methylchloroform

Formula : C<sub>2</sub>H<sub>3</sub>Cl<sub>3</sub>  
Molecular weight : 133.40 g/mol  
CAS-No. : 71-55-6  
EC-No. : 200-756-3  
Index-No. : 602-013-00-2

#### Hazardous components

Component	Classification	Concentration
1,1,1-Trichloroethane		
	Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Ozone 1; H315, H319, H332, H420	90 - 100 %

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

---

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

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

##### If inhaled

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

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

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

##### If swallowed

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.  
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. Containers which are opened must be carefully resealed and kept upright to prevent leakage.  
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,1,1-Trichloroethane	71-55-6	TWA	350 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	450 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Liver damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		C	350 ppm 1,900 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		See Appendix C 15 minute ceiling value		
		TWA	350 ppm 1,900 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m <sup>3</sup> is approximate.		

		PEL	350 ppm 1,900 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	450 ppm 2,450 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	800 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	Methyl chloroform	40parts per million	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Trichloroacetic acid	10 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of the workweek (After four or five consecutive working days with exposure)			
		Total trichloroethanol	30 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Total trichloroethanol	1 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 60 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an

industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### **Body Protection**

Complete suit protecting against chemicals, 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**

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<br>Colour: colourless                         |
| b) Odour  | No data available   |
| c) Odour Threshold                              | No data available   |
| d) pH   | No data available   |
| e) Melting point/freezing point                 | -35.0 °C (-31.0 °F)   |
| f) Initial boiling point and boiling range      | 72.0 - 75.0 °C (161.6 - 167.0 °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 | Upper explosion limit: 15 %(V)<br>Lower explosion limit: 7.5 %(V) |
| k) Vapour pressure                              | 133.3 hPa (100.0 mmHg) at 20.0 °C (68.0 °F)                       |
| l) Vapour density                               | No data available   |
| m) Relative density                             | 1.34 g/cm <sup>3</sup>  |
| n) Water solubility                             | 1.25 g/l at 23 °C (73 °F)   |
| o) Partition coefficient: n-octanol/water       | log Pow: 2.49   |
| p) Auto-ignition temperature                    | 537.0 °C (998.6 °F)   |
| q) Decomposition temperature                    | No data available   |
| r) Viscosity                                    | No data available   |
| s) Explosive properties                         | No data available   |
| t) Oxidizing properties                         | No data available   |

### **9.2 Other safety information**

No data available

---

## **10. STABILITY AND REACTIVITY**

### **10.1 Reactivity**

No data available

## 10.2 Chemical stability

Stable under recommended storage conditions.

Contains the following stabiliser(s):

Low alkyl epoxide ( $\leq 0.05\%$ )

## 10.3 Possibility of hazardous reactions

No data available

## 10.4 Conditions to avoid

No data available

## 10.5 Incompatible materials

Strong oxidizing agents, Potassium, Magnesium, Sodium/sodium oxides, Zinc, Strong bases

## 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 - 9,600 mg/kg

Remarks: Cardiac:Pulse rate. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

LD50 Oral - Mouse - 6,000 mg/kg

Remarks: Cardiac:Pulse rate. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

LC50 Inhalation - Mouse - 2 h - 3911 ppm

Remarks: Behavioral:Excitement.

Dermal: No data available

LD50 Intraperitoneal - Rat - 3,593 mg/kg

LD50 Intraperitoneal - Mouse - 2,568 mg/kg

LD50 Subcutaneous - Mouse - 16.0 mg/kg

Remarks: Drowsiness Behavioral:Ataxia.

LD50 Intraperitoneal - Dog - 3,100 mg/kg

Remarks: Liver:Liver function tests impaired.

### Skin corrosion/irritation

Skin - Rabbit

Result: Skin irritation - 24 h

### Serious eye damage/eye irritation

No data available

### Respiratory or skin sensitisation

No data available

### Germ cell mutagenicity

No data available

### Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (1,1,1-Trichloroethane)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

### Reproductive toxicity

No data available

No data available



**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., prolonged or repeated exposure can cause:, narcosis, Liver injury may occur., Kidney injury may occur.

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 fish LC50 - Pimephales promelas (fathead minnow) - 42.3 mg/l - 96 h

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

Bioaccumulation Lepomis macrochirus (Bluegill) - 28 d  
- 0.0734 mg/l

Bioconcentration factor (BCF): 9

**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.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 2831 Class: 6.1 Packing group: III  
Proper shipping name: 1,1,1-Trichloroethane  
Reportable Quantity (RQ): 1000 lbs  
Poison Inhalation Hazard: No

**IMDG****IATA**

UN number: 2831 Class: 6.1 Packing group: III  
Proper shipping name: 1,1,1-Trichloroethane

---

## 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
1,1,1-Trichloroethane	71-55-6	2007-07-01

### SARA 311/312 Hazards

Acute Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2007-07-01

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

## 16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H420	Harms public health and the environment by destroying ozone in the upper atmosphere.
Ozone	Hazardous to the ozone layer
Skin Irrit.	Skin irritation

### HMIS Rating

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

### NFPA Rating

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

### Further information

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**Preparation Information**

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

Version: 4.11

Revision Date: 05/17/2018

Print Date: 11/10/2018

# SAFETY DATA SHEET

n-Hexane

**Airgas**  
an Air Liquide company

## Section 1. Identification

<b>GHS product identifier</b>	: n-Hexane
<b>Chemical name</b>	: n-hexane
<b>Other means of identification</b>	: hexane; normal-Hexane; Hexyl hydride; n-Hexylhydride; n-Caproylhdyride; Hexane, normale; NSC 68472; n-HEXANE, conc. (3) 5%; hexane, n-; Hexane (n-Hexane)
<b>Product type</b>	: Liquid.
<b>Product use</b>	: Synthetic/Analytical chemistry.
<b>Synonym</b>	: hexane; normal-Hexane; Hexyl hydride; n-Hexylhydride; n-Caproylhdyride; Hexane, normale; NSC 68472; n-HEXANE, conc. (3) 5%; hexane, n-; Hexane (n-Hexane)
<b>SDS #</b>	: 001060
<b>Supplier's details</b>	: Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
<b>24-hour telephone</b>	: 1-866-734-3438

## Section 2. Hazards identification

<b>OSHA/HCS status</b>	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
<b>Classification of the substance or mixture</b>	: FLAMMABLE LIQUIDS - Category 2 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 2 AQUATIC HAZARD (ACUTE) - Category 2 AQUATIC HAZARD (LONG-TERM) - Category 2

### GHS label elements

<b>Hazard pictograms</b>	: 
--------------------------	--

<b>Signal word</b>	: Danger
<b>Hazard statements</b>	: May form explosive mixtures with air. Highly flammable liquid and vapor. Suspected of damaging fertility or the unborn child. May cause drowsiness or dizziness. May cause damage to organs through prolonged or repeated exposure. Toxic to aquatic life with long lasting effects.

### Precautionary statements

<b>General</b>	: Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.
<b>Prevention</b>	: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Do not breathe vapor.

## Section 2. Hazards identification

<b>Response</b>	: Collect spillage. Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
<b>Storage</b>	: Store locked up. Store in a well-ventilated place. Keep cool.
<b>Disposal</b>	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
<b>Hazards not otherwise classified</b>	: None known.

## Section 3. Composition/information on ingredients

<b>Substance/mixture</b>	: Substance
<b>Chemical name</b>	: n-hexane
<b>Other means of identification</b>	: hexane; normal-Hexane; Hexyl hydride; n-Hexylhydride; n-Caproylhydride; Hexane, normale; NSC 68472; n-HEXANE, conc. (3) 5%; hexane, n-; Hexane (n-Hexane)
<b>Product code</b>	: 001060

### CAS number/other identifiers

**CAS number** : 110-54-3

<b>Ingredient name</b>	<b>%</b>	<b>CAS number</b>
n-hexane	100	110-54-3

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

<b>Eye contact</b>	: 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 following exposure or if feeling unwell.
<b>Inhalation</b>	: 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.
<b>Skin contact</b>	: Wash contaminated skin with soap and 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.
<b>Ingestion</b>	: 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 necessary, call a poison center or physician. 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

## Section 4. First aid measures

### Potential acute health effects

- Eye contact** : No known significant effects or critical hazards.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression.

### Over-exposure signs/symptoms

- Eye contact** : No specific data.
- Inhalation** : Adverse symptoms may include the following: nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness, reduced fetal weight, increase in fetal deaths, skeletal malformations
- Skin contact** : Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations
- Ingestion** : Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations

### 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.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

- 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. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. 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 specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- 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). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact 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 get in eyes or on skin or clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Avoid release to the environment. Do not ingest. Empty containers retain product residue and can be hazardous. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Do not reuse container. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Do not breathe vapor or mist. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid exposure during pregnancy.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Store locked up. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

Ingredient name	Exposure limits
n-hexane	<p><b>ACGIH TLV (United States, 3/2017).</b>  <b>Absorbed through skin.</b>  TWA: 50 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 10/2016).</b>  TWA: 180 mg/m<sup>3</sup> 10 hours.  TWA: 50 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6/2016).</b>  TWA: 1800 mg/m<sup>3</sup> 8 hours.  TWA: 500 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b>  TWA: 180 mg/m<sup>3</sup> 8 hours.  TWA: 50 ppm 8 hours.</p>

#### 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

##### Hand protection

- : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

##### Body protection

- : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

##### Other skin protection

- : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

#### Respiratory protection

- : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.



## Section 9. Physical and chemical properties

### Appearance

Physical state	: Liquid. [COLORLESS LIQUID WITH A MILD GASOLINE-LIKE ODOR]
Color	: Colorless.
Odor	: Characteristic.
Odor threshold	: Not available.
pH	: Not available.
Melting point	: -95.35°C (-139.6°F)
Boiling point	: 68.73°C (155.7°F)
Critical temperature	: 234.25°C (453.6°F)
Flash point	: Closed cup: -22°C (-7.6°F)
Evaporation rate	: 6.82 (butyl acetate = 1)
Flammability (solid, gas)	: Extremely flammable in the presence of the following materials or conditions: oxidizing materials.
Lower and upper explosive (flammable) limits	: Lower: 1.1% Upper: 7.5%
Vapor pressure	: 17 kPa (127.51 mm Hg) [room temperature]
Vapor density	: 3 (Air = 1)
Specific Volume (ft <sup>3</sup> /lb)	: 1.5138
Gas Density (lb/ft <sup>3</sup> )	: 0.6606 (25°C / 77 to °F)
Relative density	: 0.7
Solubility	: Not available.
Solubility in water	: 0.01 g/l
Partition coefficient: n-octanol/water	: 4
Auto-ignition temperature	: 225°C (437°F)
Decomposition temperature	: Not available.
Viscosity	: Dynamic (room temperature): 0.3 mPa·s (0.3 cP)
Flow time (ISO 2431)	: Not available.
Molecular weight	: 86.18 g/mole
<b>Aerosol product</b>	
Heat of combustion	: -44766196 J/kg

## Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	: 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.

## 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

Product/ingredient name	Result	Species	Dose	Exposure
n-hexane	LC50 Inhalation Gas. LC50 Inhalation Vapor LD50 Oral	Rat Rat Rat	48000 ppm 96000 ppm 15840 mg/kg	4 hours 1 hours -

#### Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
n-hexane	Eyes - Mild irritant	Rabbit	-	10 milligrams	-

#### Sensitization

Not available.

#### Mutagenicity

Not available.

#### Carcinogenicity

Not available.

#### Reproductive toxicity

Not available.

#### Teratogenicity

Not available.

#### Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
n-hexane	Category 3	Not applicable.	Narcotic effects

#### Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
n-hexane	Category 2	Not determined	Not determined

#### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

#### Potential acute health effects

**Eye contact** : No known significant effects or critical hazards.

**Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

**Skin contact** : No known significant effects or critical hazards.

**Ingestion** : Can cause central nervous system (CNS) depression.

#### Symptoms related to the physical, chemical and toxicological characteristics

**Eye contact** : No specific data.

## Section 11. Toxicological information

- Inhalation** : Adverse symptoms may include the following:, nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness, reduced fetal weight, increase in fetal deaths, skeletal malformations
- Skin contact** : Adverse symptoms may include the following:, reduced fetal weight, increase in fetal deaths, skeletal malformations
- Ingestion** : Adverse symptoms may include the following:, reduced fetal weight, increase in fetal deaths, skeletal malformations

### 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** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : Suspected of damaging the unborn child.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : Suspected of damaging fertility.

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

Product/ingredient name	Result	Species	Exposure
n-hexane	Acute LC50 2500 µg/l Fresh water	Fish - Pimephales promelas	96 hours

### Persistence and degradability

Not available.

### Bioaccumulative potential

Product/ingredient name	LogP <sub>ow</sub>	BCF	Potential
n-hexane	4	501.187	high

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.









**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

### Disposal methods

- The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1208	UN1208	UN1208	UN1208	UN1208
UN proper shipping name	Hexanes	Hexanes	Hexanes	Hexanes	Hexanes
Transport hazard class(es)	3  	3  	3 	3  	3 
Packing group	II	II	II	II	II
Environmental hazards	Yes.	Yes.	Yes. The environmentally hazardous substance mark is not required.	Yes.	Yes. The environmentally hazardous substance mark is not required.

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

### Additional information

#### DOT Classification

- This product is not regulated as a marine pollutant when transported on inland waterways in sizes of ≤5 L or ≤5 kg or by road, rail, or inland air in non-bulk sizes, provided the packagings meet the general provisions of §§ 173.24 and 173.24a. **Reportable quantity** 5000 lbs / 2270 kg [907.77 gal / 3436.3 L]. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

#### TDG Classification

- Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.18-2.19 (Class 3), 2.7 (Marine pollutant mark). The marine pollutant mark is not required when transported by road or rail. **Explosive Limit and Limited Quantity Index** 1  
**Passenger Carrying Ship Index** Forbidden  
**Passenger Carrying Road or Rail Index** 5

#### IMDG

- The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.

#### IATA

- The environmentally hazardous substance mark may appear if required by other transportation regulations.

- 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.

## Section 14. Transport information

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

## Section 15. Regulatory information

U.S. Federal regulations : TSCA 8(a) CDR Exempt/Partial exemption: Not determined

Clean 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 : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

### SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	n-hexane	110-54-3	100
Supplier notification	n-hexane	110-54-3	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.

### International regulations

#### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

#### Montreal Protocol (Annexes A, B, C, E)

Not listed.

#### Stockholm Convention on Persistent Organic Pollutants

Not listed.

#### Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

#### UNECE Aarhus Protocol on POPs and Heavy Metals

## Section 15. Regulatory information

Not listed.

### Inventory list

<b>Australia</b>	: This material is listed or exempted.
<b>Canada</b>	: This material is listed or exempted.
<b>China</b>	: This material is listed or exempted.
<b>Europe</b>	: This material is listed or exempted.
<b>Japan</b>	: <b>Japan inventory (ENCS)</b> : This material is listed or exempted. <b>Japan inventory (ISHL)</b> : This material is listed or exempted.
<b>Malaysia</b>	: This material is listed or exempted.
<b>New Zealand</b>	: This material is listed or exempted.
<b>Philippines</b>	: This material is listed or exempted.
<b>Republic of Korea</b>	: This material is listed or exempted.
<b>Taiwan</b>	: This material is listed or exempted.
<b>Thailand</b>	: Not determined.
<b>Turkey</b>	: This material is listed or exempted.
<b>United States</b>	: This material is listed or exempted.
<b>Viet Nam</b>	: Not determined.

## Section 16. Other information

### Hazardous Material Information System (U.S.A.)

Health	/	2
Flammability		4
Physical hazards		0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

### National Fire Protection Association (U.S.A.)



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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

## Section 16. Other information

Classification	Justification
FLAMMABLE LIQUIDS - Category 2	On basis of test data
TOXIC TO REPRODUCTION (Fertility) - Category 2	Expert judgment
TOXIC TO REPRODUCTION (Unborn child) - Category 2	Expert judgment
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3	Expert judgment
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Expert judgment
AQUATIC HAZARD (ACUTE) - Category 2	On basis of test data
AQUATIC HAZARD (LONG-TERM) - Category 2	Expert judgment

### History

**Date of printing** : 12/22/2017

**Date of issue/Date of revision** : 12/22/2017

**Date of previous issue** : No previous validation

**Version** : 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 = 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.