



## **Remedial Investigation/Interim Remedial Measures Workplan**

**For:**

**Cottage-Garden Auto Repair Site  
(BCP# C360180)**

**30 Garden Street and 16 Cottage Place  
New Rochelle, New York**

**Prepared for:**

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REVISED APRIL 2019**

## CERTIFICATIONS

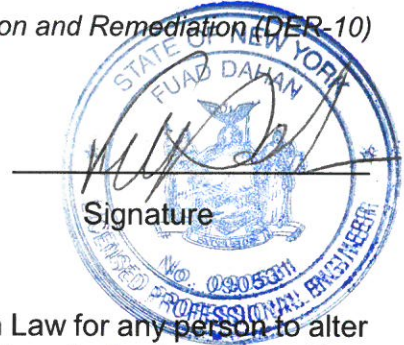
*I, Fuad Dahan, certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measure/Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10)*

090531

NYS Professional Engineer #

7/24/19

Date



Signature

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

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## 1.0 INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC) has entered into a Brownfield Cleanup Program (BCP) Agreement (BCA) Index No. C360180-11-1 for the property located at 30 Garden Street and 16 Cottage Place (also formerly known as 10 Cottage Place, and 25 and 26 Garden Street), New Rochelle, New York, which has been named the Cottage-Garden Auto Repair Site (BCP Site. # C360180) ("Site") with BCP Volunteers The Mark 95 LLC & The Mark 95 II LLC on January 16, 2019. This document comprises a Remedial Investigation Work Plan (RIWP) and an Interim Remedial Measure Plan (IRMP) to be conducted at the Site, as part of the Site's planned remedial investigation and remediation. This RIWP/IRMP includes a description of the Site, summary of the Site history and previous environmental investigations, a description of the Site's physical, geologic, hydrogeologic setting and subsurface features, and a plan of action for further investigation of the areas of concern identified previously in order to complete a nature and extent delineation of all on-Site contamination requiring remediation, and an IRMP to remove underground storage tank ("UST") removals in order to complete the investigation .

This RIWP/IRMP has been prepared to achieve the following objectives:

- To complete the delineation of the nature and extent of contamination on the Site, which will involve certain UST removals in order to complete the investigation,
- To identify any potential source areas of contamination,
- To determine the remedial action needed to protect human health and the environment, and
- To collect sufficient data to advance the remediation of the Site.

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

## 2.0 PROJECT BACKGROUND

### *2.1 Site Description*

The Site is located at 30 Cottage Place and 16 Garden Street in the City of New Rochelle, New York (Site). The Site includes Tax Map/Parcels Numbers: 3-802-0032; 3-802-0036; and 3-802-0038. The Site acreage totals approximately 0.98-acres, which has been historically utilized for residential, commercial and manufacturing purposes. **Figure 2.1** presents a Site Location Map.

The Site was formerly occupied by four commercial buildings and one residential building. All the buildings have been demolished down to their foundations. The residential parcel on 16 Cottage

Place was a two and a half story apartment building with approximately 1,000 sq. ft. of formerly occupied space. The residence was constructed as a residential single-family home in the early 1900's, with conversion to multiple apartments over the years, based on information from available records. The last business with an address of 10 – 12 Cottage Place was a retail tire and auto repair facility present on the Site for over 60 years. This portion of the Site was also once a gasoline station with underground tanks currently in place and prior uses are unknown. Commercial businesses were also present on the Site with prior addresses of 28 Garden Street and 34 Garden Street including a kitchen and bath dealer and other warehousing purposes. 26 Garden Street housed a Plastic Works manufacturing company called Strip-A-Way of New Rochelle Inc. **Figure 2.2** presents a Site Plan.

The proposed Site development includes a mixed-use project including commercial space and affordable housing residential units.

## ***2.2 Site History***

The lots were historically comprised of four commercial buildings, one residential building, and asphalt parking lots. The residential parcel was constructed in the early 1990s, with conversion to multiple apartments over the years. The remaining commercial buildings have been used as a Kitchen and Bath dealer, warehouses, retail tire and auto repair facility, a gasoline station with tanks that were closed in place in 2000/2001, and various other commercial, retail, and light manufacturing uses. The auto repair facility, former Plastic Works manufacturing and/or Strip-A-Way of New Rochelle, Inc. company on the Site were likely responsible for causing the volatile organic compounds (VOCs) and metals contamination found at the Site to date. The buildings were demolished by the Volunteers in late 2017.

## ***2.3 Previous Environmental Investigation***

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

- A. Phase I Environmental Site Assessment, 26, 34 Garden Street & 10, 16 Cottage Place, prepared by DRE Environmental, Inc., October 2016
- B. Phase II Environmental Site Assessment Report, Cottage Place and Garden Street by SESI, July 2018

### ***2.3.1 Phase I Environmental Site Assessments by DRE (October 2016)***

The following Recognized Environmental Concerns (RECs) were identified in the Phase I ESA Report prepared by DRE and SESI's review of the Site history:

- **REC 1: Former gas station with two (2) 3,000-gallon Underground Storage Tanks (USTs) remaining in place** – The corner property on Garden and Cottage, previously a tire store, was a former gasoline station. There are two abandoned 3,000-gallon gasoline USTs which were closed in place in prior to 2000, and a former 1,000-gallon heating oil UST which was

removed in 2001. There is no documentation on the closure of the two gasoline USTs. The heating oil UST was cleaned, removed, and observed by the City of New Rochelle Fire Department. The report then states that a person named IRA CONKLIN collected soil samples in 2001 on four sides of the abandoned gasoline USTs and found no indication of petroleum products in the soil. The heating oil UST removal apparently included collection of samples, and no petroleum compounds were detected in the soils. Although soil borings were conducted around the two abandoned gasoline USTs, DRE claimed they showed no evidence of petroleum compounds on the sides of these abandoned tanks, the soil beneath the USTs was not tested for petroleum compounds and no records are known to exist on the closure or condition at the time of closure. As such there is a potential for residual petroleum to have impacted the soils beneath the USTs.

- **REC 2: Additional Manufacturing Activities on the Site.** While DRE suggested that the Site's only historic use that could have resulted in contamination was the former gas station, a photo in the report reveals a small Plastic Works manufacturing facility at the 26 Garden Street parcel. A company called Strip-A-Way of New Rochelle, Inc. was located at 26 Garden Street for 20 years from 1980-2000. Trichloroethene (TCE) vapor was found in the vicinity of this portion of the Site. Therefore, it is suspected that this facility may be the source of the TCE vapor contamination as a result of the stripping operations that may have occurred in relation to the Strip-A-Way of New Rochelle, Inc. business located there.
- **REC-3: Historic Fill:** There are higher than normal levels of metals in the soils. The source may be linked to former auto repair uses or may be the result of historic fill.

The above RECs are presented on **Figure 2.3**.

### ***2.3.2 Phase II Environmental Site Assessment Report by SESI (July 2018)***

This Phase II ESA Report indicated that the Site historic uses and the investigation results revealed evidence of polynuclear aromatic hydrocarbons (PAHs), metals and PCBs above the restricted residential soil cleanup objective (RRSCOs) in the Site soils on the north side of the two gasoline USTs at soil sample location S-1. Lead, and PAHs are typically associated with petroleum hydrocarbon discharges. This report concluded that additional investigation and eventually remediation of the identified exceedances should be completed before the development on the Site. There were also high levels of iron and other metals throughout the remainder of the Site above CP-51 Residential SCOs. [NOTE: CP-51 does not clarify if the "Residential" category described in the chart is a Track 1 SCO or a Track 2 Residential SCO. Therefore, for purposes of this RIWP, it is treated as an exceedance of an applicable residential SCO.]

Based on the SESI's Phase II Environmental Site Assessment, the primary contaminants of concern detected above the RRSCOs are as follows:

#### Soil

Eight (8) soil samples were collected by SESI and analyzed from 8 borings:

- VOCs: none exceeded;

- PAHs: Benzo(a)anthracene: 3.9 mg/kg; Benzo(a)pyrene: 3.6 mg/kg, Benzo(b)fluoranthene: 5.2 mg/kg, Benzo(k)fluoranthene: 1.9 mg/kg, Chrysene: 4.1 mg/kg, Dibenz(a,h)anthracene: 0.52 mg/kg, and Indeno(1,2,3-cd)pyrene: 1.9 mg/kg
- PCBs: 1.2 mg/kg;
- Pesticides: none exceeded;
- Metals: cadmium: 18.2 mg/kg, calcium: 27,000 mg/kg max, copper: 137 mg/kg max, iron: 21,900 mg/kg max, lead: 779 mg/kg max, nickel: 335 mg/kg, silver: 3.0 mg/kg, zinc: 762 mg/kg, and mercury: 2.1 mg/kg max.

#### Soil Vapor:

Seven (7) soil vapor samples (4 sub slab and 3 sub pavement) were collected from the Site:

- Tetrachloroethene (PCE) was detected in three of seven samples at 200 µg/m<sup>3</sup>, 45 µg/m<sup>3</sup>, 110 µg/m<sup>3</sup>, and 3.8 µg/m<sup>3</sup>
- TCE was detected in three of seven samples at 3000 µg/m<sup>3</sup>, 33 µg/m<sup>3</sup>, and 26 µg/m<sup>3</sup>
- Carbon Tetrachloride was detected in one of seven samples at 17 µg/m<sup>3</sup>
- Chloroform was detected in one of seven samples at 4.3 µg/m<sup>3</sup>
- 1,1,1-Trichloroethane was detected in one of seven samples at 740 µg/m<sup>3</sup>
- 1,1,2-Trichloroethane was detected in two of seven samples at 130 µg/m<sup>3</sup>.

#### Indoor Air:

Four (4) indoor air samples were collected from the Site:

- Benzene was detected in four of four samples at 2.1 µg/m<sup>3</sup>, 0.80 µg/m<sup>3</sup>, 1.1 µg/m<sup>3</sup>, 0.99 µg/m<sup>3</sup>
- Chloroform was detected in one of four samples at 1.5 µg/m<sup>3</sup>.

#### Conclusions and Recommendations of the Phase II ESA

The chlorinated volatile organic compounds (CVOCs) exceedances in soil vapor from two sub-slab samples located in buildings on Lots 38 and 20 and a sub-pavement sample collected from Lot 20 could have been caused by a former gas station, auto repair, Plastic Works or Strip-A-Way company. The chlorinated hydrocarbon exceedances of the New York State Department of Health (NYSDOH) Guidance values and the USEPA Technical Guidance present a vapor intrusion risk potential requiring further investigation to identify if a soil source remains on-Site.

Benzene was detected in all four indoor air samples at concentrations exceeding the USEPA Target Guidance Concentrations. Benzene is typically associated with gasoline discharges. Although benzene was not detected in soil samples collected adjacent to the two gasoline USTs, it is still possible that the source of benzene in the indoor air samples are these two tanks. Additional investigation is recommended to assess the source of the benzene detected in indoor air at the Site.

A step-out remedial investigation is required to complete the delineation of the reported exceedances. Based on the additional investigation, a remedial action should be performed to remediate the impacted areas prior to any development. Additional investigation is required to determine the limit of the detected impacts to soil and soil vapor, and to determine if groundwater has been impacted.

## ***2.4 Geologic Setting***

Based on SESI's the Phase II Environmental Site Assessment, the stratigraphy of the Site, from the surface down, consists of gray and brown fine sand with little silt and gravel to depths ranging from 4 feet to 11.5 feet, underlain by gray clay. During the Phase II soil borings, groundwater was not encountered.

## ***2.5 Hydrogeologic Setting***

Groundwater was not encountered in any of the soil borings performed by SESI. Since there are no permanent groundwater monitoring wells on the Site, groundwater elevations, gradients and flow direction cannot be calculated. Based upon topography and SESI's knowledge from other environmental investigations in the area the anticipate groundwater flow is anticipated to be to the east/southeast. However, to determine the actual groundwater elevations and flow directions, Site specific hydrogeologic data is required through the installation of monitoring wells. Groundwater conditions may also vary due to seasonal changes, precipitation, well influences and variations in soil and bedrock geology.

## ***2.6 Subsurface Features***

The corner property on Garden and Cottage, formerly a tire store, was a former gasoline station. There are two underground abandoned 3,000-gallon gasoline USTs which were closed in place in prior to 2000.

## ***2.7 Summary of Environmental Assessment***

Based on the investigations conducted to date, the primary contaminants of concern (COCs) are semi-volatile organic compounds (SVOCs), heavy metals, and PCBs in soil and CVOCs in soil vapor:

**Soil:** benzo(a)anthracene: 3.9 mg/kg; benzo(a)pyrene: 3.6 mg/kg, benzo(b)fluoranthene: 5.2 mg/kg, benzo(k)fluoranthene: 1.9 mg/kg, chrysene: 4.1 mg/kg, dibenz(a,h)anthracene: 0.52 mg/kg, and indeno(1,2,3-cd)pyrene: 1.9 mg/kg. PCB exceedances include aroclor 1260 1.2 mg/kg. Metals exceedances include cadmium: 18.2 mg/kg, calcium: 27,000 mg/kg max, copper:

137 mg/kg max, iron: 21,900 mg/kg max, lead: 779 mg/kg max, nickel: 335 mg/kg, silver: 3.0 mg/kg, zinc: 762 mg/kg, and mercury: 2.1 mg/kg max.

**Soil Vapor:** Exceedances of NYSDOH and USEPA soil gas guidance values were detected for PCE was detected in three of seven samples at 200 µg/m<sup>3</sup> max; TCE 3,000 µg/m<sup>3</sup> max; Carbon Tetrachloride at 17 µg/m<sup>3</sup>; Chloroform at 4.3 µg/m<sup>3</sup>; 1,1,1-Trichloroethane at 740 µg/m<sup>3</sup>, and 1,1,2-Trichloroethane at 130 µg/m<sup>3</sup> max.

## 3.0 INTERIM REMEDIAL MEASURES (IRM)

### *3.1 IRM: REC 1 Former gas station with two (2) 3,000-gallon Underground Storage Tanks USTs*

The two (2) abandoned underground 3,000-gallon gasoline USTs will be registered with the Westchester County Department of Health (WCDOH), following the submittal of a Petroleum Bulk Storage Application once their exact size and location is known. In addition, the contractor, who is removing the tanks, will obtain a work permit from the WCDOH. Following completion of the registration the USTs will be removed as this IRM

The UST IRM will consist of completing a UST closure effort by removing the two existing and if present, third discovered USTs. These USTs may have been the source of the benzene and naphthalene soil vapor contamination discovered under the Site. All UST work will be conducted by a subcontractor licensed by the City of New Rochelle.

The NYSDEC Division of Environmental Remediation (DER) BCP Project Manager and the Westchester County Department of Health (WCDOH) will be provided a ten (10)-day notice prior to the start of UST removal activities. The petroleum bulk storage (PBS) modification form will be filed and provided as required by 6 NYCRR 612.2(d) subsequent to this IRM work.

If any liquids have accumulated in the tanks, they will be pumped and disposed of accordingly. The disposal of the liquids will be manifested. The tanks will be cleaned for appropriate scrap metal disposal.

During the IRM UST and piping removal effort, the following field observations will be made and documented:

- A description and photographic documentation of tank and pipeline conditions (e.g., pitting, holes or leak points)
- The excavation floor and sidewalls will be:
  - examined for any physical evidence of soil or groundwater contamination;
  - field screened with a calibrated PID at transects spaced no more than five (5) feet apart, so that sampling may be biased to the suspected location of greatest contamination.

Immediately after tank removal, if there is no evidence of a discharge in the existing UST excavations, confirmatory soil samples will be collected to demonstrate that the remaining soils meet the SCOs. If no groundwater is present in the excavation, discrete center line soil samples from the bottom of the excavation will be collected at a frequency equal to the total length of the tank in feet divided by five (5) (minimum of one (1) sample) and one (1) sample will be added for the fraction thereof. The samples will be spaced equidistantly and the outermost samples will be obtained at greater than 2.5-feet from each end of the tank.

Groundwater is deep and not expected to be encountered in the excavation. However, if groundwater is present in the excavation, because the USTs are anticipated to have contained No. 2 fuel oil, which has a density that is less than water, soil samples will be collected as follows:

- One sample biased based upon field screening results will be taken near or above the water table from each excavation sidewall for every 30 linear feet of sidewall (minimum of one (1) sample per sidewall).
- Where seasonal fluctuations in the water table elevation can submerge and smear product over a range of several feet, additional samples will be collected in the smear zone.

If there is evidence of a discharge, excavation will continue until all contaminated soils are removed. All grossly contaminated soils as determined by field screening will be removed. Then excavation will continue until all post-excavation confirmatory samples meet the unrestricted SCOs, or until further excavation is no longer feasible.

Confirmatory post excavation soil samples will be collected to demonstrate that all the contamination has been removed as follows:

- A minimum of five (5) soil samples will be taken, consisting of one (1) sidewall sample for each 15 linear feet of excavation, minimum four (4) samples one on each sidewall and a minimum of one (1) bottom sample. Based upon field screening, the samples will be biased toward the suspected location of greatest contamination.

The UST confirmatory soil samples will be sent to an ELAP-certified laboratory for TCL/TAL +30 and Per- and Polyfluoroalkyl Substances (PFAS) and 1-4,dioxane analysis. If analytical results of soil sampling identify impacts exceeding the unrestricted SCOs, additional excavation/removals will be conducted to the Departments satisfaction in hotspot areas, and additional confirmatory soil samples will be collected.

Any contaminated groundwater will be addressed as part of the groundwater investigation and remediation. However, if groundwater is encountered in the excavation, it will be observed for sheen or LNAPL and a sample may be collected from the excavation. If any LNAPL is observed, it will be excavated/removed to the Departments satisfaction.

All excavated soils will be characterized for proper disposal. The characterization samples will be collected in accordance with the disposal facility requirement.



Any groundwater or LNAPL that requires removal from the excavation will be either pumped in a Frac Tank or removed with a Vacuum Truck depending on the quantity and properly disposed of off-site.

SESI will prepare a tank closure report that documents the procedures for removal of underground storage tanks in accordance with WCDOH regulations including the following:

- A discussion which details the removal of any residual liquids, purging of vapors, tank inerting, and tank and piping removal procedures, and tank cleaning and tank disposal;
- A discussion of post excavation sampling and analysis and results;
- A discussion of soil removed and disposed from the Site;
- A discussion of the excavation water handling and treatment, if applicable;
- A report section that details Westchester County's acceptance of the UST closures.

The tank closure report documenting completeness of the soil removal will be sent to the WCDOH project manager for approval before determining the end of remediation in the areas listed above.

## 4.0 FIELD REMEDIAL INVESTIGATION

Soil borings and groundwater monitoring wells are proposed below based on the following rationale to complete the nature and extent delineation of contaminated soil, groundwater and soil vapor on the Site.

### ***4.1 REC 1: Former gas station with two (2) 3,000-gallon Underground Storage Tanks USTs***

#### Soil Remedial Investigation:

Five (5) soil borings will be performed on the Site to evaluate and delineate soil contamination identified in the vicinity of the closed-in-place USTs to a depth of 12 feet below ground surface or bedrock, whichever happens first. The proposed soil boring locations are shown on **Figure 4.1**. Soil samples will be collected at 5-foot depth intervals or at the depth intervals which appear to be most contaminated based on visual observations, PID readings and olfactory observations. All soil samples will be analyzed for the TCL+30/TAL, PFAS and 1-4,dioxane. This additional soil sample program will also be implemented to determine if a Track 1 Unrestricted Use remedy can be achieved. Boring logs documenting soil classifications and PID readings will be provided in the final report.

#### Groundwater Remedial Investigation:

To investigate any impact on the groundwater, one (1) groundwater monitoring well will be installed downgradient of the USTs. The well will be installed to a depth of 10 feet below the groundwater table which is anticipated to be screened from 10' to 25' bgs. Based upon topography groundwater flow is anticipated to be east/southeast. This well will be used to establish groundwater flow direction, in conjunction with monitoring wells proposed for other areas of the Site. Groundwater will be sampled for TCL/TAL +30, PFAS and 1-4,dioxane. The proposed well location is shown on **Figure 4.2**.

## ***4.2 REC 2: Additional Manufacturing Activities on the Site.***

### *Soil Remedial Investigation:*

Seven (7) soil borings will be performed on the Site to evaluate and delineate soil contamination identified in the vicinity of the tetrachloroethene (PCE) hit in soil vapor. The proposed soil boring locations are shown on **Figure 4.1**. Soil samples will be collected at 5-foot depth intervals or at the depth intervals which appear to be most contaminated based on visual observations, PID readings and olfactory observations. All soil samples will be analyzed for the TCL/TAL +30 PFAS and 1-4, dioxane. This additional soil sample program will also be implemented to determine if a Track 1 Unrestricted Use remedy can be achieved. Boring logs documenting soil classifications and PID readings will be provided in the final report.

### *Groundwater Remedial Investigation:*

To investigate any impact on the groundwater from PCE described above for REC 2 two (2) groundwater monitoring well will be installed and the groundwater sampled for TCL+30/TAL plus PFAS and 1-4,dioxane. The wells will be installed to a depth of 10 feet below the groundwater table which is anticipated to be screened from 10' to 25' bgs. One of the wells will be nested with a deeper screened casing to investigate potential deeper PCE impacts and is anticipated to be screened from 35' – 45' bgs. The proposed well location is shown on **Figure 4.2**. The well will also be used to establish groundwater flow direction beneath the site in conjunction with monitoring wells proposed for other areas of the Site.

## ***4.3 REC 3: Historic Fill***

### *Soil Remedial Investigation:*

In addition to the borings proposed for the REC 1 and REC2, eight (8) additional soil borings will be performed on the Site to evaluate and delineate soil contamination from the historic fill and for potential impacts from the historical Plastic Works manufacturing facility and Strip-A-Way of New Rochelle, Inc. at the 26 Garden Street parcel. The proposed soil boring locations are shown on **Figure 4.1**. Soil samples will be collected every five feet or at the depth intervals, which appear to be most contaminated based on visual observations, PID readings and olfactory observations. All soil samples will be analyzed for the TCL/TAL+30 and PFAS.

### *Groundwater Remedial Investigation:*

To investigate any impact on the groundwater from the historic fill described above for REC 3, two (2) groundwater monitoring wells will be installed and the groundwater sampled for TCL+30/TAL, PFAS and 1-4,dioxane. The wells will be installed to a depth of 10 feet below the groundwater table which is anticipated to be screened from 10' to 25' bgs. The proposed well location is shown on **Figure 4.2**. The well will also be used to establish groundwater flow direction beneath the Site.

### *Soil Sampling Methods:*

The depth of each boring will extend to bedrock. Soil samples will be at 5-foot depth intervals from each boring at the depth intervals which appear to be most contaminated based on visual

observations, PID readings and olfactory observations. All soil samples will be analyzed for TCL+30/TAL, PFAS and 1-4,dioxane. This additional soil sample program will also be implemented to determine if a Track 1 Unrestricted Use remedy can be achieved. Boring logs documenting soil classifications, PID readings, and visual observations will be provided in the final report.

The Site is currently entirely covered with hard surfaces including buildings and paving and hence there is no location of exposed soils to collect surface samples from 0-2". The proposed development will include a sub grade parking garage that encompasses the entire site.

Soil samples will be collected by means of a soil boring program. Soil borings shall be completed using direct push (Geoprobe®) or test pit methods, whichever method is determined to be best suited to site conditions by the SESI project manager and SESI field team leader.

Upon retrieval of the sampling barrel, the collected sample shall be placed in glass jars and labeled, stored on site (on ice in a cooler if necessary), and transmitted to the appropriate testing laboratory or storage facility. Chain-of-custody procedures will be practiced following Section 15, EPA-600/4-82-029, Handbook for Sampling and Sample Preservation of Water and Waste Waters. Soil samples for VOC analysis will be collected in Encore ® vials.

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

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

#### ***4.4 Groundwater Investigation:***

##### ***4.4.1 Groundwater Conceptual Site Model and Groundwater RI***

The applicable standards criteria and guidance (SCGs) for the Site groundwater are the Groundwater Effluent Limitations Class GA standards (cf. Section 703.6) and the proposed standards for PFOA, PFOS and 1-4,dioxane. Although the drinking water quality council has made recommendations, as of this date, standards have not yet been proposed for PFOA, PFOS or 1,4-dioxane. The five groundwater monitoring wells described above will be installed as part of the groundwater investigation. The proposed wells will be located to evaluate potential vertical delineation, off-site impacts, off-site plume migration and groundwater flow direction.

The Groundwater RI is conducted to achieve the following:

- delineate the nature and extent of REC-specific contaminants in the Site groundwater;

- Identify if REC-specific contaminants have impacted the Site groundwater;
- identify actual or potential impacts to sensitive receptors, e.g. surface water; and
- gather sufficient data to determine groundwater flow direction and evaluate groundwater Remedial alternatives, including, as appropriate, MNA.

It will also provide information on the background quality of the groundwater flowing into the Site.

All the wells will be surveyed for location and elevation. The survey data will be provided pursuant to the DER-10 requirements in an acceptable format (e.g., North America Datum 83 [NAD83]). The wells will be gauged for groundwater depth to determine the groundwater elevation. The Site-specific groundwater flow direction and gradient will be determined based on the latest elevation data and summarized in the Remedial Investigation Report (RIR). The proposed well locations are shown on **Figure 4.2**.

One round of sampling will be conducted from the newly installed wells. Prior to sampling a minimum of three (3) well volumes will be removed from each well during the development process. SESI will screen development water for water quality parameters using a water quality analyzer. Development in each well will continue until water quality parameters such as dissolved oxygen (DO), pH, conductivity, and temperature have stabilized (successive readings between well volume purges are within 10 percent).

The samples will be analyzed for TCL+30/TAL plus PFAS and 1-4,dioxane. to determine whether groundwater contamination exists, the magnitude and the extent of the potential contaminant plume. SESI's Groundwater Sampling Plan for Emerging Contaminants is presented in **Appendix B**.

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

In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. A trip blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for TCL volatiles is planned (water matrix only). The trip blank will be analyzed for TCL volatile organic

compounds as a measure of the internal laboratory procedures and their effect on the results. A field blank will be used to check the decontamination of the multi-use field equipment. The filed blank will be collected after the decontamination of the equipment. A distilled or di-ionized water will be used to rinse the equipment. The filed blank will be analyzed for the same investigation constituents, TCL/TAL + 30, 21 PFAS, and 1,4-dioxane.

The proposed groundwater monitoring wells and the rationale for their locations are presented in the table below:

Well Name	Location	Screen Depth ft-bgs	Rationale
MW-1	Former Gasoline Service Station Location	15-25 (or 10 feet in the water table)	Investigate potential petroleum hydrocarbon impacts in groundwater
MW-2	Upgradient Area	15-25 (or 10 feet in the water table)	Upgradient groundwater Sample
MW-3S	Area of Greatest CVOC Soil Vapor Impacts	15-25 (or 10 feet in the water table)	Investigate potential CVOC impacts in groundwater
MW-3D		35-45	
MW-4 and MW-5	Former Plastic Works manufacturing facility and Strip-A-Way of New Rochelle, Inc.	15-25 (or 10 feet in the water table)	Investigate potential CVOC impacts in groundwater

#### ***4.5 Soil Vapor Investigation***

There are chlorinated volatile organic compounds (CVOCs) exceedances in soil vapor from two sub-slab samples located in buildings on Lots 38 and 20 and a sub-pavement sample collected from Lot 20. In addition to the gas station, there was auto repair, Plastic Works and a Strip-A-Way company, all of which could have caused the CVOC exceedances in vapor. Additional investigation into the potential source of the chlorinated compounds on-Site shall be completed before development of the Site as part of this RIWP. The chlorinated hydrocarbon exceedances of the NYSDOH Guidance values and the USEPA Technical Guidance will be used to determine the vapor intrusion risk potential and whether there is a need for vapor mitigation.

SESI will collect six (6) soil vapor samples from six (6) soil vapor points. The soil gas samples will be collected in accordance with the procedures of the NYS Department of Health October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York. The proposed soil vapor point locations are shown on **Figure 4.3**. The purpose of the soil vapor points is to assess the potential for vapor intrusion into future buildings. Based on the results, a sub-slab decompression system (SSDS) may need to be installed during construction of any future buildings on the Site.

## **5.0 DECONTAMINATION and IDW**

Equipment utilized for ground intrusive activities (i.e. borings and wells) will be decontaminated between each boring. Equipment utilized for sample collection (i.e. spoons, trowels) will be decontaminated between each sample. Appropriate decontamination areas will be established to support work being conducted in each area of the Site.

All investigative derived waste (IDW) will be containerized, sampled, and properly disposed of pursuant to DER-10 requirements. IDW includes contaminated personal protective equipment (PPE). The excavated soil stockpile will be covered with an impermeable plastic liner and anchored to prevent migration of potential contaminants.

## **6.0 SURVEY**

After the RI sampling scope is completed, a survey will be completed, which includes the locations and elevations of all the monitoring wells and all the soil samples.

## **7.0 HUMAN HEALTH EXPOSURE ASSESSMENT**

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

Several objectives will be met by the exposure assessment. First, applicable Site information and characterization data for environmental media of concern will be evaluated. Applicable Standards, Criteria, and Guidance (SCGs) including Part 375 SCOs and CP-51 SCOs for soil, Technical and Operational Guidance Series (TOGS) Class GA water quality standards and guidance values for groundwater and surface water, and applicable state and federal Soil Vapor guidance levels and matrices will be applied.

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

## **8.0 FISH AND WILDLIFE IMPACT ANALYSIS**

A Fish and Wildlife Resources Impact Analysis (FWIA) Decision Key will be completed by SESI prior to the excavation work to determine if a FWIA is needed. Contaminant migration pathways and any fish and wildlife exposure pathways will be identified. As stated in the FWIA, "if no

resources are associated with the site or if there is no potential for contaminant migration to the resources, then only the necessary information to support that conclusion should be provided.” If the results from the RI, along with site inspections, support this conclusion, documentation will be submitted with the RI Report.

If resources are identified, or migration pathways exist, a FWIA will be completed and submitted as part of the RI Report. The FWIA would be completed to identify actual or potential impacts to fish and wildlife resources from Site contaminants. The FWIA would qualitatively determine the route, intensity, frequency, and duration of actual or potential exposures to chemicals, describe the nature and size of the population exposed to the contaminants that are present at or migrating from the site, and characterize the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. However, on this Site, which is located in an urban setting without any proximate water resource, a Fish & Wildlife assessment is not likely to be necessary.

## 9.0 DUSR

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

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

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

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

## 10.0 REMEDIAL INVESTIGATION REPORT

Following the completion of the RI activities and the receipt of sample results, a Remedial Investigation Report (RIR) report will be prepared. The RIR report will summarize the activities completed during the RI including analytical results, well logs, waste characterization information for disposal purposes, conclusions from the FWIA if necessary, a Data Usability Summary Report (DUSR) and scaled figures showing the sample locations and areas of contamination. Sampling results will be summarized and discussed and the need for additional investigation and remediation will be evaluated.

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

## 11.0 QUALITY ASSURANCE/QUALITY CONTROL

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

## 12.0 HEALTH AND SAFETY PLAN

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

## 13.0 COMMUNITY AIR MONITORING

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

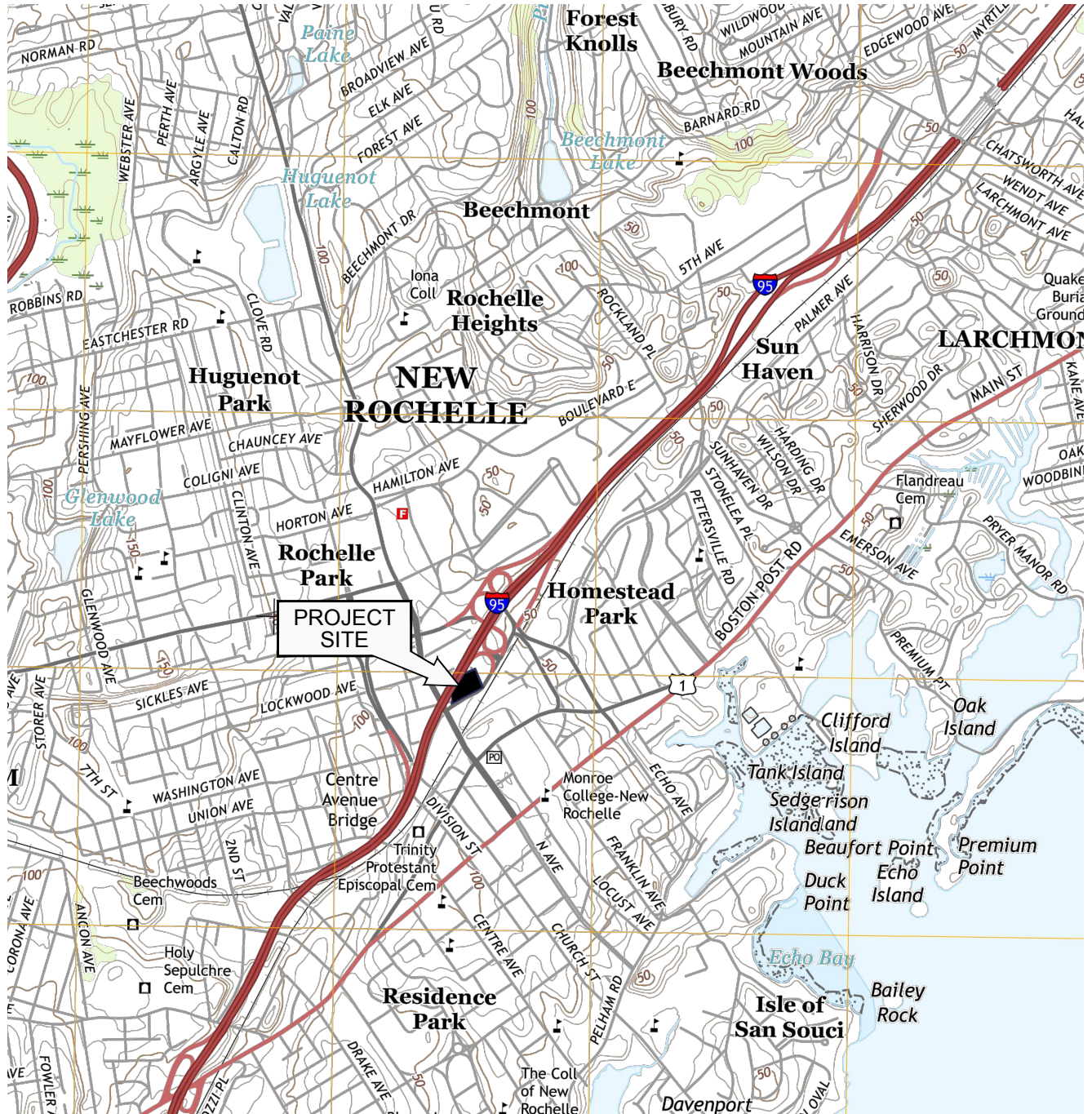
## 14.0 CITIZEN PARTICIPATION

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



## FIGURES

N:\ACAD\10491\10491 SITE LOCATION MAP.DWG 01/09/19 01:18:25PM, jenny, LAYOUT: FIG-2.1



**Produced by the United States Geological Survey**

North American Datum of 1983 (NAD83)  
World Geodetic System of 1984 (WGS84). Projection and  
1 000-meter grid: Universal Transverse Mercator, Zone 18T  
10 000-foot ticks: New York Coordinate System of 1983 (east and  
long island zones)

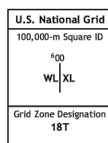
This map is not a legal document. Boundaries may be  
generalized for this map scale. Private lands within government  
reservations may not be shown. Obtain permission before  
entering private lands.

Imagery.....NAIP, June 2013  
Roads.....U.S. Census Bureau, 2015 - 2016  
Names.....GNIS, 2016  
Hydrography.....National Hydrography Dataset, 2013  
Contours.....National Elevation Dataset, 2015  
Boundaries.....Multiple sources; see metadata file 1972 - 2016

Wetlands.....FWS National Wetlands Inventory 1977 - 2014



UTM GRID AND 2016 MAGNETIC NORTH  
DECLINATION AT CENTER OF SHEET



QUADRANGLE LOCATION

1	2	3
4	5	6
7	8	9

ADJOINING QUADRANGLES

1 Nyack  
2 White Plains  
3 Glenville  
4 Yonkers  
5 Mamaroneck  
6 Central Park  
7 Flushing  
8 Sea Cliff

GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY

**SITE LOCATION MAP**

**SESI**  
CONSULTING  
ENGINEERS D.P.C.

SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL

12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

**FIG-2.1**

DRAWN BY: yy

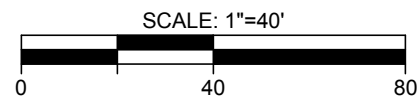
CHECKED BY: SG

SCALE: N.T.S.

DATE: 01/09/19

JOB NO.: 10491

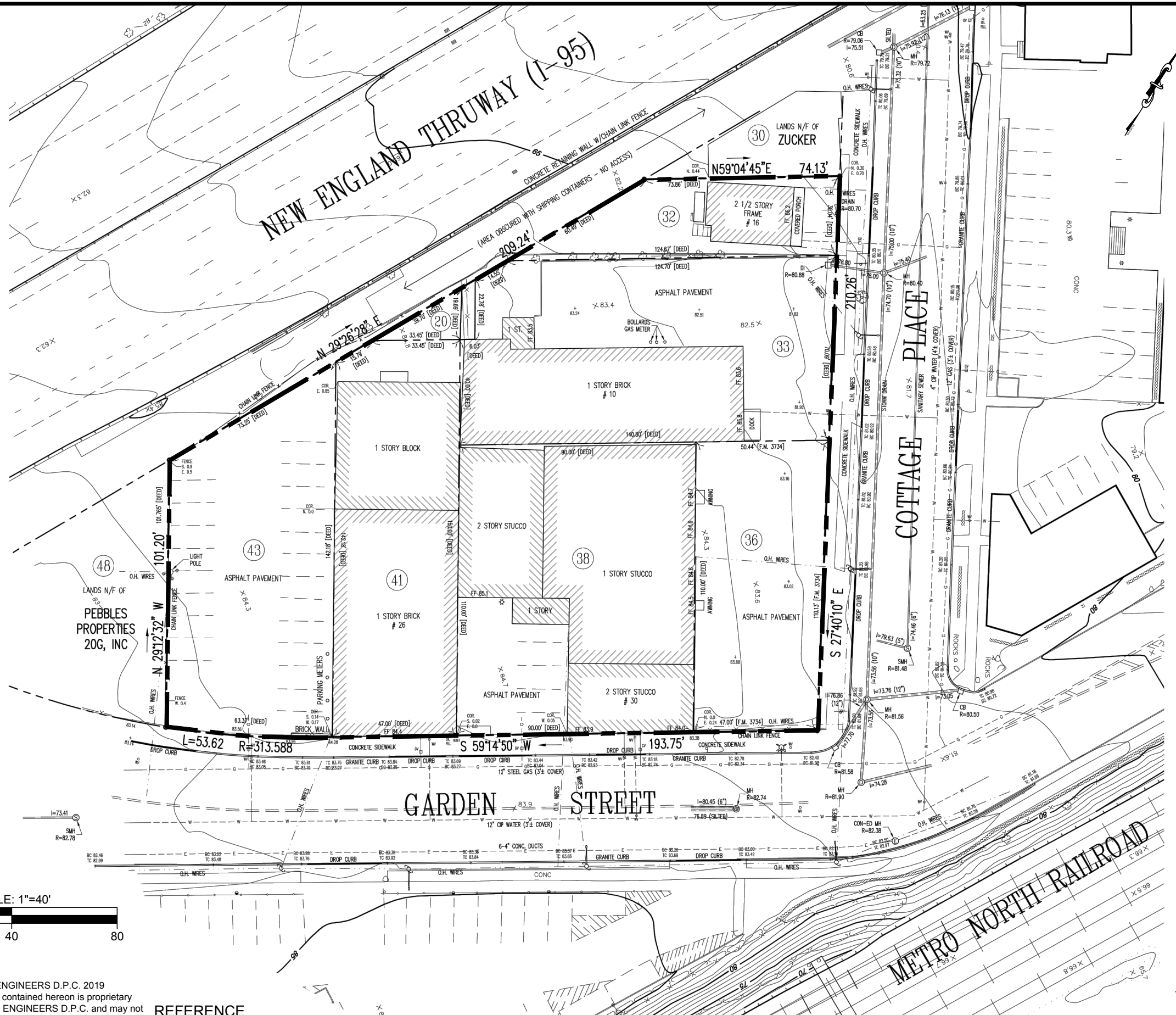
N:\ACAD\10491\10491 SITE PLAN.DWG 01/29/19 10:20:52AM, jenny, LAYOUT:FIG-2.2



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PREPARED BY CONTRACTORS' LINE & GRADE LLC.JUNE 8, 2017. LATEST REV DATE 10/19/2017.



#### LEGEND:

— — — — — - PROPERTY BOUNDARY

project:

GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY

drawing title:

SITE PLAN

job no: 10491  
drawing no:

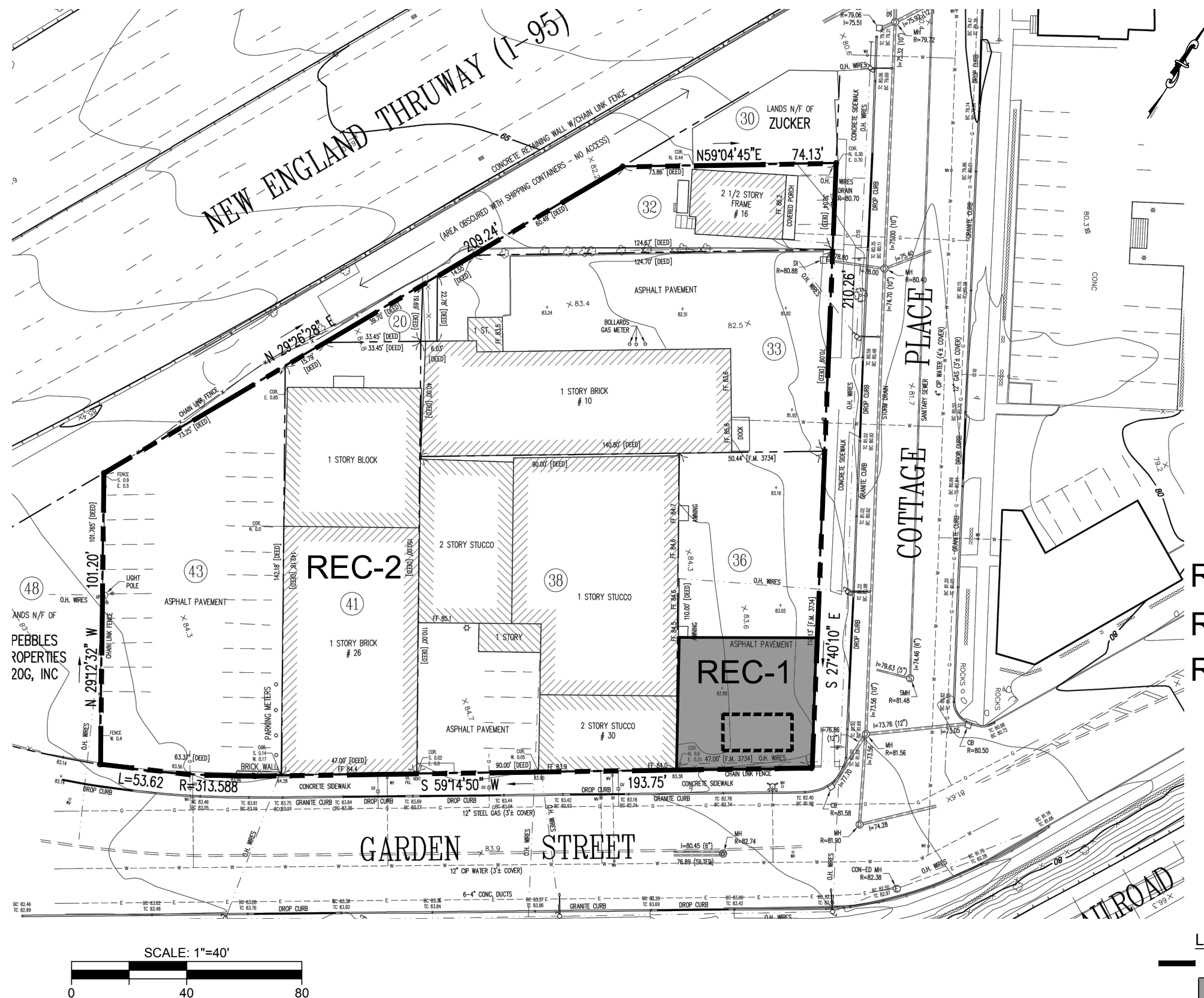
FIG-2.2

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SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL

12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: yy  
chk by: SG  
scale: 1" = 40  
date: 01/29/19



**REC-1 - UST**

REC-2 - FORMER PLASTIC WORKS

### REC-3 - HISTORIC FILL IS SITE-WIDE

LEGEND:

■ - PROPERTY BOUNDARY

- FORMER GAS STATION AREA  
WITH 2 ABANDONED USTS

- APPROXIMATE ABANDONED  
UST AREA

GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY

drawing title:

# REC LOCATION PLAN

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SITE DESIGN  
ENVIRONMENTAL

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b no: 10491  
drawing no:

**FIG-2.3**

dwg by: yy

chk by: SG

scale: 1" = 40'

date: 01/29/19

N:\ACAD\10491\10491 REC LOCATION PLAN.DWG 01/29/19 10:23:22AM, jenny, LAYOUT: FIG-2.3

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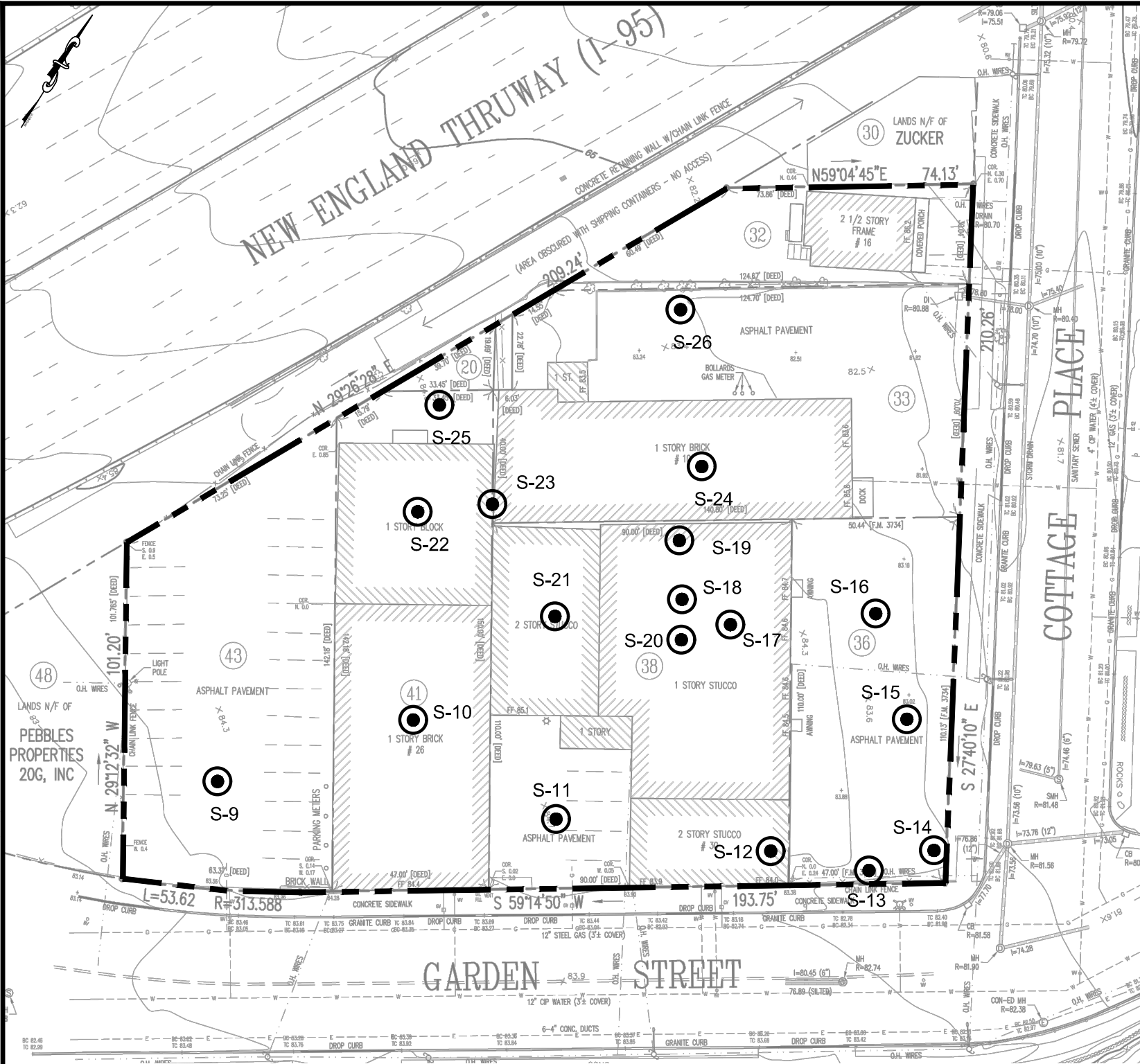
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N:\ACAD\10491\RIWP IRM\10491 FIG-4.1 TO 4.3.DWG 01/17/19 02:44:07PM, jenny, LAYOUT:FIG-4.1



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**NOTE:**  
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OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

project:  
GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY

job no: 10491  
drawing no:

**FIG-4.1**

drawing title:  
LOCATION OF PROPOSED  
SOIL BORINGS

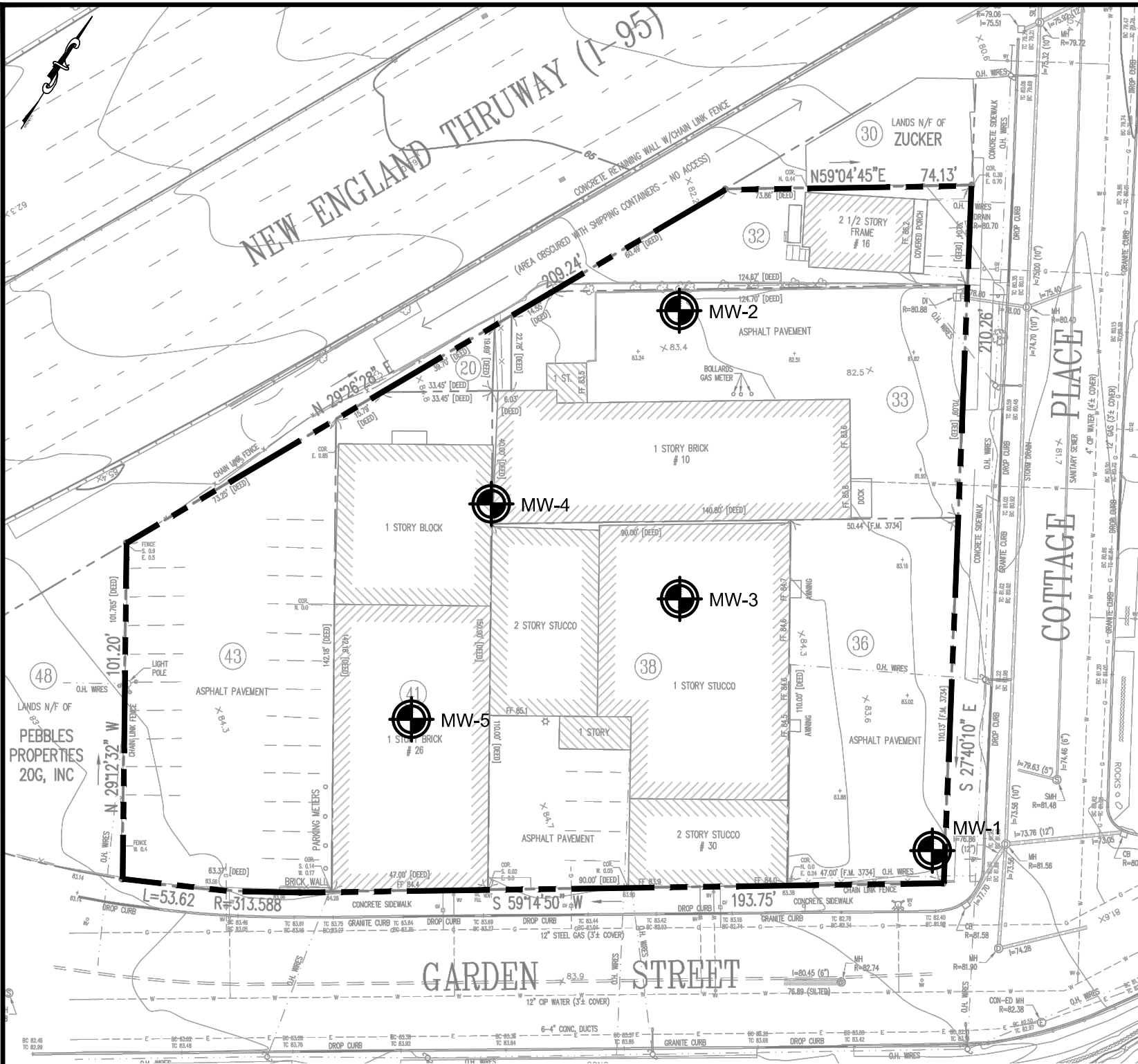
SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL

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12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: yy  
chk by: JS  
scale: 1" = 40  
date: 01/29/18

N:\ACAD\10491\RIWP IRM\10491 FIG-4.1 TO 4.3.DWG 01/17/19 02:44:34PM, jenny, LAYOUT:FIG-4.2



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project: GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY  
drawing title: LOCATION OF PROPOSED  
GROUNDWATER MONITORING WELL

job no: 10491  
drawing no:

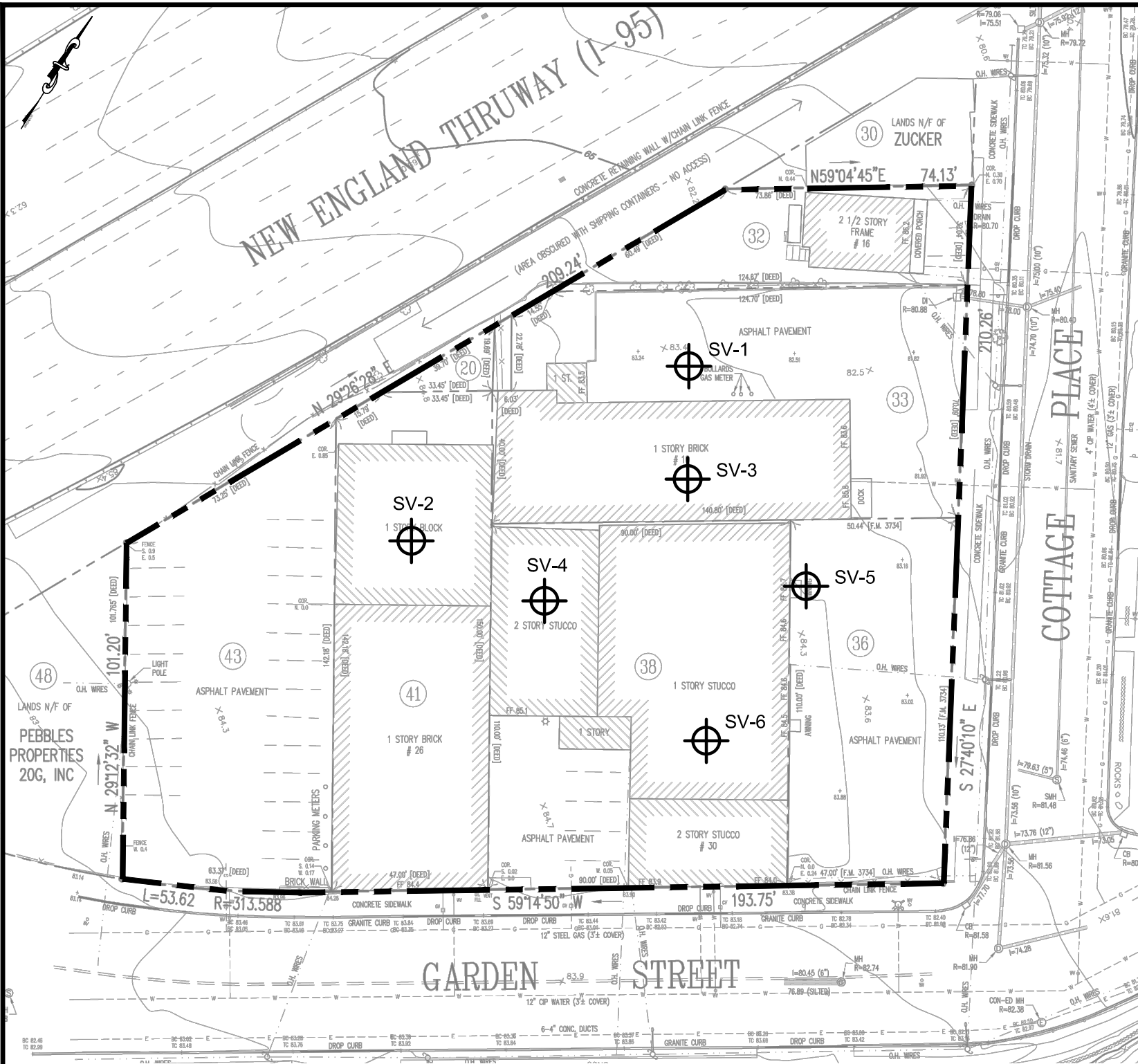
**FIG-4.2**

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SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL

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dwg by: yy  
chk by: JS  
scale: 1" = 40  
date: 01/29/18

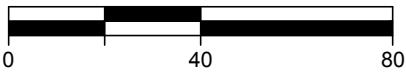
N:\ACAD\10491\RIWP IRM\10491 FIG-4.1 TO 4.3.DWG 01/17/19 02:44:51PM, Jenny, LAYOUT: FIG-4.3



LEGEND:

- PROPERTY BOUNDARY
- FORMER GAS STATION AREA WITH 2 ABANDONED USTS
- APPROXIMATE ABANDONED UST AREA
- SV-1 - PROPOSED SOIL VAPOR POINT

SCALE: 1"=40'



NOTE:  
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project:

GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY

drawing title: LOCATION OF PROPOSED  
SOIL VAPOR POINTS

job no: 10491  
drawing no:

FIG-4.3

SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL

SESI  
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12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: yy  
chk by: JS  
scale: 1" = 40  
date: 01/29/18

**APPENDIX A:**  
**PREVIOUS ENVIRONMENTAL REPORTS**  
**(ELECTRONIC)**



# **PHASE I ENVIRONMENTAL RISK REVIEW**

**26, 34 GARDEN STREET  
&  
10, 16 COTTAGE PLACE  
NEW ROCHELLE, NEW YORK**

**prepared for**

**1955 Central Avenue  
Yonkers, New York**

**prepared by**

**DRE Environmental, Inc.**

**PO Box 273  
Millwood, NY 10546**

**(914) 588-5169**

**October 2016**

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## APPENDICES

## **PHASE I - ENVIRONMENTAL SITE ASSESSMENT**

### **26, 34 Garden Street & 10, 16 COTTAGE PLACE New Rochelle, New York**

This report documents the findings of the Phase I Environmental Site Assessment performed at the property and building known as and located at 26, 34 Garden Street & 10, 16 COTTAGE PLACE, New Rochelle, County of Westchester, NY. Parcels 3-802-0030, 0032, 0033, 0036, 0038

The purpose of the report is to document "recognized environmental conditions" regarding the property and adjacent sites as defined by the American Society of Testing and Materials (ASTM) Site Assessment Standard. The work was performed following the protocols and review limitations recommended by the ASTM Standard Practices for Environmental Site Assessments, E1527-13. The report summarizes the information gathered and observations made during the investigation.

The field work was performed by Donald R. Elmendorf and by other qualified staff of DRE ENVIRONMENTAL, inc. The field and background investigation were conducted during October 2016.

The background information gathering tasks included review of published information from the US EPA, New York State Department of Environmental Conservation, Westchester County Department of Health, and the City of New Rochelle. The agencies were queried regarding practically reviewable historical records and files regarding water, sewer, waste storage and other environmental concerns at the subject site or adjacent properties. The historical record search goal is to investigate past uses over the historical period of time beginning when the property was not yet developed, or 1940 to present. DRE ENVIRONMENTAL, inc. reviewed available reports; area USGS topographic maps, highway and site maps, and available aerial photographs. DRE ENVIRONMENTAL, inc. also reviewed the practically available public information files for the above information regarding adjoining properties.

The field investigation involved the visual inspection of the property, buildings, and surrounding properties to identify "recognized environmental conditions" and any potential facility maintenance or operational practices at this property which might have in the past compromised environmental quality at the subject or adjoining sites, or possibly pose a future "recognized environmental condition". The investigation also

focused on the identification of current potential sources of environmental contamination or conditions, and any potential adjoining property facility maintenance or operational practices on which might present a current potential liability or possibly cause a future environmental condition.

The report is organized into two sections. SECTION I relates only to the subject property. SECTION II relates to properties adjoining to the subject property. The report summarizes the investigative format used to survey the environmental conditions regarding this property and adjoining properties.

## **SECTION I - SUBJECT PROPERTY**

### **A. PRESENT LAND USE AND BUSINESS PRACTICES**

The subject property comprises four commercial buildings and one residential building. The combined parcels comprise approximately three quarters acres of land. The residential parcel on Cottage Place is a two and one half story apartment building with approximately 1,000 sq. ft. of occupied space. The residence was constructed as a residential single family home in the early 1900's, with conversion to multiple apartments over the years, based on information from available records.

The 16 Cottage Place is a single story masonry structure with approximately 1,200 sq. ft. of floor area used for a Kitchen and Bath dealer and other similar warehousing purposes.

The property at 10 – 12 Cottage place is a retail tire and auto repair facility present on the site for over 60 years. The property was once a gasoline station with tanks currently closed on place and prior uses unknown.

28 Garden Street and 34 Garden Street are commercial properties with retail uses documented over the years.

Figure 1 schematically depicts the site, and the property location. The properties in this report are discussed collectively, unless specific information is noted for a particular site.

### **B. PAST LAND USE AND BUSINESS PRACTICES**

Prior use is documented to the early 1900's. The area has been both residential along Cottage Place and retail along Garden Street throughout its history of use.

## **C. PHYSICAL SITE CHARACTERISTICS**

### **1. Topography**

The topography on the site is sloped downward to the north and east, with the area to the southwest at a much higher elevation. The property is nearly 100 percent covered with impermeable surface materials consisting of the building and concrete walks.

### **2. Surficial Geology and Soils**

The area geology typically consists of shallow gravel soils overlying granite bedrock. Based on the soils maps and discussions with the City of New Rochelle, the subsurface conditions of the region do not exhibit unusual geologic conditions to the subject property or to adjoining site properties.

### **3. Surface Waters**

The property is fully developed land with no surface water on site.

## **D. PHYSICAL STRUCTURE CONDITIONS**

The following paragraphs detail the findings of the review for physical "recognized environmental conditions" identified at the time of the site reconnaissance.

### **1. Asbestos**

Based on the age of the building and visible observation, friable asbestos containing materials, as defined by the US EPA, was observed in the structure. Specifically flooring tiles throughout the structure and likely the associated mastics. However, based on the age of the buildings asbestos there is a likelihood that other asbestos will be encountered in the buildings. At this time no action is required, if the buildings are demolished or heavily modified an asbestos survey should be conducted by a licensed asbestos investigator.

### **2. Fuels & Chemicals on Site**

Electricity and natural gas are the fuels now used at the site to heat the building and water. The sites had heating oil but have been converted to natural gas over the years.

### **3. Underground Storage Tanks**

The corner property on Garden and Cottage currently the tire store is a former gasoline station. There are two in ground abandoned 3000 gallon gasoline tanks closed in place in prior to 2000, and a former 1,000 gallon heating oil tank which was removed in 2001. There is no documentation on the closure of the two gasoline tanks were tank. The heating oil tank was cleaned, removed, and observed by the City of New Rochelle Fire Department. IRA CONKLIN in 2001 collected soil samples on four sides of the abandoned gasoline tanks and found no indication of petroleum products in the soil. The heating tank removal included collection of samples, and found no petroleum products in the soils. As there are no records on who closed the gasoline tanks, the tanks' condition, and when they were abandoned, caution should be taken in respect to whether or not the site has been impacted by those tanks in the past. Further, soil borings did not extend to bedrock such there is no comprehensive site assessment conducted on those tanks on record. The other properties have no record of heating oil or gasoline tanks on site.

There are no open spill cases on the property at this time.

### **4. Drinking Water & Wastewater**

The subject parcels are connected to the public water supply system. The property uses the public sewage treatment system for the sanitary waste disposal.

### **5. Federal, State or Local List of Hazardous Waste Sites**

The subject site is not a listed local, state or federal hazardous waste site. See Appendix C for a listing databases reviewed. Based on the information available from the City of New Rochelle Building Department and the NYS DEC and Westchester County Health Department, the subject facility is not currently subject to environmental enforcement or litigation action.

### **6. Radon**

Regionally, radon may be considered a moderate concern.

### **7. Environmental Permits**

The facility requires no permits at this time. However a review of the City of New Rochelle records indicate that there are over 14 known open building department

permits on these properties overall. 20 Cottage street has 6, 10 Cottage has 4, 34 Garden has 4.

## **8. Waste Generation**

The facility generates residential and retail commercial type of wastes.

## **9. Lead Based Paint**

The buildings were constructed during a period that Lead based paint was used as a paint for residential buildings. No action is recommended at this time.

## **10. Physical Signs of Contamination on or Around the Property**

Within the property bounds as defined by adjoining properties, there are no significant visible "recognized environmental conditions" on the property as defined by the ASTM standard. However, we have a condition that must be noted. Although soil borings in the vicinity of the two abandoned gasoline tanks showed no evidence of petroleum compounds to the sides of these abandoned tanks, the soils beneath the tanks were not tested for petroleum compounds and no records are known to exist on the tanks' closure or condition at the time of closure. As such there is a potential for residual petroleum to have impacted the soils beneath the tanks. This is not an actionable condition per the NYS DEC at this time, but if the site is renovated and the tanks are removed the potential for encountering petroleum impacted soils exists based on our experience with similar tanks at other properties over our years of experience.

## **E. ENVIRONMENTAL RISKS SUMMARY**

Within the property bounds as defined by adjoining properties, there are no significant visible "recognized environmental conditions" on the property as defined by the ASTM standard. However, we have a condition that must be noted. Although soil borings in the vicinity of the two abandoned gasoline tanks showed no evidence of petroleum compounds to the sides of these abandoned tanks, the soils beneath the tanks were not tested for petroleum compounds and no records are known to exist on the tanks' closure or condition at the time of closure. As such there is a potential for residual petroleum to have impacted the soils beneath the tanks. This is not an actionable condition per the NYS DEC at this time, but if the site is renovated and the tanks are removed the potential for encountering petroleum impacted soils exists based on our experience with similar tanks at other properties over our years of experience.

## **SECTION II - ADJACENT PROPERTIES**

### **A. PRESENT LAND USE AND BUSINESS PRACTICES**

The adjacent area is primarily highways with a mix of commercial and residential properties. All properties are downgradient of the subject parcels. Refer to the aerial photo for neighborhood characteristic.

### **B. PAST LAND USE AND BUSINESS PRACTICES**

Land use has stayed the same general type for the nearly the past 100 years based on historical maps.

### **C. PHYSICAL SITE CHARACTERISTICS**

#### **1. Topography**

The topography in the areas adjacent to the property comprises gently rolling hills, all properties are downgradient of the subject properties.

### **D. PHYSICAL SITE CONDITIONS OF ADJACENT PROPERTIES**

The following paragraphs detail the findings of the review for physical environmental concerns or hazards in the area.

#### **1. Asbestos**

Friable asbestos containing materials, as defined by the US EPA, is likely to be incorporated into some building materials installed before 1978 on nearby structures. Such asbestos containing material at adjoining sites will have no foreseeable impact on the subject site.

#### **2. Fuels**

Natural gas, electric, and heating oil are the fuels typically used in the residential and commercial area.



### **3. Chemicals**

There are no nearby and adjoining sites which are cross or up gradient that in our opinion are likely to handle chemicals that would pose a "recognized environmental conditions" as defined by the ASTM.

### **4. Underground Storage Tanks and Spills**

There are no known registered underground storage tanks on the nearby up gradient or adjoining sites. Knowledge of tanks under 1,100 gallons or unregistered tanks is beyond the scope of this survey.

### **5. Transformers**

No large transformers were noted on the adjoining properties.

### **6. Wastewater Discharges**

The area is serviced by the public sewer system.

### **7. Waste Generation**

The wastes are typically stored in closed dumpsters until removed by the City or a commercial hauler. There are no enforcement or other actions against the operation.

### **8. Groundwater Monitoring or Drinking Water Wells**

According to the City of New Rochelle Building Department, the buildings in the area are serviced by the public water supply.

### **9. Federal, State or Local List of Hazardous Waste Sites**

There are no properties within the ASTM search area and geologically connected listed on local, state or federal hazardous waste site databases.

### **10. Environmental Litigation or Regulatory Enforcement Action**

Based on the information available from the City of New Rochelle and the historical record search, there are no known nearby properties within 1/2 mile and cross or up gradient of the subject site which are the subject of environmental enforcement.

### **11. Wetland or Sensitive Ecological Area**

There are no adjacent sites which are designated wetlands.

## **12. Physical Signs of Contamination On or Around the Adjoining Property**

There are no adjoining properties which exhibit a visible potential to pose an environmental risk to the subject property at the time of the site reconnaissance.

## **13. Potential Environmental Risks**

Based on a visual review of the business type and property uses, it is our opinion that no adjoining properties exhibit a visible potential to pose a "recognized environmental condition" to the subject property at the time of the site reconnaissance.

## **E. ENVIRONMENTAL RISKS SUMMARY**

Based on a visual review of the business type and property uses, it is our opinion that no adjoining properties exhibit a visible potential to pose a "recognized environmental condition" to the subject property at the time of the site reconnaissance.

## **SUMMARY**

Within the property bounds as defined by adjoining properties, there are no significant visible "recognized environmental conditions" on the property as defined by the ASTM standard. However, we have a condition that must be noted. Although soil borings in the vicinity of the two abandoned gasoline tanks showed no evidence of petroleum compounds to the sides of these abandoned tanks, the soils beneath the tanks were not tested for petroleum compounds and no records are known to exist on the tanks' closure or condition at the time of closure. As such there is a potential for residual petroleum to have impacted the soils beneath the tanks. This is not an actionable condition per the NYS DEC at this time, but if the site is renovated and the tanks are removed the potential for encountering petroleum impacted soils exists based on our experience with similar tanks at other properties over our years of experience.

Based on a visual review of the business type and property uses, it is our opinion that no adjoining properties exhibit a visible potential to pose a "recognized environmental condition" to the subject property at the time of the site reconnaissance.

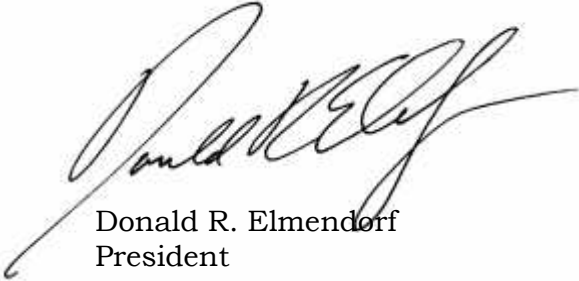
## **LIMITATIONS AND EXCEPTIONS OF ASSESSMENT**

This report represents our professional opinion of the "recognized environmental conditions" at the subject site and adjoining properties following the protocols and

review limitations defined by the ASTM Standard Practices for Environmental Site Assessments, E1527-13.

In preparing this report, DRE Environmental, Inc. has accepted as true the information gathered by site personnel and that provided by governmental agency officials. DRE Environmental, Inc. warrants that the services performed were conducted in a competent and professional manner in accordance with standard consulting practices and procedures. DRE Environmental, Inc. cannot warrant the actual site conditions described in this report beyond matters amenable to visual confirmation. There are no third party rights or benefits conferred under this report. Use of this report is strictly limited to the client designated on the title page; the only party to whom DRE Environmental, Inc. intends to confer any rights. Any reliance on the contents of this report by any third party is the sole responsibility of that party.

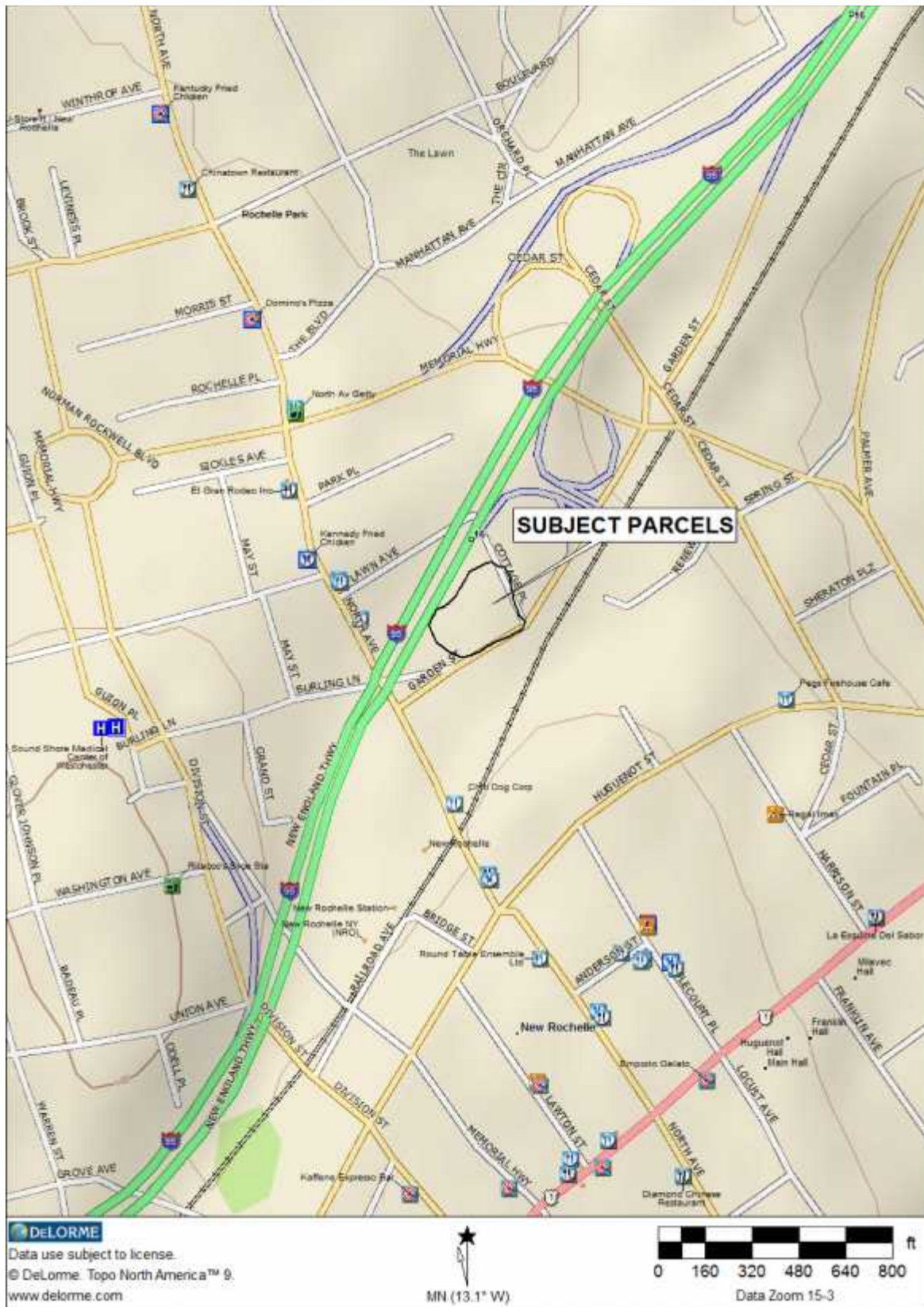
DRE ENVIRONMENTAL, Inc.



Donald R. Elmendorf  
President

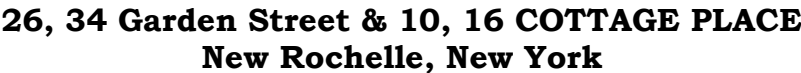
## **APPENDIX A**

### **SITE AND LOCATION PLANS**



**26, 34 Garden Street & 10, 16 COTTAGE PLACE  
New Rochelle, New York**





## **APPENDIX B**

### **PHOTOGRAPHS**





**26 Garden Street**



**34 GARDEN STREE**





**34 Garden & 10 Cottage**

**16 COTTAGE**



## **APPENDIX C**

### **HAZARDOUS SITE DATABASES**

## **DATABASE REFERENCE GUIDE**

### **NPL NATIONAL PRIORITIES LIST**

The NPL Report, also known as the Superfund List, is an EPA listing of uncontrolled or abandoned hazardous waste sites. The list is primarily based upon a score which the site receives from the EPA's Hazardous Ranking System. These sites are targeted for possible long-term remedial action under the Superfund Act of 1980. US Environmental Protection Agency

### **CERCLIS COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY INFORMATION SYSTEM**

The CERCLIS Database is a comprehensive listing of known or suspected uncontrolled or abandoned hazardous waste sites. These sites have either been investigated, or are currently under investigation by the U.S. EPA for the release, or threatened release of hazardous substances. A site is placed in CERCLIS may be subjected to several levels of review and evaluation, and ultimately placed on the National Priorities List (NPL). CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) are removed from the CERCLIS Database. US Environmental Protection Agency

### **RCRIS TS RESOURCE CONSERVATION AND RECOVERY INFORMATION SYSTEM - TREATMENT, STORAGE, AND DISPOSAL FACILITIES**

The RCRIS\_TS Report contains information pertaining to facilities which either treat, store, or dispose of EPA regulated hazardous waste. The following information is also included in the RCRIS\_TS Report: - Information pertaining to the status of facilities tracked by the RCRA Administrative Action Tracking System (RAATS), Inspections & evaluations conducted by federal and state agencies, reported facility violations, the environmental statute(s) violated, and any proposed & actual penalties, Information pertaining to corrective actions undertaken by the facility or EPA., and a complete listing of EPA regulated hazardous wastes which are generated or stored on-site US Environmental Protection Agency

### **RCRIS LG RESOURCE CONSERVATION AND RECOVERY INFORMATION SYSTEM - LARGE QUANTITY GENERATORS**

The RCRIS\_LG Report contains information pertaining to facilities which either generate more than 1000kg of EPA regulated hazardous waste per month, or meet other applicable requirements of the Resource Conservation And Recovery Act. US Environmental Protection Agency

### **RCRIS SG RESOURCE CONSERVATION AND RECOVERY INFORMATION SYSTEM - SMALL QUANTITY GENERATORS**

The RCRIS\_SG Report contains information pertaining to facilities which either generate between 100kg and 1000kg of EPA regulated hazardous waste per month, or meet other applicable requirements of the Resource Conservation And Recovery Act. US Environmental Protection Agency

### **ERNSEMERGENCY RESPONSE NOTIFICATION SYSTEM**

ERNS is a national computer database system that is used to store information concerning the sudden and/or accidental release of hazardous substances, including petroleum, into the environment. The ERNS Reporting System contains preliminary information on specific releases, including the spill location, the substance released, and the responsible party. US Environmental Protection Agency

### **LRST NEW YORK LEAKING STORAGE TANKS**

The New York Leaking Storage Tank Report is a comprehensive listing of all leaking storage tank cases reported to The New York State Department of Environmental Conservation Spill Prevention and Response Section which have not yet been resolved. The information for the LST Report is extracted from the original spills list provided by the NYSDEC. Information pertaining to leaking storage tank cases which have been resolved can be provided upon request.

### **SWF NEW YORK ACTIVE SOLID WASTE FACILITY REGISTER**

The New York Solid Waste Facility Register is a comprehensive listing of all active and inactive permitted solid waste landfills and processing facilities within the State of New York. NY Dept. of Environmental Conservation

## **HWS NEW YORK INACTIVE HAZARDOUS WASTE DISPOSAL SITES**

The New York Inactive Hazardous Waste Disposal Sites List contains summary information pertaining to those facilities that are deemed potentially hazardous to the public health and welfare by the New York State Department of Environmental Conservation (NYSDEC).

## **NFRAP NO FURTHER REMEDIAL ACTION PLANNED SITES**

The No Further Remedial Action Planned Report (NFRAP), also known as the CERCLIS Archive, contains information pertaining to sites which have been removed from the U.S. EPA's CERCLIS Database. NFRAP sites may be sites where, following an initial investigation, either no contamination was found, contamination was removed quickly without need for the site to be placed on the NPL, or the contamination was not serious enough to require federal Superfund action or NPL consideration. US Environmental Protection Agency

## **FINDS FACILITY INDEX SYSTEM**

The FINDS Report is a computerized inventory of all facilities that are regulated or tracked by the U.S. Environmental Protection Agency. These facilities are assigned a unique identification number which serves as a cross-reference for other databases in the EPA's Program System. Each FINDS record indicates the EPA Program Office which is responsible for the tracking of the facility. US Environmental Protection Agency

## **TRI TOXIC RELEASE INVENTORY SYSTEM**

The TRI Report contains information concerning the industrial release and/or transfer of toxic chemicals as reportable under Title III of the Superfund Amendments And Reauthorization Act Of 1986 (SARA Title III). US Environmental Protection Agency

## **CBS NEW YORK CHEMICAL BULK STORAGE TANKS**

The New York Chemical Bulk Storage Report contains information pertaining to active and inactive facilities that store regulated substances in aboveground storage tanks with capacities of 185 gallons or greater, and/or underground storage tanks of any size. NY Dept. of Environmental Conservation

## **MOSF NEW YORK MAJOR OIL STORAGE FACILITIES**

The Major Oil Storage Facilities Report contains summary information on active and inactive facilities with petroleum storage capacities in excess of four-hundred thousand gallons. NY Dept. of Environmental Conservation

## **PBS NEW YORK PETROLEUM BULK STORAGE TANKS**

The New York DEC Petroleum Bulk Storage Report is a comprehensive listing of all reported active and inactive facilities that have petroleum storage capacities in excess of 1100 gallons, and less than four hundred thousand gallons. The PBS information from the Delegated Counties in the State of New York; Cortland, Nassau, Rockland, Suffolk

## **SPILLS NEW YORK SPILLS REPORT**

The New York Spills Report is a comprehensive listing of all hazardous materials spills reported to The New York State Department of Environmental Conservation which have not yet been resolved. Information pertaining to spills which have been resolved can be provided upon request.

## **TELEPHONE CONTACT NUMBERS**

US Environmental Protection Agency	
Office of Solid Waste and Emergency Response	703/603-8881 202/260-4610
Office of Information Resources Management	800/908-2493
Office of Pollution Prevention and Toxics	202/260-1531
New York State Dept. of Environmental Conservation	
Spill Prevention and Response Section	518/457-7363
Bureau of Solid Waste	518/457-2051
Hazardous Waste Remediation Division	518/457-0740

## **Appendix D**

### **PROFESSIONAL RESUME**

#### **ENVIRONMENTALPROFESSIONAL STATEMENT**

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in Section 312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history and setting of the subject property. We have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312. Qualifications of the Environmental Professional are presented in this Appendix.

## **DONALD R. ELMENDORF, PE**

Mr. Elmendorf is a licensed Professional Engineer with over 30 years of diverse experience in the fields of Environmental Engineering and Environmental Sciences. He is president of DRE Environmental, Inc. a consulting firm that provides specialized engineering and environmental consulting services, which began operations in 1988. The firm list of repeat clients which includes Banks, Insurance Companies, Real Estate Companies, Fortune 500 Corporations, Attorneys, and a wide variety of private businesses.

Mr. Elmendorf's professional experience has encompassed **all** areas of Professional Environmental Engineering, Environmental Sciences, and Workplace Health & Safety and Industrial Hygiene. He has extensive experience in the areas of; Environmental Regulations and Compliance Programs, Indoor Air Quality, CERCLA/RCRA projects, hazardous waste management, Environmental Impact Statement Preparation, Indoor Air Quality programs, Industrial Hygiene and OSHA compliance programs, Environmental Risk Management, Environmental Risk Investigations including Phase I and II Site Audits, Soil and Groundwater Contamination and Remediation, Hazardous Materials Contamination and Remediation, and Oil Spill Clean-up and Response, Life Safety and Fire Hazard Assessments and Risk Management, Forensic Engineering and many other related engineering services.

He is thoroughly familiar with the various EPA, OSHA, Federal, State and Local environmental codes, standards and regulations which govern this industry. He has certifications from the US EPA, OSHA and various State agencies regarding Asbestos Management, Hazardous Waste Investigation and Hazardous Waste Spill Response, OSHA Confined Space Entry, and Underground Storage Tank System Design and Investigations. Mr. Elmendorf is also been certified by several court jurisdictions as qualified and competent in the area of national, state and local Environmental, and Fire and Building Codes and building construction related issues.

Mr. Elmendorf is a graduate of Syracuse University with a BS in Environmental & Mechanical Engineering. He was also educated in Forestry and Environmental Sciences at the SUNY College of Environmental Sciences and Forestry. He is a registered Professional Engineer in New York, Connecticut and New Jersey. Mr. Elmendorf is currently an active member of The National Society of Professional Engineers, the American Society of Testing & Materials; and the ASTM E-50 Environmental Standards Committee. He has been a guest speaker at many seminars speaking on various environmental related subject matter. He has been a guest on several television shows regarding environmental topics, and has been published in technical journals and newspapers on various environmental topics.

## **EDUCATION**

- \* B.S. Environmental and Mechanical Engineering, Syracuse University.
- \* SUNY College of Forestry, Syracuse University.
- \*\* REGISTERED PROFESSIONAL ENGINEER - NEW YORK, NEW JERSEY
- \*\* NEW JERSEY - UNDERGROUND STORAGE TANK PROGRAM - Certified Installation, Closure, Tank Testing, & Subsurface Investigations
- \* OSHA 40 Hazardous Materials Worker / Supervisor Certifications
- \* OSHA Confined Space Certification

## **Appendix E**

### **Tank Abandonment Certificate**



**Phase II Environmental Site Assessment Report**

**FOR**

**Cottage Place and Garden Street  
New Rochelle, Westchester County, New York**

**Prepared For:**

**The Mark 95 LLC & The Mark 95 II LLC  
1955 Central Park Avenue  
Yonkers, New York 10710**

**Prepared By:**

**SESI CONSULTING ENGINEERS, DPC  
12A Maple Avenue  
Pine Brook, NJ 07058**

**DATE:**

**July 26, 2018**

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**Fuad Dahan, P.E.**

**NY Lic. No. 090531**



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Appendix A: Soil, Soil Gas, and Indoor Air Results Laboratory Deliverables (Electronic)

## Figures

Figure 1.1: Site Plan

Figure 1.2: REC Location Plan

Figure 3.1: Soil Sampling Location and Sampling Results Plan

Figure 3.2: Soil Vapor and Indoor Air Location and Sampling Results Plan

## 1.0 INTRODUCTION

SESI Consulting Engineers, DPC (SESI) has conducted this Phase II Environmental Site Assessment (Phase II ESA) on behalf of the Requestors, The Mark 95 LLC and The Mark 95 II LLC. The Site is located at Cottage Place and Garden Street in the City of New Rochelle, New York (Site). The Site includes Parcels 3-802-0020, 0032, 0033, 0036, 0038, 0041, 0043. The properties total approximately 0.98-acres and have been historically been utilized for residential and commercial purposes.

The adjacent area primarily consists of highways with a mix of commercial and residential properties. Figure 1.1 presents a Site Plan.

This Phase II ESA report summarizes the data of soil samples, soil vapor samples and indoor air samples collected by SESI to investigate the identified Recognized Environmental Concerns (RECs) at the Site as identified in the DRE Environmental, Inc (DRE) Phase I ESA Report, October 2016.

### 1.1 Recognized Environmental Concerns

The following Recognized Environmental Concerns (RECs) were identified during the Phase I ESA Report prepared by DRE:

- **REC 1: Former gas station with two (2) 3,000-gallon Underground Storage Tanks USTs remaining in place** – The corner property on Garden and Cottage, currently a tire store, was a former gasoline station. There are two underground abandoned 3,000-gallon gasoline tanks which were closed in place in prior to 2000, and a former 1,000-gallon heating oil tank which was removed in 2001. There is no documentation on the closure of the two gasoline tanks.<sup>1</sup> The heating oil tank was cleaned, removed, and observed by the City of New Rochelle Fire Department. The report then states that a person named IRA CONKLIN collected soil samples in 2001 on four sides of the abandoned gasoline tanks and found no indication of petroleum products in the soil. The heating oil tank removal apparently included collection of samples,

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<sup>1</sup> While the text of this report indicated that there was no closure documentation, it appears the consultant failed to review the documentation attached in Appendix E to the Phase I report, which is a City of New Rochelle document from the Fire Department does show the 2-3,000 tanks were closed in place and filled with sand.

and no petroleum compounds were detected in the soils. Although soil borings were conducted around the two abandoned gasoline tanks, DRE claimed they showed no evidence of petroleum compounds on the sides of these abandoned tanks, the soil beneath the tanks was not tested for petroleum compounds and no records are known to exist on the closure or condition at the time of closure. As such there is a potential for residual petroleum to have impacted the soils beneath the tanks<sup>2</sup>. The above REC is presented on Figure 1.2.

In addition to this REC identified in the Phase I report, SESI has identified additional RECs:

- **REC-2: Additional Manufacturing Activities on the Site.** While DRE suggested that the Site's only historic use that could have resulted in contamination was the former gas station, a photo in the report reveals a small Plastic Works manufacturing facility at the 26 Garden Street parcel. A company called Strip-A-Way of New Rochelle, Inc. was also on 26 Garden Street for 20 years from 1980-2000. TCE vapor was found in the vicinity of this portion of the Site. Therefore, it is suspected that this facility may be the source of the TCE vapor contamination or as a result of the stripping operations that may have occurred in relation to Strip-A-Way of New Rochelle, Inc.
- **REC-3: Historic Fill:** There are higher than normal levels of metals in the soils. The source is unclear other than they may be the result of historic fill.

## 1.2 Site Settings

The Site comprises four commercial buildings and one residential building. The combined parcels comprise approximately three quarters acres of land. The residential parcel on Cottage Place is a two and one-half story apartment building with approximately 1,000 sq. ft. of occupied space. The residence was constructed as a residential single-family home in the early 1900's, with conversion to multiple apartments over the years, based on information from available records. The 16 Cottage Place is a single-story masonry structure with approximately 1,200 sq. ft. of floor area used for a Kitchen and Bath dealer and other similar warehousing purposes. The property at 10 – 12 Cottage Place is a retail tire and auto repair facility present on the site for over 60 years. The property was once a gasoline station with underground tanks currently in place and

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<sup>2</sup> The data discussed in the Phase I report was not attached to the report. Mr. Donald Elmendorf, PE from DRE has been contacted and he stated that no samples were collected by DRE during the Phase I and the mention of samples collected is probably a mistake.

prior uses are unknown. 28 Garden Street and 34 Garden Street are commercial properties with retail uses documented over the years. 26 Garden Street is a commercial property which was occupied with Plastic Works manufacturing and by Strip-A-Way of New Rochelle Inc..

### 1.3 Proposed Site Development

The proposed Site development includes a mixed-use project including commercial space and affordable housing residential units.

## 2.0 SUBSURFACE INVESTIGATION

The field work was conducted by SESI on January 24 and January 26, 2018.

### 2.1 Soil Borings

SESI subcontracted a Geoprobe® drill rig and spent two days in the field collecting eight (8) soil samples. The soil samples were collected from locations biased towards the findings of the Phase I ESA and at least one sample on each Lot. The soil sample collection depths were based on field screening, which included visual/olfactory observations and screening with a Photo Ionization Detector (PID). We collected soil samples to cover every Lot included in the property as listed below:

Lots 20, 32, 33, 38, 41, and 43: SESI advanced 1 boring within each lot and collected one soil sample from each boring.

Lot 36: As this is the reported location of a previous gas station with two (2) 3,000-gallon Underground Storage Tanks USTs remaining in place, SESI advanced 2 borings and collected 2 soil samples.

The soil samples were sent on a chain of custody to an ELAP-certified laboratory for TCL/TAL +30, TPH and cyanide analysis with a contingent analysis for hexavalent chromium on standard 2-week turnaround time (TAT). Table 2.1 contains a summary of the soil borings and collected samples.

## 2.2 Soil Vapor and Indoor Air Sampling

On January 24 and 26, 2018, SESI collected seven (7) soil gas samples in summa canisters from the existing building sub-slabs or through the asphalt parking lots. One sample was collected from each Lot that is included within the Site. In addition, we collected four (4) indoor air samples from the Site. One indoor air sample was collected from each lot that contains an enclosed structure (Lots 32, 33, 38, and 41). The soil gas and indoor air samples were sent to an ELAP-Certified laboratory for TO-15 analysis on a standard 2-week TAT.

## 3.0 ANALYTICAL RESULTS

### 3.1 Soil Investigation Results

In total, eight (8) soil samples were collected by SESI and analyzed from 8 borings as listed in Table 2.1 and shown in Figure 3.1. The soil samples were distributed and analyzed on each lot to determine the subsurface condition of the entire Site. The soil samples were sent to Test America on a chain-of-custody (COC) for the following analyses: All eight (8) samples for Target Compound List (TCL) and Target Analyte List (TAL) plus 30 tentatively identified compounds (TICs), Total Petroleum Hydrocarbons (TPH), cyanide and a contingent analysis for hexavalent chromium dependent upon the total chromium concentrations. The laboratory files are included in Appendix A. A soil sample location and a summary of the results is shown on Figure 3.1. The soil samples were collected at depths ranging from 1.5 to 11.5 ft bgs. A summary table of the analytical results is included in Table 3.2 and the laboratory reports for the soil samples are included electronically in Appendix A. Table 3.1 contains a summary of the soil exceedances compared with the restricted residential Soil Cleanup Objectives (SCOs).

As shown in Table 3.1, a number of samples exceeded the restricted residential use SCOs.

Table 3.1: Summary of soil exceedances

Sample	Property Where Sample Was Collected	Result (mg/kg)	Unrestricted Use Soil Cleanup Objective (mg/kg)	Restricted Residential Use Soil Cleanup Objective (mg/kg)
S-1(2-2.5')	3-802-0036	Benzo(a)anthracene: 3.9	1	1
		Benzo(a)pyrene: 3.6	1	1
		Benzo(b)fluoranthene: 5.2	1	1
		Benzo(k)fluoranthene: 1.9	0.8	1
		Chrysene: 4.1	1	1
		Dibenz(a,h)anthracene: 0.52	0.33	0.33
		Indeno(1,2,3-cd)pyrene: 1.9	0.5	0.5
		PCBs: 1.2	0.1	1
		Cadmium: 18.2	2.5	4.3
		Calcium: 12,000	NS	NS
		Copper: 137	50	270
		Iron: 21,900	NS	NS
		Lead: 779	63	400
		Nickel: 335	30	310
		Silver: 3.0	2	180
		Zinc: 762	109	10,000
		Mercury: 2.1	0.18	0.81
S-2(7.5-8')	3-802-0036	Aluminum: 11,500	NS	NS
		Iron: 18,500	NS	NS
S-3(4.5-5')	3-802-0038	Aluminum: 11,000	NS	NS
		Iron: 18,100	NS	NS
S-4(11-11.5')	3-802-0033	Iron: 13,000	NS	NS
S-5(1.5-2')	3-802-0032	Iron: 15,100	NS	NS
S-6(6-6.5')	3-802-0043	Aluminum: 11,100	NS	NS
		Iron: 18,000	NS	NS
S-7(1.5-2')	3-802-0020	Aluminum: 12,900	NS	NS
		Calcium: 27,000	NS	NS
		Iron: 15,100	NS	NS
		Lead: 172	63	400
S-8(4-4.5')	3-802-0041	Mercury: 0.26	0.18	0.81
		Calcium: 21,800	NS	NS
		Iron: 14,000	NS	NS

NS = No NYSDEC Standard Established

*[Note: For Calcium and Aluminum, there is a CP-51 standard of 10,000 ppm for each under the Protection of Ecological Resources category. For Iron, there is a "Residential" SCO of 2,000 ppm. It is not clear from CP-51 if this is an unrestricted Track 1 or Track 2 Residential SCO.]*

Soil sample S-1(2-2.5') was collected adjacent to the two 3,000-gallon underground storage tanks on the former gasoline station property. Polyaromatic Hydrocarbons (PAH), polychlorinated biphenyls (PCBs), and metals were detected in sample S-1(2-2.5') above restricted residential Use SCOs. In addition, iron and other metals were far higher than naturally occurring levels. Iron exceeded the "Residential" CP-51 standard of 2,000 ppm throughout the remainder of the Site.

## 3.2 Soil Vapor Investigation Results

Seven (7) soil vapor samples (4 sub slab and 3 sub pavement) were collected from the Site. All vapor samples were collected from within the first 1-foot interval below grade (basement slab or

pavement). The samples were sent to ELAP-Certified laboratory (TestAmerica) on a chain of custody (COC) for TO-15 analysis. A soil vapor sample location map and a summary of their results are shown in Figure 3.2. A summary table of the analytical results and the laboratory reports for the soil vapor samples are included electronically in Appendix A. Table 3.3 contains a summary of the soil vapor exceedances of the New York State Department of Health (NYSDOH) Air Guideline Values and/or USEPA Targeted Sub Slab Technical Guidance concentrations. A summary table of the analytical results is included in Table 3.4 and the laboratory reports for the soil samples are included electronically in Appendix A.

As shown in Table 3.3, two sub-slab samples exceeded the soil gas Guideline Values. Sample SS-1, collected from the sub-slab of the building located on Lot 38, exhibited exceedances of the soil gas guidance values for trichloroethene (TCE) and tetrachloroethene (PCE). TCE was detected at  $200 \mu\text{g}/\text{m}^3$ , compared to the updated NYSDOH Air Guidance Value of  $2 \mu\text{g}/\text{m}^3$ . PCE was detected at  $3,000 \mu\text{g}/\text{m}^3$ , compared to the updated NYSDOH Air Guidance Value of  $30 \mu\text{g}/\text{m}^3$ . Sample SS-4, collected from the sub slab of the building located on Lot 33, exhibited exceedances of the soil gas guidance values for chloroform, carbon tetrachloride, 1,1,2-trichloroethane, PCE and TCE. Chloroform was detected at a concentration of  $4.3 \mu\text{g}/\text{m}^3$ , which exceeds the USEPA Technical Guidance Value of  $4.1 \mu\text{g}/\text{m}^3$ . Carbon tetrachloride was detected at a concentration of  $17 \mu\text{g}/\text{m}^3$  above its NYSDOH Air Guidance Value of  $5 \mu\text{g}/\text{m}^3$  and above its USEPA Technical Guidance Value of  $16 \mu\text{g}/\text{m}^3$ . 1,1,2-trichloroethane was detected at a concentration of  $6.8 \mu\text{g}/\text{m}^3$  above its USEPA Technical Guidance Value of  $5.8 \mu\text{g}/\text{m}^3$ . PCE was detected at a concentration of 45 above its NYSDOH Air Guidance Value of  $30 \mu\text{g}/\text{m}^3$ . TCE was detected at a concentration of 33  $\mu\text{g}/\text{m}^3$  above its updated NYSDOH Air Guidance Value of  $2 \mu\text{g}/\text{m}^3$ .

The results of the soil vapor sample SP-3 collected from beneath the pavement located in Lot 20 showed PCE, 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane and TCE were detected above the soil gas guidance values. PCE was detected at a concentration of 110  $\mu\text{g}/\text{m}^3$  above the updated NYSDOH guidance value of  $30 \mu\text{g}/\text{m}^3$ . 1,1,1-TCA was detected at a concentration of 740  $\mu\text{g}/\text{m}^3$  above the NYSDOH guidance value of  $100 \mu\text{g}/\text{m}^3$ . 1,1,2-trichloroethane was detected at a concentration of 130  $\mu\text{g}/\text{m}^3$  above the USEPA Technical Guidance Value of  $5.8 \mu\text{g}/\text{m}^3$ . TCE was detected at a concentration of 26  $\mu\text{g}/\text{m}^3$  above the updated NYSDOH guidance value of  $2 \mu\text{g}/\text{m}^3$  and above the USEPA Technical Guidance Value of  $16 \mu\text{g}/\text{m}^3$ .



Table 3.3: Summary of soil gas exceedances of the NYSDOH and/or EPA levels

Sample	Property Where Sample Was Collected	Result ( $\mu\text{g}/\text{m}^3$ )	Air Guideline Value by the NYSDOH * ( $\mu\text{g}/\text{m}^3$ )	USEPA Targeted Sub Slab and Exterior Soil Gas Concentration ( $\mu\text{g}/\text{m}^3$ )
SS-1	3-802-0038	Tetrachloroethene: 200 Trichloroethene: 3000	30 2	360 16
SS-4	3-802-0041	Chloroform: 4.3 Carbon Tetrachloride: 17 1,1,2-Trichloroethane: 6.8 Trichloroethene: 33 Tetrachloroethene: 45	NS 5 NS 2 30	4.1 16 5.8 16 360
SP-3	3-802-0020	Tetrachloroethene: 110 1,1,1-Trichloroethane: 740 1,1,2-Trichloroethane: 130 Trichloroethene: 26	30 100 NS 2	360 170,000 5.8 16

\* Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).  
NS = No NYSDEC Standard Established

### 3.4 Indoor Air Results

Four (4) indoor air samples were collected from the Site. One sample was collected from within the breathing zone in each building. The samples were sent to an ELAP-Certified laboratory (TestAmerica) on a chain of custody (COC) for TO-15 analysis. An indoor air sample location and a summary of their results are shown in Figure 3.2. Table 3.5 presents a summary of the exceedances of the NYSDOH Guideline Values or the EPA Target Indoor Air Concentrations. A summary table of the analytical results is included in table 3.6 and the laboratory reports for the soil vapor samples are included electronically in Appendix A.

Benzene was detected in all four indoor air samples at concentrations ranging from 0.8 to 2.1  $\mu\text{g}/\text{m}^3$  above the USEPA Target Indoor Air Concentration of 0.36  $\mu\text{g}/\text{m}^3$ . Chloroform was detected in indoor air sample IA-2 at a concentration of 1.5  $\mu\text{g}/\text{m}^3$  above the USEPA Target Indoor Air Concentration of 0.12  $\mu\text{g}/\text{m}^3$ .

Table 3.5: Summary of indoor air exceedances of the NYSDOH and/or EPA levels

Sample	Property Where Sample Was Collected	Result ( $\mu\text{g}/\text{m}^3$ )	Air Guideline Value by the NYSDOH * ( $\mu\text{g}/\text{m}^3$ )	USEPA Targeted Indoor Air Concentration ( $\mu\text{g}/\text{m}^3$ )
IA-1	3-802-0038	Benzene: 2.1	NS NS	0.36
IA-2	3-802-0033	Benzene: 0.80 Chloroform: 1.5	NS NS	0.36 0.12
IA-3	3-802-0032	Benzene: 1.1	NS	0.36
IA-4	3-802-0041	Benzene: 0.99	NS	0.36

\* Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).  
NS = No NYSDEC Standard Established

## 4.0 CONCLUSIONS AND RECOMMENDATIONS

The Site historic uses and the investigation results indicate evidence of PAHs, metals and PCBs above the restricted residential use SCO in the Site soils on the north side of the two gasoline USTs at soil sample location S-1. Lead, and PAHs are typically associated with gasoline or petroleum hydrocarbon discharges. Additional investigation and eventually remediation of the identified exceedances should be completed before the development on the Site. There are also high levels of iron and other metals throughout the remainder of the Site above CP-51 SCO for Residential use. CP-51 does not clarify if the "Residential" category described in the chart is a Track 1 SCO or a Track 2 Residential SCO. Therefore, for purposes of this Phase II, it is treated as an exceedance of an applicable residential SCO.

There are chlorinated volatile organic compounds (CVOCs) exceedances in soil vapor from two sub-slab samples located in buildings on Lots 38 and 20 and a sub-pavement sample collected from Lot 20. In addition to the gas station, there was auto repair, Plastic Works and a Strip-A-Way company, all of which likely could have caused the CVOc exceedances in vapor. Additional investigation into the potential source of the chlorinated compounds on-site should be completed before development of the Site. The chlorinated hydrocarbon exceedances of the NYSDOH Guidance values and the USEPA Technical Guidance present a vapor intrusion risk potential.

Benzene was detected in all four indoor air samples at concentrations exceeding the USEPA Target Guidance Concentrations. Benzene is typically associated with gasoline discharges. Although benzene was not detected in soil samples collected adjacent to the two gasoline USTs, it is still possible that the source of benzene in the indoor air samples are these two tanks. Additional investigation is recommended to assess the source of the benzene detected in indoor air at the site.

A Step-out remedial investigation is required to complete the delineation of the reported exceedances. Based on the additional investigation, a remedial action should be performed to remediate the impacted areas prior to any development.

## TABLES

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')				S-2(7.5-8')				S-3(4.5-5')				S-4(11-11.5')			
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1				460-149090-2				460-149090-3				460-149090-4			
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00				01/24/2018 09:30:00				01/24/2018 10:00:00				01/24/2018 12:00:00			
Matrix	Cleanup	Soil Cleanup	Soil				Soil				Soil				Soil			
Dilution Factor	Criteria	Criteria	1				1				1				1			
Unit	mg/kg	mg/kg	mg/kg				mg/kg				mg/kg				mg/kg			
VOA-8260C-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL				
SOIL BY 8260C																		
1,1,1-Trichloroethane	0.68	100	0.00021	U	0.00021	0.00022	U	0.00022	0.00019	U	0.00019	0.00023	U	0.00023				
1,1,2,2-Tetrachloroethane	NA	NA	0.00019	U	0.00019	0.00020	U	0.00020	0.00017	U	0.00017	0.00021	U	0.00021				
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	NA	0.00027	U	0.00027	0.00028	U	0.00028	0.00025	U	0.00025	0.00030	U	0.00030				
1,1,2-Trichloroethane	NA	NA	0.00016	U	0.00016	0.00016	U	0.00016	0.00015	U	0.00015	0.00018	U	0.00018				
1,1-Dichloroethane	0.27	26	0.00019	U	0.00019	0.00019	U	0.00019	0.00017	U	0.00017	0.00020	U	0.00020				
1,1-Dichloroethene	0.33	100	0.00020	U	0.00020	0.00021	U	0.00021	0.00018	U	0.00018	0.00022	U	0.00022				
1,2,3-Trichlorobenzene	NA	NA	0.00016	U	0.00016	0.00017	U	0.00017	0.00015	U	0.00015	0.00018	U	0.00018				
1,2,4-Trichlorobenzene	NA	NA	0.000083	U	0.000083	0.000085	U	0.000085	0.000075	U	0.000075	0.000091	U	0.000091				
1,2-Dibromo-3-Chloropropane	NA	NA	0.00042	U	0.00042	0.00043	U	0.00043	0.00038	U	0.00038	0.00046	U	0.00046				
1,2-Dichlorobenzene	1.1	100	0.00013	U	0.00013	0.00013	U	0.00013	0.00012	U	0.00012	0.00014	U	0.00014				
1,2-Dichloroethane	0.02	3.1	0.00027	U	0.00027	0.00027	U	0.00027	0.00024	U	0.00024	0.00029	U	0.00029				
1,2-Dichloropropane	NA	NA	0.00038	U	0.00038	0.00039	U	0.00039	0.00035	U	0.00035	0.00042	U	0.00042				
1,3-Dichlorobenzene	2.4	49	0.00014	U	0.00014	0.00015	U	0.00015	0.00013	U	0.00013	0.00016	U	0.00016				
1,4-Dichlorobenzene	1.8	13	0.000090	U	0.000090	0.000093	U	0.000093	0.000082	U	0.000082	0.000099	U	0.000099				
1,4-Dioxane	0.1	13	0.0083	U	0.0083	0.0085	U	0.0085	0.0075	U	0.0075	0.0091	U	0.0091				
2-Butanone (MEK)	0.12	NA	0.0010	U	0.0010	0.0010	U	0.0010	0.00091	U	0.00091	0.0011	U	0.0011				
2-Hexanone	NA	NA	0.00070	U	0.00070	0.00072	U	0.00072	0.00064	U	0.00064	0.00077	U	0.00077				
4-Methyl-2-pentanone (MIBK)	NA	NA	0.00060	U	0.00060	0.00061	U	0.00061	0.00054	U	0.00054	0.00066	U	0.00066				
Acetone	0.05	100	0.0034	U	0.0034	0.0035	U	0.0035	0.0031	U	0.0031	0.0038	U	0.0038				
Benzene	0.06	4.8	0.00023	U	0.00023	0.00024	U	0.00024	0.00021	U	0.00021	0.00026	U	0.00026				
Bromoform	NA	NA	0.00038	U	0.00038	0.00039	U	0.00039	0.00035	U	0.00035	0.00042	U	0.00042				
Bromomethane	NA	NA	0.00043	U	0.00043	0.00044	U	0.00044	0.00039	U	0.00039	0.00047	U	0.00047				
Carbon disulfide	NA	NA	0.00024	U	0.00024	0.00025	U	0.00025	0.00022	U	0.00022	0.00026	U	0.00026				
Carbon tetrachloride	0.76	2.4	0.00016	U	0.00016	0.00017	U	0.00017	0.00015	U	0.00015	0.00018	U	0.00018				
Chlorobenzene	1.1	100	0.00016	U	0.00016	0.00016	U	0.00016	0.00014	U	0.00014	0.00018	U	0.00018				
Chlorobromomethane	NA	NA	0.00025	U	0.00025	0.00026	U	0.00026	0.00023	U	0.00023	0.00028	U	0.00028				
Chlorodibromomethane	NA	NA	0.00018	U	0.00018	0.00018	U	0.00018	0.00016	U	0.00016	0.00019	U	0.00019				
Chloroethane	NA	NA	0.00047	U	0.00047	0.00048	U	0.00048	0.00043	U	0.00043	0.00052	U	0.00052				
Chloroform	0.37	49	0.00029	U	0.00029	0.00030	U	0.00030	0.00026	U	0.00026	0.00032	U	0.00032				
Chloromethane	NA	NA	0.00039	U	0.00039	0.00040	U	0.00040	0.00036	U	0.00036	0.00043	U	0.00043				
cis-1,2-Dichloroethene	0.25	100	0.00014	U	0.00014	0.00014	U	0.00014	0.00012	U	0.00012	0.00015	U	0.00015				
cis-1,3-Dichloropropene	NA	NA	0.00025	U	0.00025	0.00025	U	0.00025	0.00022	U	0.00022	0.00027	U	0.00027				
Cyclohexane	NA	NA	0.00020	U	0.00020	0.00020	U	0.00020	0.00018	U	0.00018	0.00022	U	0.00022				

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**  
**Job Description: Garden Street, New Rochelle, NY**  
**For:**  
**SESI Consulting Engineers**  
**12 A Maple Avenue**  
**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')			S-2(7.5-8')			S-3(4.5-5')			S-4(11-11.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1			460-149090-2			460-149090-3			460-149090-4		
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00			01/24/2018 09:30:00			01/24/2018 10:00:00			01/24/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
VOA-8260C-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8260C														
Dichlorobromomethane	NA	NA	0.00023	U	0.00023	0.00024	U	0.00024	0.00021	U	0.00021	0.00026	U	0.00026
Dichlorodifluoromethane	NA	NA	0.00031	U	0.00031	0.00031	U	0.00031	0.00028	U	0.00028	0.00034	U	0.00034
Ethylbenzene	1	41	0.00018	U	0.00018	0.00018	U	0.00018	0.00016	U	0.00016	0.00020	U	0.00020
Ethylene Dibromide	NA	NA	0.00016	U	0.00016	0.00017	U	0.00017	0.00015	U	0.00015	0.00018	U	0.00018
Isopropylbenzene	NA	NA	0.00011	U	0.00011	0.00012	U	0.00012	0.00010	U	0.00010	0.00013	U	0.00013
Methyl acetate	NA	NA	0.0039	U	0.0039	0.0040	U	0.0040	0.0035	U	0.0035	0.0043	U	0.0043
Methyl tert-butyl ether	0.93	100	0.00011	U	0.00011	0.00012	U	0.00012	0.00010	U	0.00010	0.00012	U	0.00012
Methylcyclohexane	NA	NA	0.00014	U	0.00014	0.00015	U	0.00015	0.00013	U	0.00013	0.00016	U	0.00016
Methylene Chloride	0.05	100	0.00015	U	0.00015	0.00015	U	0.00015	0.00013	U	0.00013	0.00016	U	0.00016
m-Xylene & p-Xylene	NA	NA	0.00016	U	0.00016	0.00016	U	0.00016	0.00014	U	0.00014	0.00017	U	0.00017
o-Xylene	NA	NA	0.000086	U	0.000086	0.000088	U	0.000088	0.000078	U	0.000078	0.000094	U	0.000094
Styrene	NA	NA	0.00011	U	0.00011	0.00011	U	0.00011	0.00010	U	0.00010	0.00012	U	0.00012
Tetrachloroethene	1.3	19	0.00013	U	0.00013	0.00013	U	0.00013	0.00012	U	0.00012	0.00014	U	0.00014
Toluene	0.7	100	0.00056	U	0.00056	0.00058	U	0.00058	0.00051	U	0.00051	0.00062	U	0.00062
trans-1,2-Dichloroethene	0.19	100	0.00022	U	0.00022	0.00023	U	0.00023	0.00020	U	0.00020	0.00024	U	0.00024
trans-1,3-Dichloropropene	NA	NA	0.00024	U	0.00024	0.00025	U	0.00025	0.00022	U	0.00022	0.00026	U	0.00026
Trichloroethene	0.47	21	0.00013	U	0.00013	0.00013	U	0.00013	0.00027	J	0.00012	0.00014	U	0.00014
Trichlorofluoromethane	NA	NA	0.00037	U	0.00037	0.00038	U	0.00038	0.00033	U	0.00033	0.00040	U	0.00040
Vinyl chloride	0.02	0.9	0.00049	U	0.00049	0.00051	U	0.00051	0.00045	U	0.00045	0.00054	U	0.00054
Total Conc	NA	NA	0.0			0.0			0.00787			0.0		
Total Estimated Conc. (TICs)	NA	NA	0.0*T			0.0*T			0.0*T			0.0*T		

\*T There are no TICs reported for the sample

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

Job Description: Garden Street, New Rochelle, NY

For:

SESI Consulting Engineers

12 A Maple Avenue

Pine Brook, New Jersey 07058

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
VOA-8260C-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8260C														
1,1,1-Trichloroethane	0.68	100	0.00021	U	0.00021	0.00023	U	0.00023	0.00048	J	0.00024	0.00019	U	0.00019
1,1,2,2-Tetrachloroethane	NA	NA	0.00020	U	0.00020	0.00021	U	0.00021	0.00022	U	0.00022	0.00018	U	0.00018
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	NA	0.00028	U	0.00028	0.00029	U	0.00029	0.00031	U	0.00031	0.00025	U	0.00025
1,1,2-Trichloroethane	NA	NA	0.00016	U	0.00016	0.00017	U	0.00017	0.00032	J	0.00018	0.00015	U	0.00015
1,1-Dichloroethane	0.27	26	0.00019	U	0.00019	0.00020	U	0.00020	0.00021	U	0.00021	0.00017	U	0.00017
1,1-Dichloroethene	0.33	100	0.00021	U	0.00021	0.00022	U	0.00022	0.00023	U	0.00023	0.00019	U	0.00019
1,2,3-Trichlorobenzene	NA	NA	0.00017	U	0.00017	0.00018	U	0.00018	0.00018	U	0.00018	0.00015	U	0.00015
1,2,4-Trichlorobenzene	NA	NA	0.000085	U	0.000085	0.000089	U	0.000089	0.000094	U	0.000094	0.000076	U	0.000076
1,2-Dibromo-3-Chloropropane	NA	NA	0.00042	U	0.00042	0.00045	U	0.00045	0.00047	U	0.00047	0.00038	U	0.00038
1,2-Dichlorobenzene	1.1	100	0.00013	U	0.00013	0.00014	U	0.00014	0.00015	U	0.00015	0.00012	U	0.00012
1,2-Dichloroethane	0.02	3.1	0.00027	U	0.00027	0.00029	U	0.00029	0.00030	U	0.00030	0.00025	U	0.00025
1,2-Dichloropropane	NA	NA	0.00039	U	0.00039	0.00041	U	0.00041	0.00043	U	0.00043	0.00035	U	0.00035
1,3-Dichlorobenzene	2.4	49	0.00015	U	0.00015	0.00015	U	0.00015	0.00016	U	0.00016	0.00013	U	0.00013
1,4-Dichlorobenzene	1.8	13	0.000092	U	0.000092	0.000097	U	0.000097	0.00010	U	0.00010	0.000083	U	0.000083
1,4-Dioxane	0.1	13	0.0085	U	0.0085	0.0089	U	0.0089	0.0093	U	0.0093	0.0076	U	0.0076
2-Butanone (MEK)	0.12	NA	0.0010	U	0.0010	0.0011	U	0.0011	0.0011	U	0.0011	0.00092	U	0.00092
2-Hexanone	NA	NA	0.00072	U	0.00072	0.00076	U	0.00076	0.00079	U	0.00079	0.00065	U	0.00065
4-Methyl-2-pentanone (MIBK)	NA	NA	0.00061	U	0.00061	0.00065	U	0.00065	0.00068	U	0.00068	0.00055	U	0.00055
Acetone	0.05	100	0.0035	U	0.0035	0.0037	U	0.0037	0.0039	U	0.0039	0.0031	U	0.0031
Benzene	0.06	4.8	0.00024	U	0.00024	0.00025	U	0.00025	0.00026	U	0.00026	0.00021	U	0.00021
Bromoform	NA	NA	0.00039	U	0.00039	0.00041	U	0.00041	0.00043	U	0.00043	0.00035	U	0.00035
Bromomethane	NA	NA	0.00044	U	0.00044	0.00046	U	0.00046	0.00048	U	0.00048	0.00039	U	0.00039
Carbon disulfide	NA	NA	0.00025	U	0.00025	0.00026	U	0.00026	0.00027	U	0.00027	0.00022	U	0.00022
Carbon tetrachloride	0.76	2.4	0.00017	U	0.00017	0.00018	U	0.00018	0.00018	U	0.00018	0.00015	U	0.00015
Chlorobenzene	1.1	100	0.00016	U	0.00016	0.00017	U	0.00017	0.00018	U	0.00018	0.00015	U	0.00015
Chlorobromomethane	NA	NA	0.00026	U	0.00026	0.00027	U	0.00027	0.00029	U	0.00029	0.00023	U	0.00023
Chlorodibromomethane	NA	NA	0.00018	U	0.00018	0.00019	U	0.00019	0.00020	U	0.00020	0.00016	U	0.00016
Chloroethane	NA	NA	0.00048	U	0.00048	0.00051	U	0.00051	0.00053	U	0.00053	0.00043	U	0.00043
Chloroform	0.37	49	0.00029	U	0.00029	0.00031	U	0.00031	0.00032	U	0.00032	0.00026	U	0.00026
Chloromethane	NA	NA	0.00040	U	0.00040	0.00042	U	0.00042	0.00044	U	0.00044	0.00036	U	0.00036
cis-1,2-Dichloroethene	0.25	100	0.00014	U	0.00014	0.00015	U	0.00015	0.00015	U	0.00015	0.00013	U	0.00013
cis-1,3-Dichloropropene	NA	NA	0.00025	U	0.00025	0.00027	U	0.00027	0.00028	U	0.00028	0.00023	U	0.00023
Cyclohexane	NA	NA	0.00020	U	0.00020	0.00021	U	0.00021	0.00023	U	0.00023	0.00018	U	0.00018

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**  
**Job Description: Garden Street, New Rochelle, NY**  
**For:**  
**SESI Consulting Engineers**  
**12 A Maple Avenue**  
**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
VOA-8260C-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8260C														
Dichlorobromomethane	NA	NA	0.00024	U	0.00024	0.00025	U	0.00025	0.00026	U	0.00026	0.00021	U	0.00021
Dichlorodifluoromethane	NA	NA	0.00031	U	0.00031	0.00033	U	0.00033	0.00034	U	0.00034	0.00028	U	0.00028
Ethylbenzene	1	41	0.00018	U	0.00018	0.00019	U	0.00019	0.00020	U	0.00020	0.00016	U	0.00016
Ethylene Dibromide	NA	NA	0.00017	U	0.00017	0.00017	U	0.00017	0.00018	U	0.00018	0.00015	U	0.00015
Isopropylbenzene	NA	NA	0.00012	U	0.00012	0.00012	U	0.00012	0.00013	U	0.00013	0.00010	U	0.00010
Methyl acetate	NA	NA	0.0040	U	0.0040	0.0042	U	0.0042	0.0044	U	0.0044	0.0036	U	0.0036
Methyl tert-butyl ether	0.93	100	0.00012	U	0.00012	0.00012	U	0.00012	0.00013	U	0.00013	0.00010	U	0.00010
Methylcyclohexane	NA	NA	0.00015	U	0.00015	0.00016	U	0.00016	0.00016	U	0.00016	0.00013	U	0.00013
Methylene Chloride	0.05	100	0.00015	U	0.00015	0.00016	U	0.00016	0.00017	U	0.00017	0.00013	U	0.00014
m-Xylene & p-Xylene	NA	NA	0.00016	U	0.00016	0.00017	U	0.00017	0.00018	U	0.00018	0.00014	U	0.00014
o-Xylene	NA	NA	0.000088	U	0.000088	0.000092	U	0.000092	0.000097	U	0.000097	0.000079	U	0.000079
Styrene	NA	NA	0.00011	U	0.00011	0.00012	U	0.00012	0.00013	U	0.00013	0.00010	U	0.00010
Tetrachloroethene	1.3	19	0.00013	U	0.00013	0.00014	U	0.00014	0.00090	J	0.00015	0.00017	J	0.00012
Toluene	0.7	100	0.00058	U	0.00058	0.00061	U	0.00061	0.00064	U	0.00064	0.00052	U	0.00052
trans-1,2-Dichloroethene	0.19	100	0.00023	U	0.00023	0.00024	U	0.00024	0.00025	U	0.00025	0.00020	U	0.00020
trans-1,3-Dichloropropene	NA	NA	0.00025	U	0.00025	0.00026	U	0.00026	0.00027	U	0.00027	0.00022	U	0.00022
Trichloroethene	0.47	21	0.00013	U	0.00013	0.00014	U	0.00014	0.00017	J	0.00015	0.00030	J	0.00012
Trichlorofluoromethane	NA	NA	0.00037	U	0.00037	0.00039	U	0.00039	0.00041	U	0.00041	0.00034	U	0.00034
Vinyl chloride	0.02	0.9	0.00050	U	0.00050	0.00053	U	0.00053	0.00056	U	0.00056	0.00045	U	0.00045
Total Conc	NA	NA	0.0			0.0			0.00187			0.00177		
Total Estimated Conc. (TICs)	NA	NA	0.0*T			0.0*T			0.0*T			0.005		

\*T There are no TICs reported for the sample

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**  
**Job Description: Garden Street, New Rochelle, NY**  
**For:**  
**SESI Consulting Engineers**  
**12 A Maple Avenue**  
**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')			S-2(7.5-8')			S-3(4.5-5')			S-4(11-11.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1			460-149090-2			460-149090-3			460-149090-4		
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00			01/24/2018 09:30:00			01/24/2018 10:00:00			01/24/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	2			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
SVOA-8270D-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8270D														
1,1'-Biphenyl	NA	NA	0.056	J	0.015	0.0075	U	0.0075	0.0074	U	0.0074	0.0073	U	0.0073
1,2,4,5-Tetrachlorobenzene	NA	NA	0.033	U	0.033	0.016	U	0.016	0.016	U	0.016	0.016	U	0.016
2,2'-oxybis[1-chloropropane]	NA	NA	0.015	U	0.015	0.0076	U	0.0076	0.0074	U	0.0074	0.0074	U	0.0074
2,3,4,6-Tetrachlorophenol	NA	NA	0.030	U	0.030	0.015	U	0.015	0.014	U	0.014	0.014	U	0.014
2,4,5-Trichlorophenol	NA	NA	0.029	U	0.029	0.014	U	0.014	0.014	U	0.014	0.014	U	0.014
2,4,6-Trichlorophenol	NA	NA	0.030	U	0.030	0.015	U	0.015	0.014	U	0.014	0.014	U	0.014
2,4-Dichlorophenol	NA	NA	0.024	U	0.024	0.012	U	0.012	0.011	U	0.011	0.011	U	0.011
2,4-Dimethylphenol	NA	NA	0.029	U	0.029	0.014	U	0.014	0.014	U	0.014	0.014	U	0.014
2,4-Dinitrophenol	NA	NA	0.081	U	0.081	0.040	U	0.040	0.039	U	0.039	0.039	U	0.039
2,4-Dinitrotoluene	NA	NA	0.029	U	0.029	0.014	U	0.014	0.014	U	0.014	0.014	U	0.014
2,6-Dinitrotoluene	NA	NA	0.031	U	0.031	0.015	U	0.015	0.015	U	0.015	0.015	U	0.015
2-Chloronaphthalene	NA	NA	0.027	U	0.027	0.013	U	0.013	0.013	U	0.013	0.013	U	0.013
2-Chlorophenol	NA	NA	0.031	U	0.031	0.015	U	0.015	0.015	U	0.015	0.015	U	0.015
2-Methylnaphthalene	NA	NA	0.20	J	0.018	0.0089	U	0.0089	0.0087	U	0.0087	0.0087	U	0.0087
2-Methylphenol	0.33	100	0.038	U	0.038	0.019	U	0.019	0.018	U	0.018	0.018	U	0.018
2-Nitroaniline	NA	NA	0.018	U	0.018	0.0086	U	0.0086	0.0085	U	0.0085	0.0084	U	0.0084
2-Nitrophenol	NA	NA	0.044	U	0.044	0.021	U	0.021	0.021	U	0.021	0.021	U	0.021
3,3'-Dichlorobenzidine	NA	NA	0.016	U	0.016	0.0079	U	0.0079	0.0078	U	0.0078	0.0078	U	0.0078
3-Nitroaniline	NA	NA	0.020	U	0.020	0.0099	U	0.0099	0.0097	U	0.0097	0.0097	U	0.0097
4,6-Dinitro-2-methylphenol	NA	NA	0.049	U	0.049	0.024	U	0.024	0.023	U	0.023	0.023	U	0.023
4-Bromophenyl phenyl ether	NA	NA	0.023	U	0.023	0.011	U	0.011	0.011	U	0.011	0.011	U	0.011
4-Chloro-3-methylphenol	NA	NA	0.028	U	0.028	0.014	U	0.014	0.013	U	0.013	0.013	U	0.013
4-Chloroaniline	NA	NA	0.053	U	0.053	0.026	U	0.026	0.025	U	0.025	0.025	U	0.025
4-Chlorophenyl phenyl ether	NA	NA	0.021	U	0.021	0.010	U	0.010	0.010	U	0.010	0.010	U	0.010
4-Methylphenol	0.33	100	0.022	U	0.022	0.011	U	0.011	0.011	U	0.011	0.011	U	0.011
4-Nitroaniline	NA	NA	0.11	U	0.11	0.055	U	0.055	0.054	U	0.054	0.054	U	0.054
4-Nitrophenol	NA	NA	0.059	U	0.059	0.029	U	0.029	0.028	U	0.028	0.028	U	0.028
Acenaphthene	20	100	0.74		0.028	0.014	U	0.014	0.013	U	0.013	0.013	U	0.013
Acenaphthylene	100	100	0.074	J	0.020	0.0097	U	0.0097	0.0095	U	0.0095	0.0095	U	0.0095
Acetophenone	NA	NA	0.045	U	0.045	0.022	U	0.022	0.022	U	0.022	0.021	U	0.021
Anthracene	100	100	1.5		0.026	0.013	U	0.013	0.012	U	0.012	0.012	U	0.012
Atrazine	NA	NA	0.038	U	0.038	0.019	U	0.019	0.018	U	0.018	0.018	U	0.018
Benzaldehyde	NA	NA	0.082	U	0.082	0.040	U	0.040	0.039	U	0.039	0.039	U	0.039
Benzo[a]anthracene	1	1	3.9		0.019	0.0094	U	0.0094	0.0092	U	0.0092	0.0092	U	0.0092
Benzo[a]pyrene	1	1	3.6		0.021	0.010	U	0.010	0.0099	U	0.0099	0.0099	U	0.0099
Benzo[b]fluoranthene	1	1	5.2		0.022	0.011	U	0.011	0.011	U	0.011	0.011	U	0.011
Benzo[g,h,i]perylene	100	100	1.4		0.049	0.024	U	0.024	0.024	U	0.024	0.024	U	0.024
Benzo[k]fluoranthene	0.8	3.9	1.9		0.029	0.014	U	0.014	0.014	U	0.014	0.014	U	0.014
Bis(2-chloroethoxy)methane	NA	NA	0.042	U	0.042	0.021	U	0.021	0.020	U	0.020	0.020	U	0.020
Bis(2-chloroethyl)ether	NA	NA	0.029	U	0.029	0.014	U	0.014	0.014	U	0.014	0.014	U	0.014
Bis(2-ethylhexyl) phthalate	NA	NA	0.21	J	0.022	0.011	U	0.011	0.063	J	0.010	0.010	U	0.010
Butyl benzyl phthalate	NA	NA	0.024	U	0.024	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012



**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description: Garden Street, New Rochelle, NY**

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')			S-2(7.5-8')			S-3(4.5-5')			S-4(11-11.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1			460-149090-2			460-149090-3			460-149090-4		
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00			01/24/2018 09:30:00			01/24/2018 10:00:00			01/24/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	2			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
SVOA-8270D-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8270D														
Caprolactam	NA	NA	0.029	U	0.029	0.014	U	0.014	0.014	U	0.014	0.014	U	0.014
Carbazole	NA	NA	1.0		0.018	0.0089	U	0.0089	0.0087	U	0.0087	0.0087	U	0.0087
Chrysene	1	3.9	4.1		0.025	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012
Dibenz(a,h)anthracene	0.33	0.33	0.52		0.055	0.027	U	0.027	0.027	U	0.027	0.027	U	0.027
Dibenzofuran	7	59	0.40	J	0.022	0.011	U	0.011	0.011	U	0.011	0.011	U	0.011
Diethyl phthalate	NA	NA	0.025	U	0.025	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012
Dimethyl phthalate	NA	NA	0.024	U	0.024	0.012	U	0.012	0.011	U	0.011	0.011	U	0.011
Di-n-butyl phthalate	NA	NA	0.11	J	0.015	0.0075	U	0.0075	0.0073	U	0.0073	0.0073	U	0.0073
Di-n-octyl phthalate	NA	NA	0.021	U	0.021	0.010	U	0.010	0.0099	U	0.0099	0.0099	U	0.0099
Fluoranthene	100	100	8.5		0.015	0.0075	U	0.0075	0.0074	U	0.0074	0.0074	U	0.0074
Fluorene	30	100	0.80		0.018	0.0088	U	0.0088	0.0086	U	0.0086	0.0086	U	0.0086
Hexachlorobenzene	0.33	1.2	0.035	U	0.035	0.017	U	0.017	0.017	U	0.017	0.017	U	0.017
Hexachlorobutadiene	NA	NA	0.019	U	0.019	0.0093	U	0.0093	0.0091	U	0.0091	0.0091	U	0.0091
Hexachlorocyclopentadiene	NA	NA	0.024	U	0.024	0.012	U	0.012	0.011	U	0.011	0.011	U	0.011
Hexachloroethane	NA	NA	0.025	U	0.025	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012
Indeno[1,2,3-cd]pyrene	0.5	0.5	1.9		0.029	0.014	U	0.014	0.014	U	0.014	0.014	U	0.014
Isophorone	NA	NA	0.024	U	0.024	0.012	U	0.012	0.011	U	0.011	0.011	U	0.011
Naphthalene	12	100	0.33	J	0.018	0.0091	U	0.0091	0.0089	U	0.0089	0.0089	U	0.0089
Nitrobenzene	NA	15	0.017	U	0.017	0.0084	U	0.0084	0.0082	U	0.0082	0.0082	U	0.0082
N-Nitrosodi-n-propylamine	NA	NA	0.032	U	0.032	0.016	U	0.016	0.015	U	0.015	0.015	U	0.015
N-Nitrosodiphenylamine	NA	NA	0.023	U	0.023	0.011	U	0.011	0.011	U	0.011	0.011	U	0.011
Pentachlorophenol	0.8	6.7	0.19	U	0.19	0.094	U	0.094	0.092	U	0.092	0.092	U	0.092
Phenanthrene	100	100	7.3		0.021	0.010	U	0.010	0.010	U	0.010	0.010	U	0.010
Phenol	0.33	100	0.025	U	0.025	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012
Pyrene	100	100	8.1		0.026	0.013	U	0.013	0.013	U	0.013	0.013	U	0.013
Total Conc	NA	NA	51.84			0.0			0.063			0.0		
Total Estimated Conc. (TICs)	NA	NA	21.02			11.0			6.2			11.6		

Highlighted Concentrations shown in bold type face exceed limits

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.

X : Surrogate is outside control limits

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**  
**Job Description: Garden Street, New Rochelle, NY**  
**For:**  
**SESI Consulting Engineers**  
**12 A Maple Avenue**  
**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
SVOA-8270D-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8270D														
1,1'-Biphenyl	NA	NA	0.0073	U	0.0073	0.0075	U	0.0075	0.0086	U	0.0086	0.0074	U	0.0074
1,2,4,5-Tetrachlorobenzene	NA	NA	0.016	U	0.016	0.016	U	0.016	0.018	U	0.018	0.016	U	0.016
2,2'-oxybis[1-chloropropane]	NA	NA	0.0074	U	0.0074	0.0076	U	0.0076	0.0087	U	0.0087	0.0074	U	0.0074
2,3,4,6-Tetrachlorophenol	NA	NA	0.014	U	0.014	0.015	U	0.015	0.017	U	0.017	0.014	U	0.014
2,4,5-Trichlorophenol	NA	NA	0.014	U	0.014	0.014	U	0.014	0.016	U	0.016	0.014	U	0.014
2,4,6-Trichlorophenol	NA	NA	0.014	U	0.014	0.015	U	0.015	0.017	U	0.017	0.014	U	0.014
2,4-Dichlorophenol	NA	NA	0.011	U	0.011	0.012	U	0.012	0.013	U	0.013	0.011	U	0.011
2,4-Dimethylphenol	NA	NA	0.014	U	0.014	0.014	U	0.014	0.016	U	0.016	0.014	U	0.014
2,4-Dinitrophenol	NA	NA	0.039	U	0.039	0.040	U F1	0.040	0.046	U	0.046	0.039	U	0.039
2,4-Dinitrotoluene	NA	NA	0.014	U	0.014	0.014	U	0.014	0.016	U	0.016	0.014	U	0.014
2,6-Dinitrotoluene	NA	NA	0.015	U	0.015	0.015	U	0.015	0.017	U	0.017	0.015	U	0.015
2-Chloronaphthalene	NA	NA	0.013	U	0.013	0.013	U	0.013	0.015	U	0.015	0.013	U	0.013
2-Chlorophenol	NA	NA	0.015	U	0.015	0.015	U	0.015	0.017	U	0.017	0.015	U	0.015
2-Methylnaphthalene	NA	NA	0.0086	U	0.0086	0.0089	U	0.0089	0.010	U	0.010	0.017	J	0.0087
2-Methylphenol	0.33	100	0.018	U	0.018	0.019	U	0.019	0.022	U	0.022	0.019	U	0.019
2-Nitroaniline	NA	NA	0.0084	U	0.0084	0.0086	U	0.0086	0.0099	U	0.0099	0.0085	U	0.0085
2-Nitrophenol	NA	NA	0.021	U	0.021	0.021	U	0.021	0.025	U	0.025	0.021	U	0.021
3,3'-Dichlorobenzidine	NA	NA	0.0078	U	0.0078	0.0080	U	0.0080	0.0091	U	0.0091	0.0078	U	0.0078
3-Nitroaniline	NA	NA	0.0097	U	0.0097	0.0099	U	0.0099	0.011	U	0.011	0.0097	U	0.0097
4,6-Dinitro-2-methylphenol	NA	NA	0.023	U	0.023	0.024	U F1	0.024	0.027	U	0.027	0.023	U	0.023
4-Bromophenyl phenyl ether	NA	NA	0.011	U	0.011	0.011	U	0.011	0.013	U	0.013	0.011	U	0.011
4-Chloro-3-methylphenol	NA	NA	0.013	U	0.013	0.014	U	0.014	0.016	U	0.016	0.013	U	0.013
4-Chloroaniline	NA	NA	0.025	U	0.025	0.026	U	0.026	0.030	U	0.030	0.025	U	0.025
4-Chlorophenyl phenyl ether	NA	NA	0.010	U	0.010	0.010	U	0.010	0.012	U	0.012	0.010	U	0.010
4-Methylphenol	0.33	100	0.011	U	0.011	0.011	U	0.011	0.012	U	0.012	0.011	U	0.011
4-Nitroaniline	NA	NA	0.053	U	0.053	0.055	U	0.055	0.063	U	0.063	0.054	U	0.054
4-Nitrophenol	NA	NA	0.028	U	0.028	0.029	U	0.029	0.033	U	0.033	0.028	U	0.028
Acenaphthene	20	100	0.013	U	0.013	0.014	U	0.014	0.016	U	0.016	0.016	J	0.013
Acenaphthylene	100	100	0.0095	U	0.0095	0.0097	U	0.0097	0.011	U	0.011	0.0095	U	0.0095
Acetophenone	NA	NA	0.021	U	0.021	0.022	U	0.022	0.025	U	0.025	0.022	U	0.022
Anthracene	100	100	0.012	U	0.012	0.013	U	0.013	0.015	U	0.015	0.027	J	0.012
Atrazine	NA	NA	0.018	U	0.018	0.019	U	0.019	0.022	U	0.022	0.018	U	0.018
Benzaldehyde	NA	NA	0.039	U	0.039	0.040	U	0.040	0.046	U	0.046	0.085	J	0.039
Benzo[a]anthracene	1	1	0.0092	U	0.0092	0.0094	U	0.0094	0.053		0.011	0.068		0.0092
Benzo[a]pyrene	1	1	0.0099	U	0.0099	0.010	U	0.010	0.044		0.012	0.046		0.0099
Benzo[b]fluoranthene	1	1	0.011	U	0.011	0.011	U	0.011	0.064		0.013	0.076		0.011
Benzo[g,h,i]perylene	100	100	0.024	U	0.024	0.024	U	0.024	0.045	J	0.028	0.035	J	0.024
Benzo[k]fluoranthene	0.8	3.9	0.014	U	0.014	0.014	U	0.014	0.024	J	0.017	0.028	J	0.014
Bis(2-chloroethoxy)methane	NA	NA	0.020	U	0.020	0.021	U	0.021	0.024	U	0.024	0.020	U	0.020
Bis(2-chloroethyl)ether	NA	NA	0.014	U	0.014	0.014	U	0.014	0.016	U	0.016	0.014	U	0.014
Bis(2-ethylhexyl) phthalate	NA	NA	0.010	U	0.010	0.011	U	0.011	0.012	U	0.012	0.010	U	0.010
Butyl benzyl phthalate	NA	NA	0.012	U	0.012	0.012	U	0.012	0.014	U	0.014	0.012	U	0.012

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
SVOA-8270D-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8270D														
Caprolactam	NA	NA	0.014	U	0.014	0.014	U	0.014	0.016	U	0.016	0.014	U	0.014
Carbazole	NA	NA	0.0086	U	0.0086	0.0089	U	0.0089	0.010	U	0.010	0.012	J	0.0087
Chrysene	1	3.9	0.012	U	0.012	0.012	U	0.012	0.053	J	0.014	0.070	J	0.012
Dibenz(a,h)anthracene	0.33	0.33	0.026	U	0.026	0.027	U	0.027	0.031	U	0.031	0.027	U	0.027
Dibenzofuran	7	59	0.011	U	0.011	0.011	U	0.011	0.013	U	0.013	0.014	J	0.011
Diethyl phthalate	NA	NA	0.012	U	0.012	0.012	U	0.012	0.014	U	0.014	0.012	U	0.012
Dimethyl phthalate	NA	NA	0.011	U	0.011	0.012	U	0.012	0.013	U	0.013	0.011	U	0.011
Di-n-butyl phthalate	NA	NA	0.0073	U	0.0073	0.0075	U	0.0075	0.0086	U	0.0086	0.0073	U	0.0073
Di-n-octyl phthalate	NA	NA	0.0099	U	0.0099	0.010	U	0.010	0.012	U	0.012	0.010	U	0.010
Fluoranthene	100	100	0.0073	U	0.0073	0.0075	U	0.0075	0.094	J	0.0086	0.16	J	0.0074
Fluorene	30	100	0.0086	U	0.0086	0.0088	U	0.0088	0.010	U	0.010	0.016	J	0.0086
Hexachlorobenzene	0.33	1.2	0.017	U	0.017	0.017	U	0.017	0.019	U	0.019	0.017	U	0.017
Hexachlorobutadiene	NA	NA	0.0091	U	0.0091	0.0093	U	0.0093	0.011	U	0.011	0.0091	U	0.0091
Hexachlorocyclopentadiene	NA	NA	0.011	U	0.011	0.012	U	0.012	0.013	U	0.013	0.011	U	0.011
Hexachloroethane	NA	NA	0.012	U	0.012	0.012	U	0.012	0.014	U	0.014	0.012	U	0.012
Indeno[1,2,3-cd]pyrene	0.5	0.5	0.014	U	0.014	0.014	U	0.014	0.046		0.016	0.037		0.014
Isophorone	NA	NA	0.011	U	0.011	0.012	U	0.012	0.013	U	0.013	0.011	U	0.011
Naphthalene	12	100	0.0088	U	0.0088	0.0091	U	0.0091	0.010	U	0.010	0.017	J	0.0089
Nitrobenzene	NA	15	0.0082	U	0.0082	0.0084	U	0.0084	0.0096	U	0.0096	0.0082	U	0.0082
N-Nitrosodi-n-propylamine	NA	NA	0.015	U	0.015	0.016	U	0.016	0.018	U	0.018	0.015	U	0.015
N-Nitrosodiphenylamine	NA	NA	0.011	U	0.011	0.011	U	0.011	0.013	U	0.013	0.011	U	0.011
Pentachlorophenol	0.8	6.7	0.092	U	0.092	0.094	U	0.094	0.11	U	0.11	0.092	U	0.092
Phenanthrene	100	100	0.010	U	0.010	0.010	U	0.010	0.047	J	0.012	0.15	J	0.010
Phenol	0.33	100	0.012	U	0.012	0.012	U	0.012	0.014	U	0.014	0.012	U	0.012
Pyrene	100	100	0.013	U	0.013	0.013	U	0.013	0.094	J	0.015	0.12	J	0.013
Total Conc	NA	NA	0.0			0.0			0.564			0.994		
Total Estimated Conc. (TICs)	NA	NA	4.0			5.7			1.2			25.06		

Highlighted Concentrations shown in bold type face exceed limits

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.

X : Surrogate is outside control limits

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')			S-2(7.5-8')			S-3(4.5-5')			S-4(11-11.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1			460-149090-2			460-149090-3			460-149090-4		
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00			01/24/2018 09:30:00			01/24/2018 10:00:00			01/24/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
GCSVOA-8081B-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8081B														
4,4'-DDD	0.0033	13	0.0013	U	0.0013	0.0013	U	0.0013	0.0012	U	0.0012	0.0012	U	0.0012
4,4'-DDE	0.0033	8.9	0.00089	U	0.00089	0.00087	U	0.00087	0.00085	U	0.00085	0.00085	U	0.00085
4,4'-DDT	0.0033	7.9	0.0014	U	0.0014	0.0014	U	0.0014	0.0013	U	0.0013	0.0013	U	0.0013
Aldrin	0.005	0.097	0.0011	U	0.0011	0.0011	U	0.0011	0.0011	U	0.0011	0.0011	U	0.0011
alpha-BHC	0.02	0.48	0.00076	U	0.00076	0.00075	U	0.00075	0.00074	U	0.00074	0.00073	U	0.00073
beta-BHC	0.036	0.36	0.00084	U	0.00084	0.00083	U	0.00083	0.00081	U	0.00081	0.00081	U	0.00081
Chlordane (technical)	NA	NA	0.018	U	0.018	0.018	U	0.018	0.018	U	0.018	0.018	U	0.018
delta-BHC	0.04	100	0.00046	U	0.00046	0.00045	U	0.00045	0.00044	U	0.00044	0.00044	U	0.00044
Dieldrin	0.005	0.2	0.00098	U	0.00098	0.00096	U	0.00096	0.00094	U	0.00094	0.00094	U	0.00094
Endosulfan I	2.4	24	0.0011	U	0.0011	0.0011	U	0.0011	0.0011	U	0.0011	0.0011	U	0.0011
Endosulfan II	2.4	24	0.0019	U	0.0019	0.0019	U	0.0019	0.0019	U	0.0019	0.0019	U	0.0019
Endosulfan sulfate	2.4	24	0.00094	U	0.00094	0.00093	U	0.00093	0.00091	U	0.00091	0.00091	U	0.00091
Endrin	0.014	11	0.0011	U	0.0011	0.0011	U	0.0011	0.0010	U	0.0010	0.0010	U	0.0010
Endrin aldehyde	NA	NA	0.0018	U	0.0018	0.0017	U	0.0017	0.0017	U	0.0017	0.0017	U	0.0017
Endrin ketone	NA	NA	0.0015	U	0.0015	0.0014	U	0.0014	0.0014	U	0.0014	0.0014	U	0.0014
gamma-BHC (Lindane)	0.1	1.3	0.00070	U	0.00070	0.00068	U	0.00068	0.00067	U	0.00067	0.00067	U	0.00067
Heptachlor	0.042	2.1	0.00089	U	0.00089	0.00087	U	0.00087	0.00085	U	0.00085	0.00085	U	0.00085
Heptachlor epoxide	NA	NA	0.0011	U	0.0011	0.0011	U	0.0011	0.0011	U	0.0011	0.0011	U	0.0011
Methoxychlor	NA	NA	0.0017	U	0.0017	0.0017	U	0.0017	0.0017	U	0.0017	0.0017	U	0.0017
Toxaphene	NA	NA	0.027	U	0.027	0.027	U	0.027	0.026	U	0.026	0.026	U	0.026

U : Indicates the analyte was analyzed for  
but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
GCSVOA-8081B-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
<b>SOIL BY 8081B</b>														
4,4'-DDD	0.0033	13	0.0012	U	0.0012	0.0013	U	0.0013	0.0014	U	0.0014	0.0012	U	0.0012
4,4'-DDE	0.0033	8.9	0.00085	U	0.00085	0.00087	U	0.00087	0.0010	U	0.0010	0.00086	U	0.00086
4,4'-DDT	0.0033	7.9	0.0013	U	0.0013	0.0014	U	0.0014	0.0016	U	0.0016	0.0013	U	0.0013
Aldrin	0.005	0.097	0.0011	U	0.0011	0.0011	U	0.0011	0.0013	U	0.0013	0.0011	U	0.0011
alpha-BHC	0.02	0.48	0.00073	U	0.00073	0.00075	U	0.00075	0.00086	U	0.00086	0.00074	U	0.00074
beta-BHC	0.036	0.36	0.00081	U	0.00081	0.00083	U	0.00083	0.00095	U	0.00095	0.00081	U	0.00081
Chlordane (technical)	NA	NA	0.017	U	0.017	0.018	U	0.018	0.021	U	0.021	0.018	U	0.018
delta-BHC	0.04	100	0.00044	U	0.00044	0.00045	U	0.00045	0.00052	U	0.00052	0.00044	U	0.00044
Dieldrin	0.005	0.2	0.00094	U	0.00094	0.00096	U	0.00096	0.0011	U	0.0011	0.00094	U	0.00094
Endosulfan I	2.4	24	0.0011	U	0.0011	0.0011	U	0.0011	0.0013	U	0.0013	0.0011	U	0.0011
Endosulfan II	2.4	24	0.0019	U	0.0019	0.0019	U	0.0019	0.0022	U	0.0022	0.0019	U	0.0019
Endosulfan sulfate	2.4	24	0.00090	U	0.00090	0.00093	U	0.00093	0.0011	U	0.0011	0.00091	U	0.00091
Endrin	0.014	11	0.0010	U	0.0010	0.0011	U	0.0011	0.0012	U	0.0012	0.0010	U	0.0010
Endrin aldehyde	NA	NA	0.0017	U	0.0017	0.0017	U	0.0017	0.0020	U	0.0020	0.0017	U	0.0017
Endrin ketone	NA	NA	0.0014	U	0.0014	0.0014	U	0.0014	0.0016	U	0.0016	0.0014	U	0.0014
gamma-BHC (Lindane)	0.1	1.3	0.00067	U	0.00067	0.00069	U	0.00069	0.00079	U	0.00079	0.00067	U	0.00067
Heptachlor	0.042	2.1	0.00085	U	0.00085	0.00087	U	0.00087	0.0010	U	0.0010	0.00086	U	0.00086
Heptachlor epoxide	NA	NA	0.0011	U	0.0011	0.0011	U	0.0011	0.0013	U	0.0013	0.0011	U	0.0011
Methoxychlor	NA	NA	0.0016	U	0.0016	0.0017	U	0.0017	0.0019	U	0.0019	0.0017	U	0.0017
Toxaphene	NA	NA	0.026	U	0.026	0.027	U	0.027	0.031	U	0.031	0.026	U	0.026

U : Indicates the analyte was analyzed for  
but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**  
**Job Description:** Garden Street, New Rochelle, NY  
**For:**  
**SESI Consulting Engineers**  
**12 A Maple Avenue**  
**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')			S-2(7.5-8')			S-3(4.5-5')			S-4(11-11.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1			460-149090-2			460-149090-3			460-149090-4		
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00			01/24/2018 09:30:00			01/24/2018 10:00:00			01/24/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
GCSVOA-8082A-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8082A														
Aroclor 1016	NA	NA	0.010	U	0.010	0.0098	U	0.0098	0.0096	U	0.0096	0.0096	U	0.0096
Aroclor 1221	NA	NA	0.010	U	0.010	0.0098	U	0.0098	0.0096	U	0.0096	0.0096	U	0.0096
Aroclor 1232	NA	NA	0.010	U	0.010	0.0098	U	0.0098	0.0096	U	0.0096	0.0096	U	0.0096
Aroclor 1242	NA	NA	0.010	U	0.010	0.0098	U	0.0098	0.0096	U	0.0096	0.0096	U	0.0096
Aroclor 1248	NA	NA	0.010	U	0.010	0.0098	U	0.0098	0.0096	U	0.0096	0.0096	U	0.0096
Aroclor 1254	NA	NA	0.010	U	0.010	0.010	U	0.010	0.010	U	0.010	0.0099	U	0.0099
Aroclor 1260	NA	NA	1.2		0.010	0.010	U	0.010	0.010	U	0.010	0.0099	U	0.0099
Aroclor 1268	NA	NA	0.010	U	0.010	0.010	U	0.010	0.010	U	0.010	0.0099	U	0.0099
Aroclor-1262	NA	NA	0.010	U	0.010	0.010	U	0.010	0.010	U	0.010	0.0099	U	0.0099
Total PCBs	0.1	1	1.2		0.010	0.010	U	0.010	0.010	U	0.010	0.0099	U	0.0099

Highlighted Concentrations shown in bold type face exceed limits  
 U : Indicates the analyte was analyzed for  
 but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

Job Description: Garden Street, New Rochelle, NY

For:

SESI Consulting Engineers

12 A Maple Avenue

Pine Brook, New Jersey 07058

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Dilution Factor	Criteria	Criteria	1			1			1			1		
Unit	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg		
GCSVOA-8082A-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 8082A														
Aroclor 1016	NA	NA	0.0096	U	0.0096	0.0098	U	0.0098	0.011	U	0.011	0.0096	U	0.0096
Aroclor 1221	NA	NA	0.0096	U	0.0096	0.0098	U	0.0098	0.011	U	0.011	0.0096	U	0.0096
Aroclor 1232	NA	NA	0.0096	U	0.0096	0.0098	U	0.0098	0.011	U	0.011	0.0096	U	0.0096
Aroclor 1242	NA	NA	0.0096	U	0.0096	0.0098	U	0.0098	0.011	U	0.011	0.0096	U	0.0096
Aroclor 1248	NA	NA	0.0096	U	0.0096	0.0098	U	0.0098	0.011	U	0.011	0.0096	U	0.0096
Aroclor 1254	NA	NA	0.0099	U	0.0099	0.010	U	0.010	0.012	U	0.012	0.010	U	0.010
Aroclor 1260	NA	NA	0.0099	U	0.0099	0.010	U	0.010	0.012	U	0.012	0.010	U	0.010
Aroclor 1268	NA	NA	0.0099	U	0.0099	0.010	U	0.010	0.012	U	0.012	0.010	U	0.010
Aroclor-1262	NA	NA	0.0099	U	0.0099	0.010	U	0.010	0.012	U	0.012	0.010	U	0.010
Total PCBs	0.1	1	0.0099	U	0.0099	0.010	U	0.010	0.012	U	0.012	0.010	U	0.010

Highlighted Concentrations shown in bold type face exceed limits

U : Indicates the analyte was analyzed for  
but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')			S-2(7.5-8')			S-3(4.5-5')			S-4(11-11.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1			460-149090-2			460-149090-3			460-149090-4		
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00			01/24/2018 09:30:00			01/24/2018 10:00:00			01/24/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
Unit	Criteria	Criteria												
METALS-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 6010C(MG/KG)														
Aluminum	NA	NA	9760		7.3	11500		6.8	11000		7.1	7680		6.7
Antimony	NA	NA	3.3	J	0.43	0.40	U	0.40	0.42	U	0.42	0.39	U	0.39
Arsenic	13	16	6.6		0.66	0.91	J	0.61	0.64	U	0.64	0.61	U	0.61
Barium	350	400	242		2.9	85.4		2.7	87.7		2.8	68.3		2.7
Beryllium	7.2	72	0.35	J	0.041	0.22	J	0.038	0.19	J	0.040	0.17	J	0.038
Cadmium	2.5	4.3	18.2		0.11	0.099	U	0.099	0.10	U	0.10	0.097	U	0.097
Calcium	NA	NA	12000		91.0	781	J	84.7	1950		88.3	1750		83.5
Chromium	NA	NA	175		0.50	22.3		0.46	24.7		0.48	14.4		0.45
Cobalt	NA	NA	7.4	J	1.0	7.6	J	0.95	16.2		0.99	5.7	J	0.93
Copper	50	270	137		1.0	17.3		0.94	35.3		0.98	14.8		0.93
Iron	NA	NA	21900		4.8	18500		4.5	18100		4.7	13000		4.4
Lead	63	400	779		0.54	10		0.50	4.0		0.52	4.0		0.49
Magnesium	NA	NA	5930		68.8	3080		64.0	3580		66.8	2350		63.1
Manganese	1600	2000	434		0.28	464		0.26	454		0.27	281		0.25
Nickel	30	310	335		0.68	19.9		0.63	25.7		0.66	15.1		0.62
Potassium	NA	NA	2400		47.5	3090		44.2	3370		46.1	2550		43.6
Selenium	3.9	180	1.1	U	1.1	1.0	U	1.0	1.0	U	1.0	0.99	U	0.99
Silver	2	180	3.0		0.27	0.25	U	0.25	0.26	U	0.26	0.25	U	0.25
Sodium	NA	NA	97.5	J	68.7	105	J	64.0	219	J	66.7	165	J	63.0
Thallium	NA	NA	1.1	U	1.1	0.98	U	0.98	1.0	U	1.0	0.97	U	0.97
Vanadium	NA	NA	27.7		1.1	26.9		0.99	30.3		1.0	18.1		0.97
Zinc	109	10000	762		0.46	37.8		0.43	37.4		0.45	27.0		0.42
SOIL BY 7471B(MG/KG)														
Mercury	0.18	0.81	2.1		0.035	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012

Highlighted Concentrations shown in bold type face exceed limits

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.



**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
	Criteria	Criteria												
Unit														
METALS-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 6010C(MG/KG)														
Aluminum	NA	NA	9550		8.8	<b>11100</b>		9.1	<b>12900</b>		10.2	7760		8.9
Antimony	NA	NA	0.51	U	0.51	0.53	U	0.53	0.60	U	0.60	0.52	U	0.52
Arsenic	13	16	0.79	U	0.79	1.1	J	0.82	8.3		0.92	0.92	J	0.80
Barium	350	400	61.6		3.5	86.6		3.6	181		4.0	62.3		3.5
Beryllium	7.2	72	0.70		0.049	0.89		0.051	1.0		0.057	0.68		0.050
Cadmium	2.5	4.3	0.13	U	0.13	0.13	U	0.13	0.15	U	0.15	0.13	U	0.13
Calcium	NA	NA	2990		109	1210		113	<b>27000</b>		127	<b>21800</b>		111
Chromium	NA	NA	17.2		0.59	19.9		0.61	22.2		0.69	30.6		0.60
Cobalt	NA	NA	4.1	J	1.2	6.2	J	1.3	6.0	J	1.4	4.7	J	1.2
Copper	50	270	14.2		1.2	18.0		1.3	25.2		1.4	15.7		1.2
Iron	NA	NA	<b>15100</b>		5.8	<b>18000</b>		6.0	<b>15100</b>		6.7	<b>14000</b>		5.9
Lead	63	400	4.1		0.64	34.6		0.67	<b>172</b>		0.75	4.7		0.65
Magnesium	NA	NA	3200		82.3	2600		85.3	3130		95.7	3100		83.6
Manganese	1600	2000	482		0.33	561		0.34	605		0.38	217		0.34
Nickel	30	310	13.2		0.81	18.4		0.84	15.8		0.94	14.5		0.82
Potassium	NA	NA	2270		56.8	2810		58.9	1220	J	66.1	2490		57.7
Selenium	3.9	180	1.3	U	1.3	1.3	U	1.3	1.5	U	1.5	1.3	U	1.3
Silver	2	180	0.33	U	0.33	0.34	U	0.34	0.38	U	0.38	0.33	U	0.33
Sodium	NA	NA	82.2	U	82.2	524	J	85.2	330	J	95.6	231	J	83.5
Thallium	NA	NA	1.3	U	1.3	1.3	U	1.3	1.5	U	1.5	1.3	U	1.3
Vanadium	NA	NA	21.1		1.3	26.1		1.3	28.9		1.5	20.3		1.3
Zinc	109	10000	24.1		0.55	46.5		0.57	84.7		0.64	26.9		0.56
SOIL BY 7471B(MG/KG)														
Mercury	0.18	0.81	0.011	U	0.011	0.012	U	0.012	<b>0.26</b>		0.013	0.011	U	0.011

Highlighted Concentrations shown in bold type face exceed limits

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-1(2-2.5')			S-2(7.5-8')			S-3(4.5-5')			S-4(11-11.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149090-1			460-149090-2			460-149090-3			460-149090-4		
Sampling Date	Use Soil	Restricted Residential	01/24/2018 09:00:00			01/24/2018 09:30:00			01/24/2018 10:00:00			01/24/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
	Criteria	Criteria												
WETCHEM-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 1664A														
TPH (1664A) (mg/l)	NA	NA	45.0	U	45.0	45.0	U	45.0	44.0	U	44.0	45.5	U	45.5
SOIL BY 9012B														
Cyanide, Total (mg/kg)	27	NA	0.31		0.066	0.070	J F1	0.070	0.10	J	0.063	0.061	U	0.061

F1 : MS and/or MSD Recovery is outside acceptance limits.

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.

**Table 3.2: Soil Sample Results Summary**  
**Garden Street, New Rochelle, NY**  
**SESI Consulting Engineers D.P.C.**  
**January 2018**



**SUMMARY OF ANALYTICAL RESULTS: 460-149090-1**

**Job Description:** Garden Street, New Rochelle, NY

**For:**

**SESI Consulting Engineers**

**12 A Maple Avenue**

**Pine Brook, New Jersey 07058**

Client ID	NY 375-6.8(a)	NY 375-6.8(b)	S-5(1.5-2')			S-6(6-6.5')			S-7(1.5-2')			S-8(4-4.5')		
Lab Sample ID	UnRestricted	& CP-51 T-1	460-149215-1			460-149215-2			460-149215-3			460-149215-4		
Sampling Date	Use Soil	Restricted Residential	01/26/2018 14:00:00			01/26/2018 09:30:00			01/26/2018 10:30:00			01/26/2018 12:00:00		
Matrix	Cleanup	Soil Cleanup	Soil			Soil			Soil			Soil		
	Criteria	Criteria												
WETCHEM-SOIL			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
SOIL BY 1664A														
TPH (1664A) (mg/l)	NA	NA	45.0	U	45.0	45.5	U	45.5	44.0	U	44.0	45.5	U	45.5
SOIL BY 9012B														
Cyanide, Total (mg/kg)	27	NA	0.061	U	0.061	0.062	U	0.062	0.77		0.074	0.063	U	0.063

F1 : MS and/or MSD Recovery is outside acceptance limits.

J : Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

U : Indicates the analyte was analyzed for but not detected.

**Table 3.4: Sub Slab and Indoor Air Results Summary**  
**Cottage Place Garden Street**  
**New Rochelle, New York**  
**SESI Job Number 9822**

Compound	Sample Name:	NYSDEC /	EPA Target	SS-1		SS-2		SS-3		SS-4	
	IAL ID:	NYSDOH	Sub Slab	E18-00025-01		E18-00025-02		E18-00025-03		E18-00025-04	
	CAS#	Guidance	Concentration	Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3
Acetone	67-64-1		1100000	D	86	4.8	D	410	48	7.1	0.48
Benzene	71-43-2		12		ND	6.4		8.1	0.64	ND	0.64
Bromodichloromethane	75-27-4				ND	13		ND	1.3	ND	1.3
Bromoform	75-25-2				ND	21		8.2	2.1	ND	2.1
Bromomethane	74-83-9				ND	7.8		ND	0.78	ND	0.78
1,3-Butadiene	106-99-0				ND	4.4		ND	0.44	ND	0.44
Chlorobenzene	108-90-7				ND	9.2		ND	0.92	ND	0.92
Chloroethane	75-00-3				ND	5.3		ND	0.53	ND	0.53
Chloroform	67-66-3		4.1		ND	9.8		2.6	0.98	ND	0.98
Chloromethane	74-87-3				ND	4.1		ND	0.41	ND	0.41
Carbon disulfide	75-15-0		24000		ND	6.2		15	0.62	ND	0.62
Carbon tetrachloride	56-23-5	5 (250)	16		ND	2.5		0.44	0.25	0.50	0.25
Cyclohexane	110-82-7		210000		ND	6.9		3.6	0.69	ND	0.69
Dibromochloromethane	124-48-1				ND	17		ND	1.7	ND	1.7
1,2-Dibromoethane	106-93-4				ND	15		ND	1.5	ND	1.5
1,2-Dichlorobenzene	95-50-1				ND	12		ND	1.2	ND	1.2
1,3-Dichlorobenzene	541-73-1				ND	12		ND	1.2	ND	1.2
1,4-Dichlorobenzene	106-46-7				ND	12		ND	1.2	ND	1.2
Dichlorodifluoromethane	75-71-8		3500		ND	9.9		ND	0.99	ND	0.99
1,1-Dichloroethane	75-34-3		58		ND	8.1		ND	0.81	ND	0.81
1,2-Dichloroethane	107-06-2				ND	8.1		ND	0.81	ND	0.81
1,1-Dichloroethene	75-35-4	100 (1000)	7000		ND	7.9		ND	0.79	ND	0.79
1,2-Dichloroethene (cis)	156-59-2	100 (1000)			ND	7.9		ND	0.79	ND	0.79
1,2-Dichloroethene (trans)	156-60-5				ND	7.9		ND	0.79	ND	0.79
1,2-Dichloropropane	78-87-5		25		ND	9.2		ND	0.92	ND	0.92
1,3-Dichloropropene (cis)	10061-01-5				ND	9.1		ND	0.91	ND	0.91
1,3-Dichloropropene (trans)	10061-02-6				ND	9.1		ND	0.91	ND	0.91
1,3-Dichloropropene - TOTAL	542-75-6				ND	9.1		ND	0.91	ND	0.91
1,2-Dichlorotetrafluoroethane	76-14-2				ND	14		ND	1.4	ND	1.4
1,4-Dioxane	123-91-1				ND	7.2		ND	0.72	ND	0.72
Ethylbenzene	100-41-4		37		ND	8.7		1.7	0.87	ND	0.87
n-Heptane	142-82-5		14000		ND	8.2		6.5	0.82	ND	0.82
1,3-Hexachlorobutadiene	87-68-3				ND	21		ND	2.1	ND	2.1
n-Hexane	110-54-3		24000	D	25	7.1		9.6	0.71	ND	0.71
Methylene chloride	75-09-2		3400		ND	7.0		3.5	0.70	1.7	0.70
Methyl ethyl ketone	78-93-3		170000	D	11	5.9		7.7	0.59	0.65	0.59
Methyl isobutyl ketone	108-10-1		100000		ND	8.2		ND	0.82	ND	0.82
Methyl tert-butyl ether	1634-04-4				ND	7.2		ND	0.72	ND	0.72
Styrene	100-42-5		35000		ND	8.5		ND	0.85	ND	0.85
Tert-butyl alcohol	75-65-0		--		ND	6.1		ND	0.61	ND	0.61
1,1,2,2-Tetrachloroethane	79-34-5				ND	14		ND	1.4	ND	1.4
Tetrachloroethene	127-18-4	100 (1000)	360	D	200	14		1.7	1.4	ND	1.4
Toluene	108-88-3		170000		ND	7.5		13	0.75	ND	0.75
1,2,4-Trichlorobenzene	120-82-1				ND	15		ND	1.5	ND	1.5
1,1,1-Trichloroethane	71-55-6	100 (1000)	170000		ND	11		17	1.1	ND	1.1
1,1,2-Trichloroethane	79-00-5		5.8		ND	11		ND	1.1	ND	1.1
Trichloroethene	79-01-6	5 (250)	16	D	3000	25		0.38	0.25	ND	0.25
Trichlorofluoromethane	75-69-4		--		ND	11		1.3	1.1	1.5	1.1
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		170000		ND	15		ND	1.5	ND	1.5
1,2,4-Trimethylbenzene	95-63-6		2100		ND	9.8		2.9	0.98	ND	0.98
1,3,5-Trimethylbenzene	108-67-8		2100		ND	9.8		ND	0.98	ND	0.98
2,2,4-Trimethylpentane	540-84-1		--		ND	9.3		2.1	0.93	ND	0.93
Vinyl bromide	593-60-2				ND	8.7		ND	0.87	ND	0.87
Vinyl chloride	75-01-4	5 (250)	5.6		ND	5.1		ND	0.51	ND	0.51
Xylenes (m&p)	179601-23-1		3500		ND	8.7		6.9	0.87	ND	0.87
Xylenes (o)	95-47-6		3500		ND	8.7		2.0	0.87	ND	0.87
Xylenes - TOTAL	1330-20-7		3500		ND	8.7		8.9	0.87	ND	0.87

(250) = Sub Slab Concentration requiring mitigation  
D = Extra dilution required for this compound

**Table 3.4: Sub Slab and Indoor Air Results Summary**  
**Cottage Place Garden Street**  
**New Rochelle, New York**  
**SESI Job Number 9822**

Compound	Sample Name: IAL ID: CAS#	NYSDEC / NYSDOH Guidance ug/m3	EPA Target Sub Slab Concentration ug/m3	SP-1 E18-00025-05 RL		SP-2 E18-00025-06 RL		SP-3 E18-00025-07 RL	
				Q	ug/m3	Q	ug/m3	Q	ug/m3
Acetone	67-64-1		1100000		8.8	0.48	D	53	4.8
Benzene	71-43-2		12		0.90	0.64		ND	6.4
Bromodichloromethane	75-27-4				ND	1.3		ND	13
Bromoform	75-25-2				ND	2.1		ND	21
Bromomethane	74-83-9				ND	0.78		ND	7.8
1,3-Butadiene	106-99-0				ND	0.44		ND	4.4
Chlorobenzene	108-90-7				ND	0.92		ND	9.2
Chloroethane	75-00-3				ND	0.53		ND	5.3
Chloroform	67-66-3		4.1		ND	0.98		ND	9.8
Chloromethane	74-87-3				ND	0.41		ND	4.1
Carbon disulfide	75-15-0		24000		1.4	0.62		ND	6.2
Carbon tetrachloride	56-23-5	5 (250)	16		0.44	0.25		ND	2.5
Cyclohexane	110-82-7		210000		ND	0.69	D	94	6.9
Dibromochloromethane	124-48-1				ND	1.7		ND	17
1,2-Dibromoethane	106-93-4				ND	1.5		ND	15
1,2-Dichlorobenzene	95-50-1				ND	1.2		ND	12
1,3-Dichlorobenzene	541-73-1				ND	1.2		ND	12
1,4-Dichlorobenzene	106-46-7				ND	1.2		ND	12
Dichlorodifluoromethane	75-71-8		3500		ND	0.99		ND	9.9
1,1-Dichloroethane	75-34-3		58		ND	0.81		ND	8.1
1,2-Dichloroethane	107-06-2				ND	0.81		ND	8.1
1,1-Dichloroethene	75-35-4	100 (1000)	7000		ND	0.79		ND	7.9
1,2-Dichloroethene (cis)	156-59-2	100 (1000)			ND	0.79		ND	7.9
1,2-Dichloroethene (trans)	156-60-5				ND	0.79		ND	7.9
1,2-Dichloropropane	78-87-5		25		ND	0.92		ND	9.2
1,3-Dichloropropene (cis)	10061-01-5				ND	0.91		ND	9.1
1,3-Dichloropropene (trans)	10061-02-6				ND	0.91		ND	9.1
1,3-Dichloropropene - TOTAL	542-75-6				ND	0.91		ND	9.1
1,2-Dichlorotetrafluoroethane	76-14-2				ND	1.4		ND	14
1,4-Dioxane	123-91-1				ND	0.72		ND	7.2
Ethylbenzene	100-41-4		37		ND	0.87		ND	8.7
n-Heptane	142-82-5		14000		ND	0.82	D	67	8.2
1,3-Hexachlorobutadiene	87-68-3				ND	2.1		ND	21
n-Hexane	110-54-3		24000		1.2	0.71	D	150	7.1
Methylene chloride	75-09-2		3400		2.1	0.70		ND	7.0
Methyl ethyl ketone	78-93-3		170000		1.4	0.59	D	6.8	5.9
Methyl isobutyl ketone	108-10-1		100000		ND	0.82		ND	8.2
Methyl tert-butyl ether	1634-04-4				ND	0.72		ND	7.2
Styrene	100-42-5		35000		ND	0.85		ND	8.5
Tert-butyl alcohol	75-65-0		--		ND	0.61		ND	6.1
1,1,2,2-Tetrachloroethane	79-34-5				ND	1.4		ND	14
Tetrachloroethene	127-18-4	100 (1000)	360		ND	1.4		ND	14
Toluene	108-88-3		170000		1.0	0.75	D	11	7.5
1,2,4-Trichlorobenzene	120-82-1				ND	1.5		ND	15
1,1,1-Trichloroethane	71-55-6	100 (1000)	170000		ND	1.1		ND	11
1,1,2-Trichloroethane	79-00-5		5.8		ND	1.1		ND	11
Trichloroethene	79-01-6	5 (250)	16		0.65	0.25		ND	2.5
Trichlorofluoromethane	75-69-4		--		1.5	1.1		ND	11
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		170000		ND	1.5		ND	15
1,2,4-Trimethylbenzene	95-63-6		2100		ND	0.98		ND	9.8
1,3,5-Trimethylbenzene	108-67-8		2100		ND	0.98		ND	9.8
2,2,4-Trimethylpentane	540-84-1		--		ND	0.93	D	5400	93
Vinyl bromide	593-60-2				ND	0.87		ND	8.7
Vinyl chloride	75-01-4	5 (250)	5.6		ND	0.51		ND	5.1
Xylenes (m&p)	179601-23-1		3500		ND	0.87		ND	8.7
Xylenes (o)	95-47-6		3500		ND	0.87		ND	8.7
Xylenes - TOTAL	1330-20-7		3500		ND	0.87		ND	8.7

(250) = Sub Slab Concentration requiring mitigation  
D = Extra dilution required for this compound

**Table 3.4: Sub Slab and Indoor Air Results Summary**  
**Cottage Place Garden Street**  
**New Rochelle, New York**  
**SESI Job Number 9822**

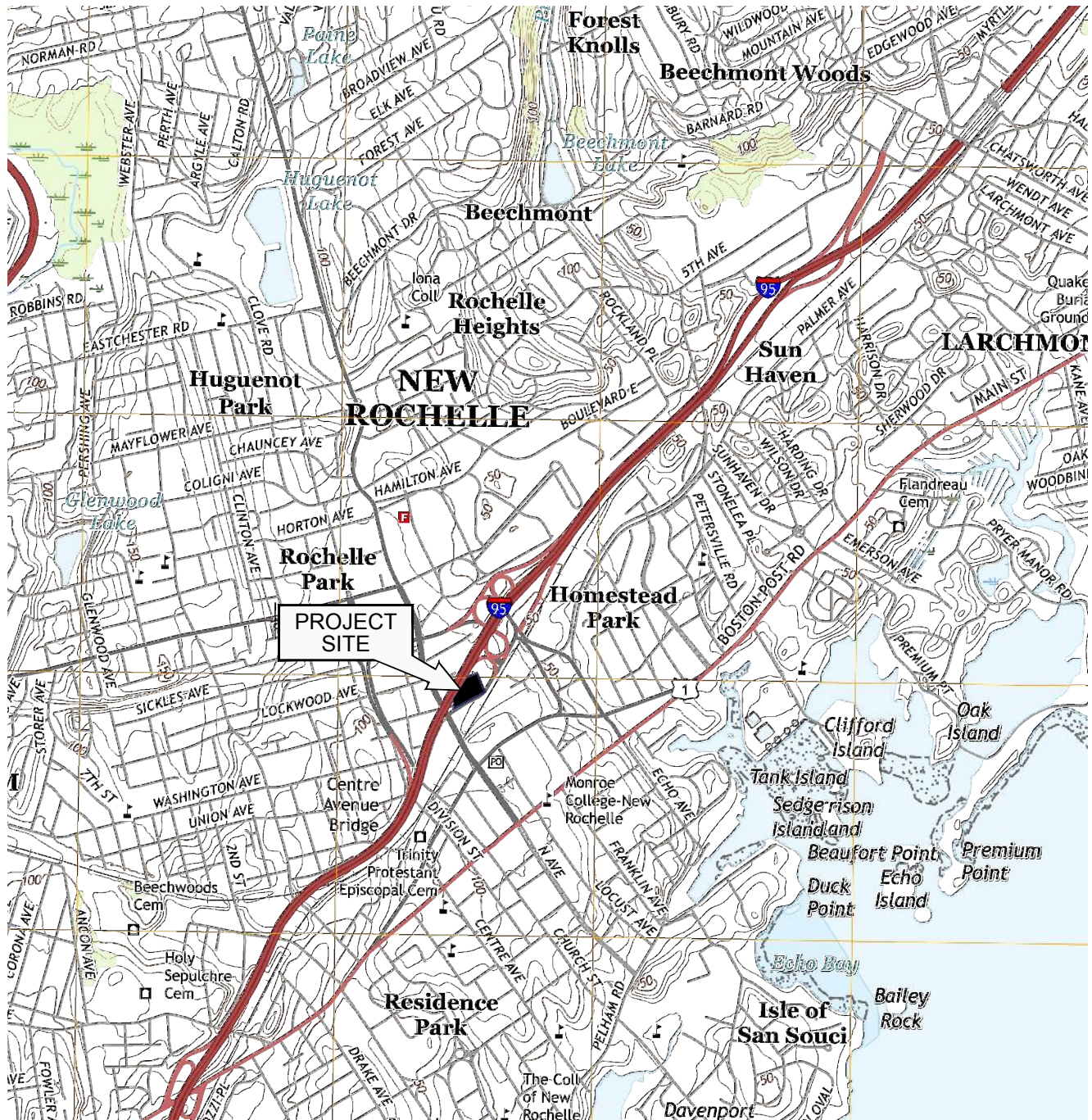
Compound	Sample Name: IAL ID: CAS#	NYSDEC / NYSDOH Guidance ug/m3	EPA Target Indoor Air Concentration ug/m3	IA-1 E18-00025-08		IA-2 E18-00025-09		IA-3 E18-00025-10		IA-4 E18-00025-11	
				RL		RL		RL		RL	
				Q	ug/m3	Q	ug/m3	Q	ug/m3	Q	ug/m3
Acetone	67-64-1		32000		6.1		0.48		ND		0.48
Benzene	71-43-2		0.36		2.1		0.64		1.1		0.64
Bromodichloromethane	75-27-4				ND		1.3		ND		1.3
Bromoform	75-25-2				ND		2.1		ND		2.1
Bromomethane	74-83-9				ND		0.78		ND		0.78
1,3-Butadiene	106-99-0				ND		0.44		ND		0.44
Chlorobenzene	108-90-7				ND		0.92		ND		0.92
Chloroethane	75-00-3				ND		0.53		ND		0.53
Chloroform	67-66-3		0.12		ND		0.98		1.5		0.98
Chloromethane	74-87-3				ND		0.41		ND		0.41
Carbon disulfide	75-15-0				ND		0.62		ND		0.62
Carbon tetrachloride	56-23-5	-- (5)	0.47		0.50		0.25		0.57		0.25
Cyclohexane	110-82-7		6300		1.7		0.69		ND		0.69
Dibromochloromethane	124-48-1				ND		1.7		ND		1.7
1,2-Dibromoethane	106-93-4				ND		1.5		ND		1.5
1,2-Dichlorobenzene	95-50-1				ND		1.2		ND		1.2
1,3-Dichlorobenzene	541-73-1				ND		1.2		ND		1.2
1,4-Dichlorobenzene	106-46-7				ND		1.2		ND		1.2
Dichlorodifluoromethane	75-71-8		100		2.6		0.99		ND		0.99
1,1-Dichloroethane	75-34-3				ND		0.81		ND		0.81
1,2-Dichloroethane	107-06-2				ND		0.81		ND		0.81
1,1-Dichloroethene	75-35-4	-- (100)	210		ND		0.79		ND		0.79
1,2-Dichloroethene (cis)	156-59-2	-- (100)	--		ND		0.79		ND		0.79
1,2-Dichloroethene (trans)	156-60-5				ND		0.79		ND		0.79
1,2-Dichloropropane	78-87-5				ND		0.92		ND		0.92
1,3-Dichloropropene (cis)	10061-01-5				ND		0.91		ND		0.91
1,3-Dichloropropene (trans)	10061-02-6				ND		0.91		ND		0.91
1,3-Dichloropropene - TOTAL	542-75-6				ND		0.91		ND		0.91
1,2-Dichlorotetrafluoroethane	76-14-2				ND		1.4		ND		1.4
1,4-Dioxane	123-91-1				ND		0.72		ND		0.72
Ethylbenzene	100-41-4		1.1		1.1		0.87		ND		0.87
n-Heptane	142-82-5		420		2.1		0.82		ND		0.82
1,3-Hexachlorobutadiene	87-68-3				ND		2.1		ND		2.1
n-Hexane	110-54-3		730		3.4		0.71		ND		0.71
Methylene chloride	75-09-2	60	100		1.6		0.70		2.2		0.70
Methyl ethyl ketone	78-93-3				ND		0.59		ND		0.59
Methyl isobutyl ketone	108-10-1		3100		1.3		0.82		4.8		0.82
Methyl tert-butyl ether	1634-04-4				ND		0.72		ND		0.72
Styrene	100-42-5				ND		0.85		ND		0.85
Tert-butyl alcohol	75-65-0				ND		0.61		ND		0.61
1,1,2,2-Tetrachloroethane	79-34-5				ND		1.4		ND		1.4
Tetrachloroethene	127-18-4	100 (30)	11		ND		1.4		ND		1.4
Toluene	108-88-3		5200		11		0.75		1.1		0.75
1,2,4-Trichlorobenzene	120-82-1				ND		1.5		ND		1.5
1,1,1-Trichloroethane	71-55-6	-- (100)	5200		ND		1.1		ND		1.1
1,1,2-Trichloroethane	79-00-5				ND		1.1		ND		1.1
Trichloroethene	79-01-6	5 (2)	0.48		0.54		0.25		ND		0.25
Trichlorofluoromethane	75-69-4		--		1.8		1.1		1.4		1.1
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1				ND		1.5		ND		1.5
1,2,4-Trimethylbenzene	95-63-6				ND		0.98		ND		0.98
1,3,5-Trimethylbenzene	108-67-8				ND		0.98		ND		0.98
2,2,4-Trimethylpentane	540-84-1		--		1.7		0.93		ND		0.93
Vinyl bromide	593-60-2				ND		0.87		ND		0.87
Vinyl chloride	75-01-4	-- (5)			ND		0.51		ND		0.51
Xylenes (m&p)	179601-23-1		100		4.7		0.87		ND		0.87
Xylenes (o)	95-47-6		100		1.2		0.87		ND		0.87
Xylenes - TOTAL	1330-20-7		100		5.9		0.87		ND		0.87

(5) = Indoor Air Concentration requiring mitigation  
D = Extra dilution required for this compound

## FIGURES



N:\ACAD\9822\9822 SITE LOCATION MAP.DWG 07/31/18 11:30:00AM, Jenny, LAYOUT:FIG-1.1



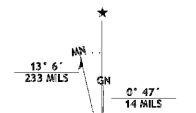
**Produced by the United States Geological Survey**

North American Datum of 1983 (NAD83)  
World Geodetic System of 1984 (WGS84). Projection and  
1 000-meter grid: Universal Transverse Mercator, Zone 18T  
10 000-foot ticks: New York Coordinate System of 1983 (east and  
long island zones)

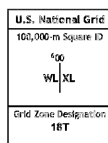
This map is not a legal document. Boundaries may be  
generalized for this map scale. Private lands within government  
reservations may not be shown. Obtain permission before  
entering private lands.

Imagery.....NAIP, June 2013  
Roads.....U.S. Census Bureau, 2015 - 2016  
Names.....GNIS, 2016  
Hydrography.....National Hydrography Dataset, 2013  
Contours.....National Elevation Dataset, 2015  
Boundaries.....Multiple sources; see metadata file 1972 - 2016

Wetlands.....FWS National Wetlands Inventory 1977 - 2014



UTM GRID AND 2016 MAGNETIC NORTH  
DECLINATION AT CENTER OF SHEET



QUADRANGLE LOCATION

1	2	3
4	5	6
7	8	9

ADJOINING QUADRANGLES

1 Nyack  
2 White Plains  
3 Glenville  
4 Yonkers  
5 Mamaroneck  
6 Central Park  
7 Flushing  
8 Sea Cliff

GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY

**SITE LOCATION MAP**

**SESI**  
CONSULTING  
ENGINEERS D.P.C.

SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL

12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

**FIG-1.1**

DRAWN BY: yy

CHECKED BY: FD

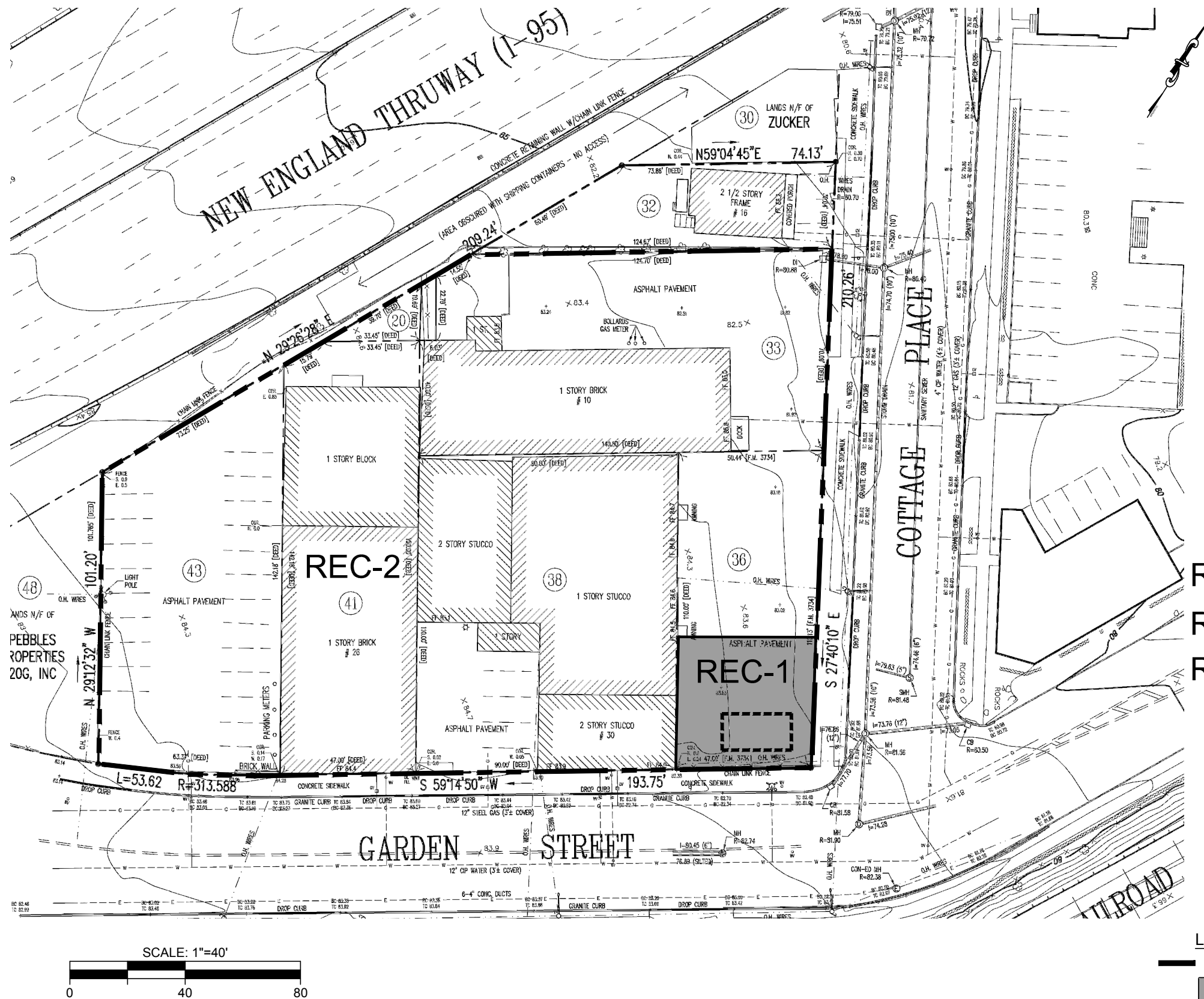
SCALE: N.T.S.

DATE: 07/31/18

JOB NO.: 9822



N:\ACAD\9822\9822 REC LOCATION PLAN.DWG 07/31/18 11:29:16AM, Jenny, LAYOUT:FIG-1.2



REC-1 - UST  
REC-2 - FORMER PLASTIC WORKS  
REC-3 - HISTORIC FILL IS SITE-WIDE

LEGEND:  
- PROPERTY BOUNDARY  
- FORMER GAS STATION AREA WITH 2 ABANDONED USTS  
- APPROXIMATE ABANDONED UST AREA

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SITE INFORMATION ARE TAKEN FROM "SURVEY OF PROPERTY PREPARED FOR THE MARK 95, LLC"  
PREPARED BY CONTRACTORS' LINE & GRADE LLC.JUNE 8, 2017. LATEST REV DATE 10/19/2017.

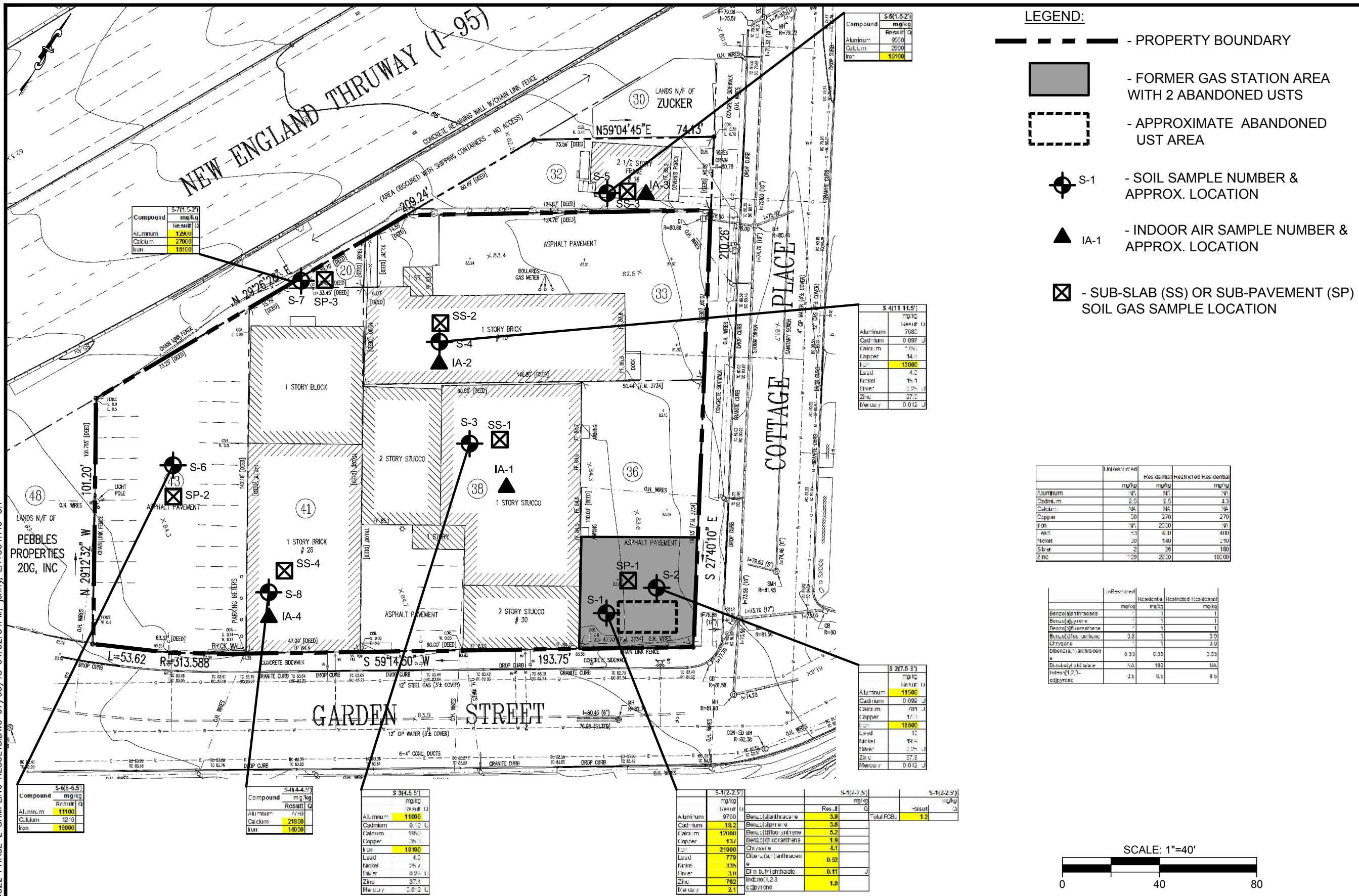
project:  
GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY  
drawing title:  
REC LOCATION PLAN

job no: 9822  
drawing no:  
FIG-1.2

SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL  
SES  
CONSULTING ENGINEERS D.P.C.  
12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: yy  
chk by: FD  
scale: 1" = 40  
date: 07/30/18

N:\ACAD\9822\9822 PHASE 2 SAMPLING RESULTS.DWG 07/05/18 04:52:54PM, Jenny, LAYOUT: FIG-3.1



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dwg by: EW  
chk by: NL  
scale: 1" = 40  
date: 02/02/18

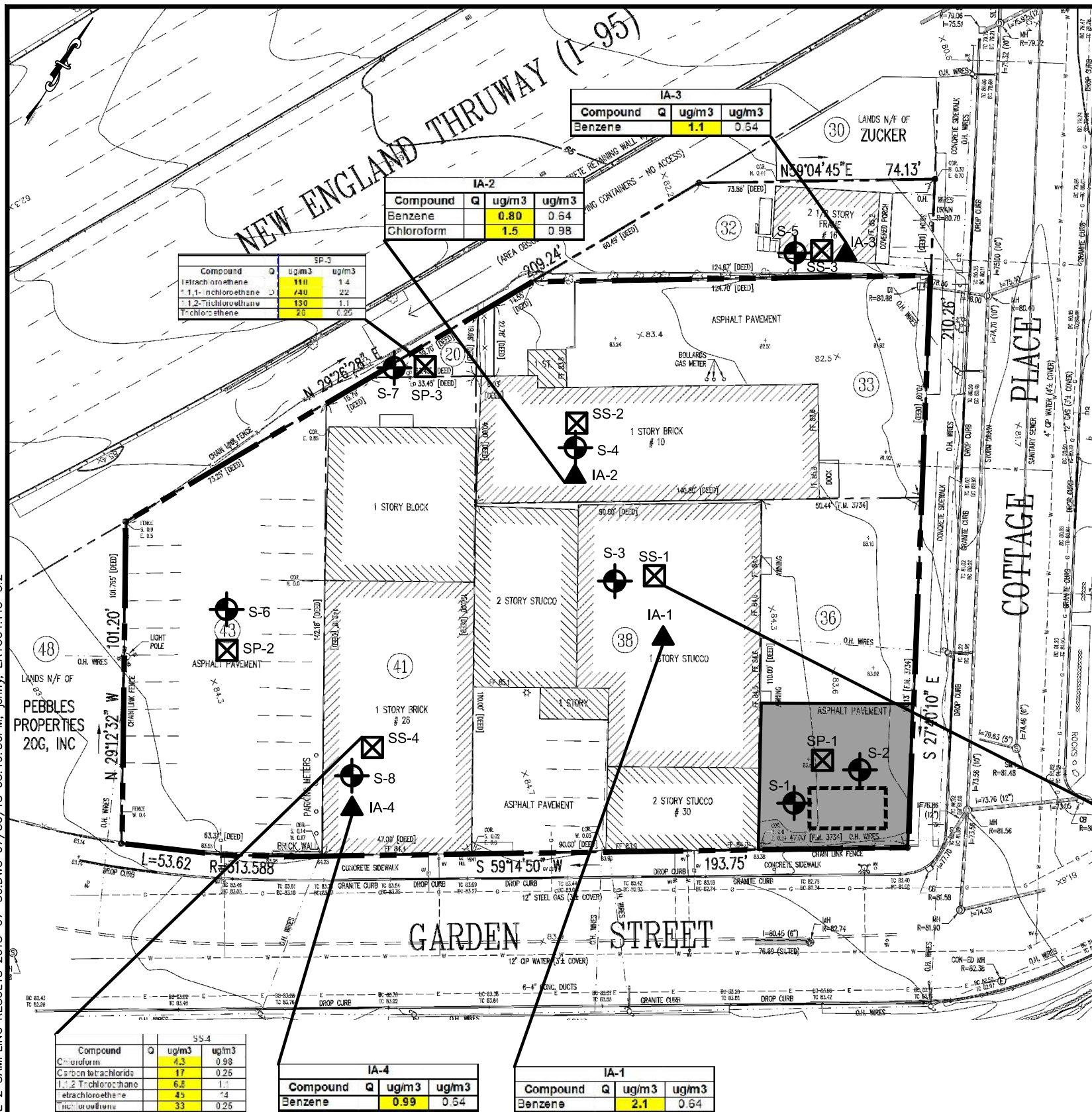
SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL  
**SESI**  
CONSULTING  
ENGINEERS D.P.C.  
12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

project: GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY  
drawing title: SOIL SAMPLING RESULTS PLAN

job no: 9822  
drawing no:



N:\ACAD\9822\9822 PHASE 2 SAMPLING RESULTS 2018-07-30.DWG 07/30/18 03:19:50PM, Jenny, LAYOUT-FIG-3.2



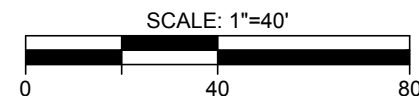
Compound	NYSDEC / NYSDOH Guidance	EPA Target Sub Slab Concentrat
	ug/m3	ug/m3
Chloroform	NS	4.1
Carbon tetrachloride	5	16
Tetrachloroethene	30	360
1,1,1-Trichloroethane	100	170000
1,1,2-Trichloroethane	NS	5.8
Trichloroethene	2	16
NS = No Standard		
D = Extra dilution required for this compound		

Compound	NYSDEC / NYSDOH Guidance	EPA Target Indoor Air Concentrat
	ug/m3	ug/m3
Benzene		0.36
Chloroform		0.12
(5) = Indoor Air Concentration requiring mitigation		
D = Extra dilution required for this compound		

LEGEND:

- PROPERTY BOUNDARY
- FORMER GAS STATION AREA WITH 2 ABANDONED USTS
- APPROXIMATE ABANDONED UST AREA
- S-1 - SOIL SAMPLE NUMBER & APPROX. LOCATION
- IA-1 - INDOOR AIR SAMPLE NUMBER & APPROX. LOCATION
- SUB-SLAB (SS) OR SUB-PAVEMENT (SP) SOIL GAS SAMPLE LOCATION

Compound	Q	ug/m3	ug/m3
Tetrachloroethene		200	14
Trichloroethene		1000	25



NOTE:  
THIS PLAN IS FOR LOCATING SAMPLES ONLY.  
OTHER SITE WORK SHOWN HERE IS NOT  
INTENDED FOR CONSTRUCTION.

SOILS / FOUNDATIONS  
SITE DESIGN  
ENVIRONMENTAL

**SESI**  
CONSULTING  
ENGINEERS D.P.C.

12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

project:  
GARDEN STREET RESIDENCES  
NEW ROCHELLE, WESTCHESTER COUNTY, NY

drawing title:  
SOIL VAPOR SAMPLING  
RESULTS PLAN

job no: 9822  
drawing no:

**FIG-3.2**

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REFERENCE

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PREPARED BY CONTRACTORS' LINE & GRADE LLC.JUNE 8, 2017. LATEST REV DATE 10/19/2017.

**APPENDIX A**  
**Laboratory Results Deliverables**  
**(Electronic)**

**APPENDIX B:**  
**GROUNDWATER SAMPLING PLAN FOR EMERGENT  
CONTAMINANTS**

**Cottage-Garden Auto Repair Site**  
NEW ROCHELLE, NEW YORK

---

**GROUNDWATER SAMPLING PLAN  
FOR  
EMERGING CONTAMINANTS**

**NYSDEC BCP Site Number: C360180**

**Prepared for:**

**The Mark 95 LLC & The Mark 95 II LLC  
1955 Central Park Avenue  
Yonkers, New York 10710**

**Prepared by:**

**SESI CONSULTING ENGINEERS, D.P.C.  
12A Maple Avenue  
Pine Brook, NJ 07058**

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**JANUARY 9, 2019**

## 1.0 EMERGING CONTAMINANTS SAMPLING PLAN

This sampling plan is for groundwater sampling at the Cottage-Garden Auto Repair Site BCP Site located in New Rochelle, New York. SESI will collect ground water samples from five groundwater monitoring wells as shown in Figure 3.2 of the IRM/RIWP.

The sampling will be performed in accordance with the NYSDEC March 1991 Sampling Guidelines and Protocols, with materials limitations for Per- and polyfluoroalkyl substances (PFAS) sampling. The groundwater samples will be sent via chain of custody in a cooler at 4 degrees C to Test America Laboratories, which is ELAP-certified, and analyzed for TCL/TAL+30, 1,4-dioxane and the PFAS compounds listed in Table 1. The groundwater samples will be analyzed for PFAS using Modified USEPA Method 537. Reporting limits for PFOA and PFOS will not exceed 2 nanogram per liter (ng/L). Category B deliverables and an electronic data deliverable will be completed. A DUSR will be prepared by a data validator for all the analyses including PFAS and 1,4-dioxane. The method detection limit (MDL) for 1,4-dioxane will be no higher than 0.28 µg/l (ppb). In order to get the appropriate detection limit, the lab will run EPA method 8270 in "selective ion monitoring" (SIM) mode for 1,4-dioxane.

PFAS are very persistent in the environment and in the human body. There is evidence that exposure to PFAS can lead to adverse human health effects. EPA established the health advisory levels for PFAS in drinking water at 70 parts per trillion. Due to their presence in a variety of products, persistence in the environment and very low drinking water standards, care must be used when groundwater sampling for PFAS to avoid cross contamination from the sampling equipment and personal protective equipment (PPE).

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

Sampling will be performed using either stainless steel, high density polyethylene (HDPE), PVC, silicone, acetate or polypropylene pump and tubing which do not contain

PFAS. Standard two step decontamination using Alconox® detergent and clean water rinse will be performed for equipment that does come in contact with PFAS materials. No waterproof field books, plastic clipboards, binders, or spiral hard cover will be used for PFAS containers. No adhesives (i.e. Post-It® Notes), sharpies, or permanent markers will be used for PFAS containers. The PFAS containers will be labeled with ball point pens. PFAS samples will be stored in separate cooler filled with regular ice only with no chemical (blue) ice packs.

Pre-cleaned sample bottles with closures, coolers, sample labels and a chain of custody form will be provided by Test America. The ground water samples will be collected using low flow purging to obtain representative turbid free samples. The sampling event will include inspection and gauging each well for depth to water and total depth. If free product is detected in a monitoring well, the product thickness will be measured and recorded. Wells, which contain free product, will not be sampled.

The pumping flow rate will be in the range of 100 to 500 ml/min. Field parameters will be measured using a flow through cell before, during and after low flow purging including dissolved oxygen, pH, temperature, and conductivity. The field purging information and parameter data will be recorded on the field parameter sheets. The depth to groundwater will also be recorded throughout the purging process and ideally will not drawdown more than 0.3 foot. The samples will be collected directly from the low flow purging tubing by disconnecting the flow through cell. Two pre-cleaned laboratory supplied 500 ml HDPE or polypropylene bottles will be collected for PFAS analysis first prior to collecting the samples for other analyses. Additional bottles will be supplied by the laboratory for the TCL/TAL+30 and 1,4-dioxane analysis.

Equipment blanks will be collected daily, if the equipment that come in touch with the sample is de-contaminated and re-used. If all the sampling material are disposable, no field blanks will be collected. Field duplicate will be collected on a frequency of 1/20 samples. One matrix spike and matrix spike duplicate (MS/MSD) will also be collected on a frequency of 1/20 samples. A trip blank will accompany each shipment which includes analysis for volatile organic compounds.



Table 1: PFAS compounds list\*

**Full PFAS Target Analyte List**

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	<b>Perfluorobutanesulfonic acid</b>	<b>PFBS</b>	<b>375-73-5</b>
	<b>Perfluorohexanesulfonic acid</b>	<b>PFHxS</b>	<b>355-46-4</b>
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	<b>Perfluorooctanesulfonic acid</b>	<b>PFOS</b>	<b>1763-23-1</b>
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	<b>Perfluoroheptanoic acid</b>	<b>PFHpA</b>	<b>375-85-9</b>
	<b>Perfluorooctanoic acid</b>	<b>PFOA</b>	<b>335-67-1</b>
	<b>Perfluorononanoic acid</b>	<b>PFNA</b>	<b>375-95-1</b>
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluorooctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Bold entries depict the 6 original UCMR3 chemicals

\*Table source is the letter from DEC addressing the sampling of the emerging contaminant dated June 15, 2018.

**APPENDIX C**

**QUALITY ASSURANCE PROJECT PLAN (QAPP)**

## **Quality Assurance Project Plan**

**10 and 16 Cottage Place, and  
25, 26, and 30 Garden Street  
New Rochelle, New York**

**BCP #C360180**

### **1.0 PROJECT DESCRIPTION**

This document presents the Quality Assurance Project Plan (QAPP) for the Remedial Investigation Workplan (RIWP) for the Cottage Place and Garden Street property in the City of New Rochelle, New York (Site). The Site includes Parcels 3-802-0020, 0032, 0033, 0036, 0038, 0041, 0043. The properties total approximately 0.98-acres and have been historically been utilized for residential and commercial purposes. Figure 2.1 presents a Site Location Map.

The Site comprises four commercial buildings and one residential building. The combined parcels comprise approximately three quarters acres of land. The residential parcel on Cottage Place is a two and one-half story apartment building with approximately 1,000 sq. ft. of occupied space. The residence was constructed as a residential single-family home in the early 1900's, with conversion to multiple apartments over the years, based on information from available records. The 16 Cottage Place is a single-story masonry structure with approximately 1,200 sq. ft. of floor area used for a Kitchen and Bath dealer and other similar warehousing purposes. The property at 10 – 12 Cottage Place is a retail tire and auto repair facility present on the site for over 60 years. The property was once a gasoline station with underground tanks currently in place and prior uses are unknown. 28 Garden Street and 34 Garden Street are commercial properties with retail uses documented over the years. 26 Garden Street is a commercial property which was occupied with Plastic Works manufacturing and by Strip-A-Way of New Rochelle Inc. Figure 2.2 presents a Site Plan.

### **2.0 PROJECT ORGANIZATION**

The RIWP will be conducted by Soils Engineering Services, Inc. (SESI), on behalf of The Mark 95 LLC and The Mark 95 II LLC. The organization of SESI's key project management and field staff, and respective areas of responsibility, is presented below.

#### **2.1 Project Principal**

Michael W. St. Pierre, P.E.

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

#### **2.2 Principal Engineer**

Fuad Dahan, PhD, P.E.

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

#### **2.3 Project Manager**

Steven Gustems, PG

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

## **2.4 Remedial Investigation Program Manager**

Fuad Dahan, PhD, P.E.

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

## **2.5 Field Team Leader**

Joseph Scardino

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

## **3.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA**

### Sample Collection

The chemical constituents anticipated to be sampled and their analytical methods are listed in Table 7-1. In addition to the collection of investigative field samples, requirements and procedures for the collection of field QA/QC samples for the Site will be adhered to as discussed below:

*Duplicate Samples:* The NYSDEC specifies a duplicate sample frequency requirement of 20% (1 duplicate per 20 investigative samples of a given matrix). Duplicates will be analyzed for the same parameters as the original investigative sample. The time of duplicate sample collection will not be recorded on any documents, jars, labels, or other equipment that is to be submitted to the laboratory performing the sample analysis; instead, the duplicate sample information is to be recorded by the field personnel in the project field notes for reference. The analytical results of the duplicate will be used to check for analytical and sampling reproducibility, which is to measure the precision of laboratory methods and instrumentation, in addition to the precision of field sample collection methods employed.

*Field and Trip Blanks:* Field and trip blanks consisting of distilled water will be submitted to the analytical laboratory to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples will be analyzed to check for procedural chemical constituents at the facility that may cause sample contamination. One (1) field blank will be collected for every 20 or fewer investigative samples of a given matrix and will be analyzed for the total amount of parameters to be sampled during the sampling event. Trip blanks will be used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. One (1) trip blank will be included with each shipment container storing at least one (1) aqueous sample collected and proposed for volatile organic compound analysis. Each trip blank will be submitted for volatile organic compound analysis.

*Matrix Spike / Matrix Spike Duplicates (MS/MSD):* MS/MSD and MS/Duplicate samples provide information about the effect of the sample matrix on the digestion and measurement methodology. Depending on site-specific circumstances, one MS/MSD or MS/Duplicate should be collected for every 20 or fewer investigative samples to be analyzed for organic and inorganic parameters of a given matrix.

### Sample Preservation

Effective sample preservation methods increase the prevention for degradation of a sample due to precipitation, biological action, or other physical/chemical processes between the time of sample collection and analysis. Prior to sample collection in the field, all sample bottle/ware must be checked to ensure the proper sample containerization is provided from the laboratory for the respective sample parameters to be collected. Table 4.1 provides sample containerization elements to be referenced with the objective of achieving the proper collection and preservation of samples in accordance to their proposed laboratory method to be performed. Containerization elements to be considered include the sample analysis method by matrix, quantity of containers required for proposed analysis, the size and material construction of bottle/ware, the requirement for temperature-based and/or chemical preservatives to be present within select sample containers based on proposed laboratory analysis, and the consideration of parameter-specific sample holding times that must not be exceeded for collected samples awaiting delivery, processing, and extraction at the laboratory. Section 4.4 provides additional information on sample preservation and shipment.

Sample preservation must be documented on the Chain-of-Custody form either using codes provided by the laboratory or written notes.

In cases where NYSDOH ELAP Certification exists for a specific group or category of parameters, the laboratories performing analysis in connection with this project will have appropriate NYSDOH ELAP Certification.

Detection limits set by NYSDEC-ASP (July 2005) will be used for all sample analyses unless otherwise noted. If NYSDEC-ASP-dictated detection limits prove insufficient to assess project goals (i.e., comparison to drinking water standards or attainment of ARARs), then ASP Special Analytical Services (SAS) or other appropriate methods will be utilized.

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

### **3.1 COMPLETENESS**

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

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

### **3.2 REPRESENTATIVENESS**

Samples must be taken of the population and, where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where Target Compound List (TCL) volatiles are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory, will accompany each set of sample bottles from the laboratory to the field and

back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for TCL volatile organic compounds along with the groundwater samples to ensure that contamination with TCL volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for TCL volatile organic compounds. The TCL compounds are identified in the United States Environmental Protection Agency (USEPA) Contract Laboratory Program dated 7/85 or as periodically updated.

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

### **3.3 COMPARABILITY**

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

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

### **3.4 PRECISION AND ACCURACY**

The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), colorimetry, atomic spectroscopy, gravimetric and titrametric techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control. All data evaluations will be consistent with NYSDEC-ASP procedures (July 2005). Data will be 100 percent compliant with NYSDEC-ASP requirements.

The requirements of QA/QC are both method specific and matrix dependent. The number of duplicate, spiked and blank samples analyzed will be dependent upon the total number of samples of each matrix to be analyzed, but there will be at least one split per matrix with a minimum of 1 per every 20 samples. The inclusion and frequency of analysis of field blanks and trip blanks will be on the order of one per each site. Samples to be analyzed for volatile organic compounds will be accompanied by trip and field blanks (water matrix) or field blanks (soil, sediment matrice).

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

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

## **4.0 SAMPLING PROCEDURES**

### **4.1 SAMPLING PROGRAM**

The sampling program for this project will include soil and groundwater. Soil samples will be collected from split spoon sampling or macrocore devices retrieved from soil borings. Groundwater samples will be collected from groundwater monitoring wells using low flow purging techniques.

#### **4.1.1 Drilling/Sampling Procedures**

Soil and groundwater samples will be collected by means of a soil boring program. Soil borings shall be completed using the hollow stem auger drilling methods, direct push methods, or rotary drilling methods, whichever methods are determined to be best suited to site conditions by the SESI project manager and SESI field team leader.

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

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

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

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

#### **4.1.2 Monitoring Well Completion**

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

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

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

#### **4.1.3 Well Development**

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

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

#### **4.1.4 Decontamination**

All drilling equipment and associated tools including augers, drill rods, sampling equipment, wrenches and any other equipment or tools that have come in contact with contaminated materials will be decontaminated before any drilling on site begins, between each well, and prior to removing any equipment from the site. The preferred decontamination procedure will be to use a high pressure steam cleaner to remove soils and volatile organics from the equipment. The water used for this procedure will be contained and shall come from a controlled source, preferably a municipal drinking supply. Representative samples of the contained decontamination water and well development water will be screened in the field to determine the proper method of disposal. Every effort will be made to minimize the generation of contaminated water.

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## **4.2 Groundwater Sampling Program.**

### **4.2.1 Well Evacuation**

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



groundwater samples from monitoring wells that are representative of ambient groundwater conditions in the aquifer. The LFPS method reduces turbidity which is needed particularly when sampling for metals.

#### **4.2.2 Sampling Procedure**

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

In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of 40 ml VOA vials, as follows:

A trip blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for TCL volatiles is planned (water matrix only). The trip blank will be analyzed for TCL volatile organic compounds as a measure of the internal laboratory procedures and their effect on the results.

#### **4.3 Soil Vapor Sampling**

Soil vapor sampling will be conducted in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). Soil vapor samples will be collected in the vadose zone from shallow vapor probes installed either between 1 to 2 feet below impervious surfaces such as concrete or asphalt (sub-slab samples), or from vapor probes with a minimum distance of 3 feet below atmosphere-permeable surfaces to be sealed above the installed vapor probe to prevent atmospheric interference. In addition, indoor air samples may be collected within building interiors to evaluate ambient air conditions representative of selected locations within the building.

Each soil vapor point will be installed in a boring drilled either by hand-operated equipment (e.g. hand auger or percussion hammer drill), or by a small truck-mounted drill rig. Drilling equipment used shall be based on soil conditions, and the method that provides the most practical approach.

Each soil vapor point will consist of an inert sampling tube (polyethylene, stainless steel, or Teflon®) attached with a probe tip at the bottom through which soil vapors can be sampled. Each designated soil vapor sampling location will be purged of a minimum of three volumes using a low volume pump, and then attached to a regulator, and secured with a clamp. The regulator will then be attached to a 1-liter summa canister.

The regulator will be set to collect a soil vapor sample at a flow rate of no less than 0.2 liters per minute. After the summa canister is filled, the valve will be closed.

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

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

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

#### **4.4 SAMPLE PRESERVATION AND SHIPMENT**

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

The bottles will be sent from the laboratory in coolers which will be organized on a per site basis. Following sample collection, the bottles should be placed on ice in the shipping cooler. The samples will be cooled to 4°C, but not frozen. Final packing and shipment of coolers will be performed in accordance with ASP guidelines.

#### **5.0 SAMPLE CUSTODY**

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

##### **5.1 FIELD SAMPLE CUSTODY**

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

Each sample shipping container is assigned a unique identification number by the laboratory. This number is recorded on the chain-of-custody record and is marked with indelible ink on the outside of the shipping container. The field sampler will indicate the sample designation/location number in the space provided on the appropriate chain-of-custody form for each sample collected. The shipping container is closed and a seal provided by the laboratory is affixed to the latch. This

seal must be broken to open the container, and this indicates possible tampering if the seal is broken before receipt at the laboratory. The laboratory will contact the site investigation team leader and the sample will not be analyzed if tampering is apparent.

## **5.2 LABORATORY SAMPLE CUSTODY**

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

The laboratory sample program meets the following criteria:

1. The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
2. Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody record and records the date and time received.
3. Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the site investigation team leader as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.
4. The samples are stored in a secured area at a temperature of approximately 4°C until analyses are to commence.
5. A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
6. A copy of the chain-of-custody form will accompany the laboratory report and will become a permanent part of the project records.

## **5.3 FINAL EVIDENCE FILES**

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

A sample or an evidence file is under custody if:

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

## **6.0 CALIBRATION PROCEDURES**

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

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

## **7.0 ANALYTICAL PROCEDURES**

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

The procedures for the sample preparation and analysis for organic compounds are as specified in the NYSDEC-ASP. Analytical cleanups are mandatory where matrix interferences are noted. No sample shall be diluted any more than 1 to 5. The sample shall be either re-extracted, re-sonicated, re-stream distilled, etc. or be subjected to any one analytical cleanup noted in SW846 or a combination thereof. The analytical laboratory shall expend such effort and discretion to demonstrate good laboratory practice and demonstrate an attempt to best achieve the method detection limit.

### **7.1 VOLATILE ORGANICS (VOA)**

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

### **7.2 SEMI-VOLATILE ORGANIC COMPOUNDS**

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

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

### **7.3 PESTICIDE AND PCB COMPOUNDS**

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

### **7.4 METALS**

Water, soil and waste samples will be analyzed for the metals listed in Table 7.1. The detection limits for these metals are as specified in the NYSDEC-ASP, Section D-V. The instrument detection limits will be determined using calibration standards and procedures specified in the NYSDEC-ASP. The detection limits for individual samples may be higher due to the sample matrix. The procedures for these analyses will be as described in the NYSDEC-ASP. The extraction and analytical procedures used for preparation of water, soil and sediment samples for the analysis of the TAL metals will be performed in accordance with EPA solid waste methods

6010, 6020, 7470, and 7471. Analysis for cyanide will be performed in accordance with EPA Method 9010/9014.

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

## **7.5 SITE SPECIFICITY OF ANALYSES**

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

**TABLE 4.1 – SAMPLE CONTAINERIZATION**

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE <sup>(1)</sup>	HOLDING TIME
<b>Aqueous Samples</b>				
SVOCs (BNAs) – USEPA 8270C	2	1-liter amber glass bottle	None	7 days (until extraction) 40 days (extracted)
Pesticides – USEPA 8081A	2	1-liter amber glass bottle	None	7 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082	2	1-liter amber glass bottle	None	7 days (until extraction) 40 days (extracted)
VOCs – USEPA 8260B	2	40 mL, glass vial with septum cap	Hydrochloric Acid to pH <2	14 days
Metals <sup>(2)</sup>	1	1-liter, plastic bottle	Nitric acid to pH <2	180 days Mercury: 28 days
Cyanide – SM 4500-CN-E	1	1-liter, plastic	Sodium Hydroxide to pH >12	14 days
<b>Soil, Sediment, Solid Waste Samples</b>				
VOCs – USEPA 8260B	3	15-gram EnCore samplers	None	14 days
SVOCs (BNAs) – USEPA 8270C	1	4-oz. glass jar with Teflon lid	None	7 days (until extraction, 40 days extracted)
Pesticides – USEPA 8081A	1	4-oz. glass jar with Teflon lid	None	7 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082	1	4-oz. glass jar with Teflon lid	None	7 days (until extraction) 40 days (extracted)
Metals <sup>(2)</sup>	1	4-oz. glass jar with Teflon lid	None	180 days Cyanide: 14 days Mercury: 28 days
<b>Soil Vapor / Indoor Air Samples</b>				
VOCs – USEPA TO-15	1	Summa Canister	None	30 days

(1) All samples will be preserved with ice during collection and shipment.

(2) Metals refers to the 24 metals and cyanide in the Target Compound List.

## **TABLE 4.2 – SAMPLING PROCEDURE FOR MONITORING WELLS**

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

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

1. Initial static water level recorded with an electric contact probe accurate to the nearest 0.1 foot.
2. Sampling device is lowered into well. Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well. Pump intake must be no less than 2 feet from the bottom of the well to prevent disturbance and resuspension of sediments which may be at the bottom of the well.
3. Measure water level again: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.
4. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.
5. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):
  - a. 0.1 for pH
  - b. 3% for specific conductance (conductivity)
  - c. 10 mv for redox potential
  - d. 10% for DO and turbidity
6. Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.
7. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.
8. Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 ml). Groundwater purged from the well prior to sampling can be used for this purpose.



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

**TABLE 7-1 – CONTRACT-REQUIRED QUANTITATION LEVELS AND ANALYTICAL METHODS FOR ASP INORGANICS, ASP VOLATILES, ASP SEMI-VOLATILES, ASP PESTICIDES, AND PCBS**

**Superfund Target Compound List (TCL) and Contract-Required Quantitation Limit**

<b>SECTION 1 - ASP INORGANICS Method: NYSDEC-ASP-91-4</b>			
<b>PARAMETER</b>	<b>CONTRACT-REQUIRED DETECTION LEVEL* (µg/L)</b>	<b>PARAMETER</b>	<b>CONTRACT-REQUIRED DETECTION LEVEL* (µg/L)</b>
1. Aluminum	200	13. Magnesium	5,000
2. Antimony	60	14. Manganese	15
3. Arsenic	15	15. Mercury	0.2
4. Barium	200	16. Nickel	40
5. Beryllium	5	17. Potassium	5,000
6. Cadmium	5	18. Selenium	35
7. Calcium	5,000	19. Silver	10
8. Chromium	10	20. Sodium	5,000
9. Cobalt	50	21. Thallium	25
10. Copper	25	22. Vanadium	50
11. Iron	100	23. Zinc	60
12. Lead	10	24. Cyanide	10

<b>SECTION 2 – ASP ORGANICS (VOLATILES) Method: NYSDEC-ASP-91-1</b>			
<b>VOLATILE</b>	<b>CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)</b>	<b>VOLATILE</b>	<b>CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)</b>
1. Chloromethane	5.0	18. 1,2-Dichloropropane	5.0
2. Bromomethane	5.0	19. cis-1,3-Dichloropropene	5.0
3. Vinyl Chloride	5.0	20. Trichloroethene	5.0
4. Chloroethane	5.0	21. Dibromochloromethane	5.0
5. Methylene Chloride	5.0	22. 1,1,2-Trichloroethane	5.0
6. Acetone	10.0	23. Benzene	5.0
7. Carbon Disulfide	5.0	24. Trans-1,3-Dichloropropene	5.0
8. 1,1-Dichloroethylene	5.0	25. Bromoform	5.0
9. 1,1-Dichloroethane	5.0	26. 2-Hexanone	10.0
10. 1,2-Dichloroethylene (total)	5.0	27. 4-Methyl, 1,2-Pentanone	10.0
11. Chloroform	5.0	28. Tetrachloroethylene	5.0
12. 1,2-Dichloroethane	5.0	29. Toluene	5.0
13. 2-Butanone	10.0	30. Chlorobenzene	5.0
14. 1,1,1-Trichloroethane	5.0	31. Ethylbenzene	5.0
15. Carbon Tetrachloride	5.0	32. Styrene	5.0
16. Bromodichloromethane	5.0	33. Total Xylenes	5.0
17. 1,1,2,2-Tetrachloroethane	5.0		

SECTION 3 - ASP ORGANICS (SEMI-VOLATILES) Method: NYSDEC-ASP-91-2			
SEMI-VOLATILE	CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)	SEMI-VOLATILE	CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)
1. Phenol	5.0	33. Acenaphthene	5.0
2. Bis(2-chloroethyl)ether	5.0	34. 2,4-Dinitrophenol	10.0
3. 2-Chlorophenol	5.0	35. 4-Nitrophenol	10.0
4. 1,3-Dichlorobenzene	5.0	36. Dibenzofuran	5.0
5. 1,4-Dichlorobenzene	5.0	37. Dinitrotoluene	5.0
6. 1,2-Dichlorobenzene	5.0	38. Diethylphthalate	5.0
7. 2-Methylphenol	5.0	39. 4-Chlorophenyl phenyl ether	5.0
8. 2,2'-oxybis(1-Chloropropane)	5.0	40. Fluorene	5.0
9. 4-Methylphenol	5.0	41. 4-Nitroanile	10.0
10. N-Nitroso-dipropylamine	5.0	42. 4,6-Dinitro-2-methylphenol	10.0
11. Hexachloroethane	5.0	43. N-nitrosodiphenyl amine	5.0
12. Nitrobenzene	5.0	44. 4-Bromophenyl phenyl ether	5.0
13. Isophorone	5.0	45. Hexachlorobenzene	5.0
14. 2-Nitrophenol	5.0	46. Pentachlorophenol	10.0
15. 2,4-Dimethylphenol	5.0	47. Phenanthrene	5.0
16. Bis(2-Chloroethoxy) methane	5.0	48. Anthracene	5.0
17. 2,4-Dichlorophenol	5.0	49. Carbazole	5.0
18. 1,2,4-Trichlorobenzene	5.0	50. Di-n-butyl phthalate	5.0
19. Naphthalene	5.0	51. Fluoranthene	5.0
20. 4-Chloroaniline	5.0	52. Pyrene	5.0
21. Hexachlorobutadiene	5.0	53. Butyl benzyl phthalate	5.0
22. 4-Chloro-3-methylphenol	5.0	54. 3,3'-Dichloro benzidine	5.0
23. 2-Methylnaphthalene	5.0	55. Benz(a)anthracene	5.0
24. Hexachlorocyclopentadiene	5.0	56. Chrysene	5.0
25. 2,4,6-Trichlorophenol	5.0	57. Bis(2-ethylhexyl) phthalate	5.0
26. 2,4,5-Trichlorophenol	10.0	58. Di-n-octyl phthalate	5.0
27. 2-Chloronaphthalene	5.0	59. Benzo(b)fluoranthene	5.0
28. 2-Nitroaniline	10.0	60. Benzo(k)fluoranthene	5.0
29. Dimethyl phthalate	5.0	61. Benzo(a)pyrene	5.0
30. Acenaphthylene	5.0	62. Indeno(1,2,3-cd) pyrene	5.0
31. 2,6-Dinitrotoluene	5.0	63. Dibenz(a,h) anthracene	5.0
32. 3-Nitroaniline	10.0	64. Benzo(g,h,i)perylene	5.0

SECTION 3 - ASP ORGANICS (PESTICIDES/PCBS) Method: NYSDEC-ASP-91-3			
PESTICIDE/PCB	CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)	PESTICIDE/PCB	CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)
1. Alpha-BHC	0.05	15. 4,4'-DDT	0.10
2. Beta-BHC	0.05	16. Methoxychlor	0.5
3. Delta-BHC	0.05	17. Endrin ketone	0.10
4. Gamma-BHC (lindane)	0.05	18. Endrin aldehyde	0.10
5. Heptachlor	0.05	19. Alpha-Chlordane	0.05
6. Aldrin	0.05	20. Gamma-Chlordane	0.05
7. Heptachlor epoxide	0.05	21. Toxaphene	5.0
8. Endosulfan I	0.05	22. AROCHLOR-1016	1.0
9. Dieldrin	0.10	23. AROCHLOR-1221	1.0
10. 4,4'-DDE	0.10	24. AROCHLOR-1232	1.0
11. Endrin	0.10	25. AROCHLOR-1242	1.0
12. Endosulfan II	0.10	26. AROCHLOR-1248	1.0
13. 4,4'-DDD	0.10	27. AROCHLOR-1254	1.0
14. Endosulfan sulfate	0.10	28. AROCHLOR-1260	1.0

\*Matrix: groundwater. For soil matrix, multiply CRDL by 100.

\*\*Quantitation limit for medium-level soil is 1,200 µg/kg (wet weight basis).

**APPENDIX D**

**HEALTH AND SAFETY PLAN (HASP)**



## **SITE-SPECIFIC HEALTH AND SAFETY PLAN**

**10 and 16 Cottage Place, and  
25, 26, and 30 Garden Street  
New Rochelle, New York  
BCP #C360180**

**Prepared For:**

**The Mark 95 LLC & The Mark 95 II LLC  
1955 Central Park Avenue  
Yonkers, New York 1071**

**Prepared By:**

**SESI CONSULTING ENGINEERS  
12A Maple Avenue  
Pine Brook, NJ 07058**

**Project No.: 10491**

**January 29, 2019**

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

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

*This HASP has been prepared for the sole and exclusive use of The Mark 95 LLC & The Mark 95 II LLC, and may not be relied upon by any other person without the express written consent and authorization of SESI.*

**SITE-SPECIFIC HEALTH AND SAFETY PLAN**

**For**

**10 and 16 Cottage Place, and  
25, 26, and 30 Garden Street  
New Rochelle, New York**

Prepared by: \_\_\_\_\_

Date:

\_\_\_\_\_  
Steven Gustems  
SESI- Project Manager

Approved by: \_\_\_\_\_

Date:

\_\_\_\_\_  
Fuad Dahan  
SESI-Principal

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
COC	Constituent(s) of Concern
CRZ	Contamination Reduction Zone
EZ	Exclusion Zone
FS	Field Supervisor
GFCI	Ground Fault Circuit Interrupter
HASP	Health and Safety Plan
HSM	Health and Safety Manager
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheet
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PM	Project Manager
PO	Project Officer
PPE	Personal Protective Equipment
SESI	SESI Consulting Engineers
SSO	Site Safety Officer
SVOC	Semi-Volatile Organic Compound
SZ	Support Zone
TLV	Threshold Limit Value
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

## HEALTH AND SAFETY PLAN SUMMARY

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

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

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

Parameter	Reading	Action
Dust	0 to .5 mg/m <sup>3</sup>	Normal operations
	0.5 to 1 mg/m <sup>3</sup>	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 1 mg/m <sup>3</sup>	Stop work, fully implement dust control plan
Oxygen	≤ 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	≥ 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to ≤ 20 ppm	Normal operations
	> 20 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area

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

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

## **1.0 INTRODUCTION**

### **1.1 Objective**

The objective of this Health and Safety Plan (HASP) is to provide a mechanism for establishing safe working conditions during activities at 10 and 16 Cottage Place, and 25, 26, and 30 Garden Street, New Rochelle, New York (the Site). The safety organization, procedures, and protective equipment have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of injury, illness, or other hazardous incident.

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

### **1.2 Site and Facility Description**

The Site is located at Cottage Place and Garden Street in the City of New Rochelle, New York (Site). The Site includes Parcels 3-802-0020, 0032, 0033, 0036, 0038, 0041, 0043. The properties total approximately 0.98-acres and have been historically been utilized for residential and commercial purposes.

The Site was formerly occupied by four commercial buildings and one residential building. All the buildings have been demolished down to their foundations. The residential parcel on 16 Cottage Place was a two and one-half story apartment building with approximately 1,000 sq. ft. of formerly occupied space. The residence was constructed as a residential single-family home in the early 1900's, with conversion to multiple apartments over the years, based on information from available records. The last business with an address of 10 – 12 Cottage Place was a retail tire and auto repair facility present on the Site for over 60 years. This portion of the Site was also once a gasoline station with underground tanks currently in place and prior uses are unknown. Commercial businesses were also present on the Site with prior addresses of 28 Garden Street and 34 Garden Street including a kitchen and bath dealer and other warehousing purposes. 26 Garden Street housed a Plastic Works manufacturing company called Strip-A-Way of New Rochelle Inc.

### **1.3 Policy Statement**

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

This HASP prescribes the procedures that must be followed by SESI personnel during activities at the site. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager (PM) and the Health and Safety Manager (HSM). This document will be reviewed periodically by the HSM to ensure that it is current and technically correct. Any

changes in site conditions and/or the scope of work will require a review and modification to this HASP. Such changes will be completed in the form of an addendum or a revision to the plan.

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

#### 1.4 References

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

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

#### 1.5 Definitions

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

- *Contamination Reduction Zone (CRZ)* - Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- *Exclusion Zone (EZ)* - Any portions of the site where hazardous substances are, or are reasonably suspected to be present, and pose an exposure hazard to on-site personnel.
- *Incident* - All losses, including first aid cases, injuries, illnesses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- *On-Site Personnel* - All SESI and subcontractors involved with the project.
- *Project* - All on-site work performed under the scope of work.
- *Site* - The area described in Section 1.2, Site and Facility Description, where the work is to be performed by SESI personnel and subcontractors.
- *Support Zone (SZ)* - All areas of the site except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- *Subcontractor* - Includes contractor personnel hired by SESI.
- *Visitor* - All other personnel, except the on-site personnel.
- *Work Area* - The portion of the site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ,



CRZ, and EZ. If the work area is located in an area on the site that is not contaminated, or suspected of being contaminated, the entire work area may be a SZ.

## **2.0 PROJECT SCOPE OF WORK**

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

- Mobilization/Sample location stakeout;
- Soil Borings and Monitoring Well Installation;
- Excavation of contaminated soil “hot spots”;
- Earthwork and grading;
- Chemical sampling of soil and groundwater; and
- Decontamination and demobilization/site restoration.

## **3.0 ROLES AND RESPONSIBILITIES**

### **3.1 All Personnel**

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

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

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

### **3.2 Key Safety Personnel**

#### **3.2.1 Project Officer (PO)**

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

#### **3.2.2 Project Manager (PM)**

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

- Consult with the HSM on site health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work;

- Verify that all incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications of this HASP; and
- Suspend work or modify work practices, as necessary, for personal safety, protection of property, and regulatory compliance.

### **3.2.3 Health and Safety Manager (HSM)**

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

### **3.2.4 Site Safety Officer (SSO)**

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

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

### **3.2.5 Field Supervisor (FS)**

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

- Consult with the SSO on site health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a site map and determine and post routes to medical facilities and emergency telephone numbers;
- Notify local public emergency representatives (as appropriate) of the nature of the site operations, and post their telephone numbers (i.e., local fire department personnel who would respond for a confined space rescue);
- Observe on-site project personnel for signs of ill health effects;

- Investigate and report any incidents to the SSO;
- Verify that all on-site personnel have had applicable training;
- Verify that on-site personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control the hazards; and
- Issue/obtain any required work permits (hot work, confined space, etc.).

### **3.2.6 Field Personnel (FP)**

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

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

### **3.3 Subcontractors**

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

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

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

### **3.4 Stop Work Authority**

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

### **3.5 All On-Site Personnel**

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

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

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

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

### 3.6 Visitors

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

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

**Table 1 – Key Safety Personnel**

SESI Personnel		
Role	Name	Address/Telephone No.
Project Officer (PO)	TBD	
Project Manager (PM)	TBD	
Senior Project Engineer (SPE)	TBD	
Health and Safety Manager (HSM)	TBD	
Site Safety Officer (SSO)	TBD	
Field Supervisor (FS)	TBD	
Field Personnel	TBD	
Field Personnel	TBD	
Subcontractors		
Company/Role	Name	Address/Telephone No.
TBD	TBD	TBD

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

### 4.1 Levels of Protection

PPE is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the levels of COCs and the degree of physical

hazard. This section presents the various levels of protection and defines the conditions of use for each level. A summary of the levels is presented in Table 2 in this section.

#### **4.1.1 Level D Protection**

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

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

#### **4.1.2 Modified Level D Protection**

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

- Nitrile gloves worn over nitrile surgical gloves;
- Latex/polyvinyl chloride (PVC) overboots when contact with COC-impacted media is anticipated;
- Steel toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Face shield in addition to safety glasses or goggles when projectiles or splash hazards exist (e.g. during Power Washing activities);
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used);
- Tyvek<sup>®</sup> suit (polyethylene coated Tyvek<sup>®</sup> suits for handling liquids) when body contact with COC-impacted media is anticipated; and
- PFD if working on or near the water.

#### **4.1.3 Level C Protection**

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

- Full-face, air-purifying respirator with combination organic vapor/HEPA cartridges;
- Polyethylene-coated Tyvek<sup>®</sup> suit, with ankles and cuffs taped to boots and gloves;
- Nitrile gloves worn over nitrile surgical gloves;
- Steel toe work boots, meeting ANSI Z41;
- Chemical-resistant boots with steel toes or latex/PVC overboots over steel toe boots;
- Hard hat, meeting ANSI Z89;

- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

#### **4.2 Selection of PPE**

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

#### **4.3 Site Respiratory Protection Program**

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

- All on-site personnel who may use respiratory protection will have an assigned respirator.
- All on-site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-face air-purifying respirator within the past 12 months. Documentation of the fit test must be provided to the SSO prior to commencement of work.
- All on-site personnel who may use respiratory protection must within the past year have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SSO, prior to commencement of site work.
- Only cleaned, maintained, NIOSH-approved respirators will be used.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All on-site personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

#### **4.4 Using PPE**

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

##### **4.4.1 Donning Procedures**

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

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

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

#### 4.4.2 Doffing Procedures

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

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;
- Remove protective garments, equipment, and respirator (Level C). All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels;
- Wash hands, face, and neck (or shower if necessary);
- Proceed to clean area and dress in clean clothing; and
- Clean and disinfect respirator for next use.

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

#### 4.5 Selection Matrix

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

**Table 2 – PPE Selection Matrix**

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

Decontamination	Modified Level D
Demobilization	Level D

## **5.0 AIR AND NOISE MONITORING**

### **5.1 Air Monitoring**

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

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

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

### **5.2 Noise Monitoring**

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

### **5.3 Monitoring Equipment Maintenance and Calibration**

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

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

If an instrument is found to be inoperative or suspected of giving erroneous readings, the SSO must be responsible for immediately removing the instrument from service and



obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The SSO will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

#### 5.4 Action Levels

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

**Table 3 – Airborne Contaminant Action Levels**

Parameter	Reading	Action
Total Hydrocarbons	0 ppm to $\leq$ 1 ppm	Normal operations; continue hourly breathing zone monitoring
	> 1 ppm to 5 ppm	Increase monitoring frequency to every 15 minutes and use benzene detector tube to screen for the presence of benzene
	$\geq$ 5 ppm to $\leq$ 50 ppm	Upgrade to Level C PPE; continue screening for benzene
	> 50 ppm	Stop work; investigate cause of reading
	At any reading > 5 ppm	Monitor perimeter per CAMP
Benzene	$\geq$ 1 ppm to 5 ppm	Upgrade to Level C PPE
	> 5 ppm	Stop work; investigate cause of reading
Dust	0 to .05 mg/m <sup>3</sup>	Normal operations
	0.05 to 0.1 mg/m <sup>3</sup>	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 0.15 mg/m <sup>3</sup>	Stop work, fully implement dust control plan
Oxygen	$\leq$ 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	$\geq$ 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to $\leq$ 20 ppm	Normal operations
	> 20 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Hydrogen Sulfide	0 ppm to $\leq$ 5 ppm	Normal operations
	> 5 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Flammable Vapors (LEL)	< 10% LEL	Normal operations
	$\geq$ 10% LEL	Stop work, ventilate area, investigate source of vapors

## **6.0 WORK ZONES AND DECONTAMINATION**

### **6.1 Work Zones**

#### **6.1.1 Authorization to Enter**

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

#### **6.1.2 Site Orientation and Hazard Briefing**

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

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

#### **6.1.3 Certification Documents**

A training and medical file may be established for the project and kept on site during all site operations. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR) certificates, as well as current medical clearances for all project field personnel required to wear respirators, will be maintained within that file. All project personnel must provide their training and medical documentation to the SSO prior to starting work.

#### **6.1.4 Entry Log**

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

#### **6.1.5 Entry Requirements**

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

#### **6.1.6 Emergency Entry and Exit**

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

#### **6.1.7 Contamination Control Zones**

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

### **6.1.8 Exclusion Zone (EZ)**

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

### **6.1.9 Contamination Reduction Zone**

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

### **6.1.10 Support Zone (SZ)**

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

### **6.1.11 Posting**

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

### **6.1.12 Site Inspections**

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

## **6.2 Decontamination**

### **6.2.1 Personnel Decontamination**

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

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

### **6.2.2 Equipment Decontamination**

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

contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

### **6.2.3 Personal Protective Equipment Decontamination**

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

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

## **7.0 TRAINING AND MEDICAL SURVEILLANCE**

### **7.1 Training**

#### **7.1.1 General**

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

#### **7.1.2 Basic 40-Hour Course**

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

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

- General emergency response procedures.

### **7.1.3 Supervisor Course**

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

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

### **7.1.4 Site-Specific Training**

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

### **7.1.5 Daily Safety Meetings**

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

### **7.1.6 First Aid and CPR**

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

## **7.2 Medical Surveillance**

### **7.2.1 Medical Examination**

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

### **7.2.2 Pre-placement Medical Examination**

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

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;
- Chest X-ray, at a frequency determined by the physician;
- Pulmonary function test;

- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

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

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

### **7.2.3 Other Medical Examinations**

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

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

### **7.2.4 Periodic Exam**

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

### **7.2.5 Medical Restriction**

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

## **8.0 GENERAL SAFETY PRACTICES**

### **8.1 General Safety Rules**

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

- At least one copy of this HASP must be in a location at the site that is readily available to personnel, and all project personnel shall review the plan prior to starting work.

- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required and stop work and replace damaged PPE immediately.
- Secure disposable coveralls, boots, and gloves at the wrists and legs and ensure closure of the suit around the neck.
- Upon skin contact with materials that may be impacted by COCs, remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by COCs must be reported to the FS or SSO immediately. If needed, medical attention should be sought.
- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by COCs, such as standing water, mud, or discolored soil. Equipment must be stored on elevated or protected surfaces to reduce the potential for incidental contamination.
- Remove PPE as required in the CRZ to limit the spread of COC-containing materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Removing soil containing site COCs from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited.
- Inspect all non-disposable PPE for contamination in the CRZ. Any PPE found to be contaminated must be decontaminated or disposed of appropriately.
- Recognize emergency signals used for evacuation, injury, fire, etc.
- Report all injuries, illnesses, and unsafe conditions or work practices to the FS or SSO.
- Use the “buddy system” during all operations requiring Level C PPE, and when appropriate, during Modified Level D operations.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.
- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and in accordance with the manufacturer’s directions.
- Personnel are to perform only tasks for which they have been properly trained and will advise their supervisor if they have been assigned a task for which they are not trained.
- The presence or consumption of alcoholic beverages or illicit drugs during the workday, including breaks, is strictly prohibited. Notify your supervisor if you must take prescription or over-the-counter drugs that indicate they may cause drowsiness or, that you should not operate heavy equipment.
- Remain upwind during site activities whenever possible.

## **8.2 Buddy System**

On-site personnel must use the buddy system as required by operations. Use of the “buddy system” is required during all operations requiring Level C to Level A PPE, and when appropriate, during Level D operations. Crewmembers must observe each other for

signs of chemical exposure, and heat or cold stress. Indications of adverse effects include, but are not limited to:

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

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

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

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

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

### **8.3 Heat Stress**

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

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

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

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the



water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

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

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

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

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

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

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

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

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

## 8.4 Heat Stress Safety Precautions

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

**Table 4 – Work/Rest Schedule**

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

- For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)
- Calculate the adjusted air temperature ( $t_{a\text{ adj}}$ ) by using this equation:  $t_{a\text{ adj}}\text{ }^{\circ}\text{F} = t_a\text{ }^{\circ}\text{F} + (13 \times \% \text{ sunshine})$ . Measure air temperature ( $t_a$ ) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
- A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
- The information presented above was generated using the information provided in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Handbook.

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

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

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

- Employees must remove impermeable garments during rest periods. This includes white Tyvek-type garments.

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

## 8.5 Cold Stress

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

**Table 5 – Wind Chill Temperature Chart**

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

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

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

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

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the

extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

## **8.6 Safety Precautions for Cold Stress Prevention**

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

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

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

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

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

## **8.7 Safe Work Practices**

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

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

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

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

## **8.8 Biological Hazards**

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

### **8.8.1 Tick Borne Diseases**

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

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

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

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

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

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

### **8.8.2 Poisonous Plants**

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

*Control* - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination

avoidance. If skin contact is made, the area should be washed immediately with soap and water and observed for signs of reddening.

### **8.8.3 Snakes**

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

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

### **8.8.4 Spiders**

Personnel may encounter spiders during work activities.

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

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

## **8.9 Noise**

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

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

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

### **8.10 Spill Control**

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

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

### **8.11 Sanitation**

Site sanitation will be maintained according to OSHA requirements.

#### **8.11.1 Break Area**

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

#### **8.11.2 Potable Water**

The following rules apply to all field operations:

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

#### **8.11.3 Sanitary Facilities**

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

#### **8.11.4 Lavatory**

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

#### **8.12 Emergency Equipment**

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

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

#### **8.13 Lockout/Tagout Procedures**

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

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

#### **8.14 Electrical Safety**

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

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or USCG regulations.
- Portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM.



- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- All extension cord outlets must be equipped with ground fault circuit interrupters (GFCI).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

### **8.15 Lifting Safety**

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

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

### **8.16 Ladder Safety**

When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting

and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

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

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

### 8.17 Traffic Safety

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

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

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

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

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

## 9.0 SITE-SPECIFIC HAZARDS AND CONTROL MEASURES

### 9.1 Evaluation of Hazards

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

#### 9.1.1 Hazard Characteristics

Existing information for Site:

☒ Detailed    ☐ Preliminary    ☐ None

Hazardous/Contaminated Material Form(s):

☒ Solid    ☒ Liquid    ☐ Sludge    ☐ Gas    ☒ Vapor

Containment Type(s):

☐ Drum    ☒ Tank    ☐ Pit    ☐ Debris  
☐ Pond    ☐ Lagoon    Other: \_\_\_\_\_

Hazardous Material Characteristics:

☒ Volatile      ☐ Corrosive      ☐ Reactive      ☐ Radioactive  
☐ Ignitable      ☒ Toxic      ☒ Unknown

Routes of Exposure:

☒ Oral      ☒ Dermal      ☒ Eye      ☒ Respiratory

**9.1.2 Potential Health and Safety Hazards**

<input checked="" type="checkbox"/> Heat	<input type="checkbox"/> Congested areas
<input checked="" type="checkbox"/> Cold	<input checked="" type="checkbox"/> General Construction
<input type="checkbox"/> Confined space entry	<input checked="" type="checkbox"/> Physical injury
<input type="checkbox"/> Oxygen depletion	<input checked="" type="checkbox"/> Electrical hazards
<input type="checkbox"/> Asphyxiation	<input checked="" type="checkbox"/> Handling and product transfer
<input checked="" type="checkbox"/> Excavation	<input checked="" type="checkbox"/> Fire
<input checked="" type="checkbox"/> Cave-ins	<input checked="" type="checkbox"/> Explosion
<input checked="" type="checkbox"/> Falls, slippage	<input checked="" type="checkbox"/> Biological Hazards
	<input checked="" type="checkbox"/> Plants – Poison Ivy, Poison Oak
	<input checked="" type="checkbox"/> Insects – Ticks
	<input checked="" type="checkbox"/> Insects – Mosquitoes
	<input checked="" type="checkbox"/> Insects – Bees and Wasps
	<input checked="" type="checkbox"/> Rats and Mice
<input checked="" type="checkbox"/> Heavy equipment	<input type="checkbox"/> Non-ionizing Radiation (i.e. UV, IR, etc.)
<input type="checkbox"/> Other: Potential Ignition Hazard.	

**9.2 Field Activities, Hazards, and Control Procedures**

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

**9.2.1 Mobilization/Construction Stakeout**

Description of Tasks

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

Hazard Identification

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

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

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

#### Controls

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

### **9.2.2 Demolition/Site Clearing**

#### Description of Tasks

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

#### Hazard Identification

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

#### Controls

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

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

*Utilities* – All electric, gas, water, steam, sewer, and other service lines shall be shut off, capped, or otherwise controlled, outside the building line before demolition work is started. In each case, any utility company that is involved shall be notified in advance. If it is necessary to maintain any power, water or other utilities during demolition, such lines shall be temporarily relocated, as necessary.

*Hazardous Substances* – It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used

in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

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

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

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

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

## **9.2.3 Excavation and Cut/Fill Operations**

### **9.2.3.1 Excavation/Trenching**

#### Description of Tasks

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

#### Hazard Identification

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

#### Controls

*Underground Utilities* – The estimated locations of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during the excavation work, shall be determined prior to opening an excavation. Utility companies or owners shall be contacted (“Call Before You Dig”) within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation.

When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

While the excavation is open, underground installations shall be protected, supported, or removed, as necessary, to safeguard site personnel.

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

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

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

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

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

*Excavation Egress* – A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are four feet or more in depth so as to require no more than 25 feet or lateral travel for project personnel.

### **9.2.3.2 Heavy Equipment Operation**

#### Description of Tasks

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

#### Hazard Identification

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

#### Controls

*Equipment Inspection* – All vehicles in use shall be checked prior to operation to ensure that all parts, equipment, and accessories that affect safe operations are in proper

operating condition and free from defects. All defects shall be corrected before the vehicle is placed in service.

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

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

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

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

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

### **9.2.3.3 Disturbance/Handling of Contaminated Material**

#### Description of Tasks

After the contaminated soil is excavated from below the Site's surface, the material will be stockpiled, dried, and either transported offsite or relocated and backfilled on site.

#### Hazard Identification

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

#### Controls

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

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

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

### **9.2.4 Drilling/Subsurface Intrusion Activities**

#### Description of Tasks

This component of work includes the project tasks of delineation and sampling the PCB-impacted soil, installation of the groundwater cutoff wall, and in-situ soil grouting. Geotechnical testing of the grout and existing site soils will also be conducted.



### Hazard Identification

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

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

### Controls

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

The operator is responsible for the safe operation of the rig, as well as the crew's adherence to the requirements of this HASP. The operator must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the operator, wear all personal protective equipment, and be aware of all hazards and control procedures. The operator and crew must participate in the Daily Safety Meetings and be aware of all emergency procedures.

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

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

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

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

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

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

*Rules for Intrusive Activity* - Before beginning any intrusive activity, the existence and location of underground pipe, conduit, electrical equipment, and other installations will be

determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. "Call Before You Dig" will verify the potential for encountering subsurface utilities. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Employees rigging loads on catlines shall:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### **9.2.5 Subsurface Chemical Sample Collection/Analysis**

#### Description of Tasks

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

#### Hazard Identification

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

### Controls

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

## **9.2.6 UST Closure**

### **9.2.6.1 Working in Confined Spaces**

#### Description of Tasks

The project will involve the closure of several USTs.

#### Hazard Identification

Closure activities may require the entrance into confined spaces to facilitate cleaning and removal of the USTs.

#### Controls

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

### **9.2.6.2 Working with Compressed Air**

#### Description of Tasks

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

#### Hazard Identification

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

#### Controls

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

*Cylinder Storage* – Valve protection caps shall be in place and secured when compressed gas cylinders are transported, moved, or stored. Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved. Compressed gas cylinders shall be secured in an upright position at all times, except if necessary for short periods of time when cylinders are actually being hoisted or carried. Cylinders shall be placed in a location where they cannot become part of an electrical circuit.

## **9.2.7 Site Capping System Construction**

Refer to Section 8.0 for general safety procedures.

### **9.2.8 Creek Relocation**

Refer to Section 8.0 for general safety procedures.

### **9.2.9 Decontamination**

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

### **9.2.10 Demobilization**

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

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

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

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

## **9.3 Chemical Hazards**

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site COCs. Concentrations of airborne COCs during site tasks may be measurable and will require air monitoring during certain operations. Air monitoring requirements for site tasks are outlined in Section 5.1.

COCs at the site include heavy metals, some VOC compounds, some SVOC compounds and potentially other industrial chemicals including PCBs and pesticides.

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

Table 6 – List of Primary Contaminants

<b>Media: Soil</b>		
<b>SVOCs</b>	<b>Concentration (mg/kg)</b>	<b>Applicable Monitoring Instrument</b>
Benzo(a)anthracene	3.9	PID
Benzo(a)pyrene	3.6	PID
Benzo(b)fluoranthene	5.2	PID
Benzo(k)fluoranthene	1.9	PID
Chrysene	4.1	PID
Dibenz(a,h)anthracene	0.52	PID
Indeno(1,2,3-cd)pyrene	1.9	PID
<b>Metals</b>	<b>Concentration (mg/kg)</b>	<b>Applicable Monitoring Instrument</b>
Aluminum	12,900	Not Applicable
Cadmium: 18.2	18.2	Not Applicable
Calcium: 12,000	12,000	Not Applicable
Copper	137	Not Applicable
Iron	21,900	Not Applicable
Lead	779	Not Applicable
Nickel	335	Not Applicable
Silver	3.0	Not Applicable
Zinc	762	Not Applicable
Mercury	2.1	Not Applicable
<b>Pesticides/PCBs</b>	<b>Concentration (mg/kg)</b>	<b>Applicable Monitoring Instrument</b>
Arochlor 1260	1.2	Not Applicable
4,4'-DDT	0.0078	Not Applicable

Media: Soil Vapor		
Volatile Organic Compounds	Concentration (ug/m3)	Applicable Monitoring Instrument
Carbon Tetrachloride	17	PID
Chloroform	4.3	PID
Tetrachloroethene	200	PID
Trichloroethene	3,000	PID
1,1,1-Trichloroethane	740	PID
1,1,2-Trichloroethane	130	PID

## 10.0 EMERGENCY PROCEDURES

### 10.1 General

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

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

### 10.2 Emergency Response

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

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

#### 10.2.1 Fire

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



### **10.2.2 Contaminant Release**

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

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

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

### **10.3 Medical Emergency**

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

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

#### **10.3.1 Emergency Care Steps**

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

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

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

### **10.4 First Aid - General**

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

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

any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

#### **10.4.1 First Aid - Inhalation**

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

#### **10.4.2 First Aid - Ingestion**

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

#### **10.4.3 First Aid - Skin Contact**

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

#### **10.4.4 First Aid - Eye Contact**

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

### **10.5 Reporting Injuries, Illnesses, and Safety Incidents**

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

### **10.6 Emergency Information**

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

**Table 7 – Emergency Contacts**

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

### 10.6.1 Directions to Hospital

Montefiore New Rochelle Hospital  
W677+52 New Rochelle, New York

(914) 632-5000

Directions to Hospital:

Take Cottage Pl to Garden St

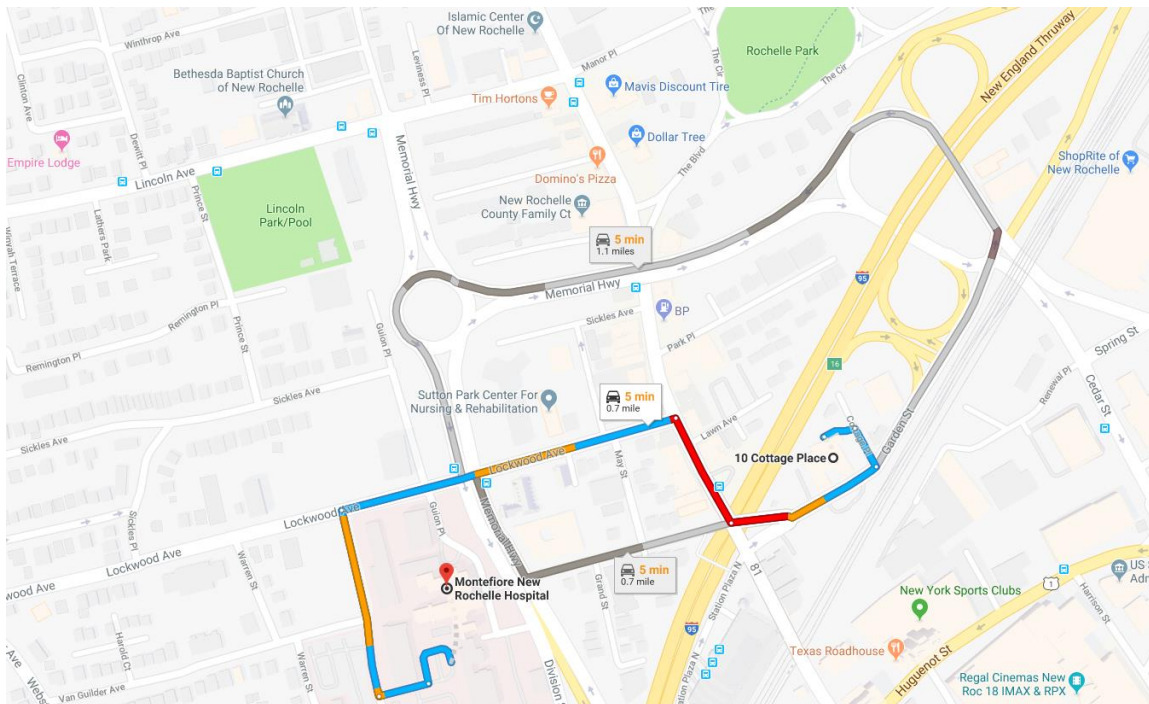
1. Head northeast toward Cottage Pl
2. Turn right onto Cottage Pl

Take Lockwood Ave to Glover Johnson Pl

3. Turn right onto Garden St
4. Turn right onto 81/North Ave
5. Turn left onto Lockwood Ave

Continue on Glover Johnson Pl to your destination

6. Turn left onto Glover Johnson Pkwy
7. Turn left
8. Turn left



## 11.0 LOGS, REPORTS, AND RECORD KEEPING

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

### 11.1 HASP Field Change Request

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

### **11.2 Medical and Training Records**

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

### **11.3 Exposure Records**

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

### **11.4 Accident/Incident Report**

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

### **11.5 OSHA Form 200**

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

### **11.6 On-Site Health and Safety Field Logbooks**

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

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

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

### **11.7 Material Safety Data Sheets**

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

**ATTACHMENT 1**  
**AIR MONITOR LOG**

### Air Monitoring: Sample Collection and Analysis

Date & Time of Monitoring	Task / Operation Being	Substance(s)/ Hazard(s) Being	Monitoring Location	Type/Method of Monitoring <small>(separate lines for</small>	Monitoring Results	Exposure Limits	Required Action

## **ATTACHMENT 2**

### **OSHA POSTER**



# Job Safety and Health

## It's the law!



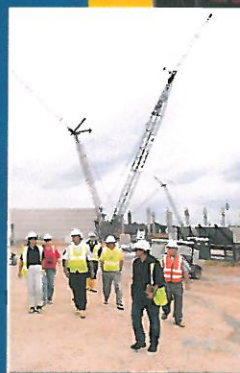
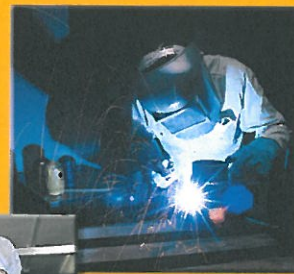
### EMPLOYEES:

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

### EMPLOYERS:

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

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



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

**1-800-321-OSHA (6742)**  
[www.osha.gov](http://www.osha.gov)

OSHA 3165-02 2012R





**ATTACHMENT 3**  
**FILED CHANGE REQUEST FORM**

# HEALTH & SAFETY PLAN CHANGE NOTICE

Pages \_\_\_\_ of \_\_\_\_

Project: \_\_\_\_\_ H&S-CN

1) HASP VERSION: \_\_\_\_\_ SECTION: \_\_\_\_\_ PAGE (s): \_\_\_\_\_

RE: --- Change to existing HASP Anticipated Revision Date: \_\_\_\_\_  
--- Addition to existing HASP  
--- Other: \_\_\_\_\_  
\_\_\_\_\_ CONT. \_\_\_\_\_

2) PROPOSED CHANGE: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

4) EXHIBITS ATTACHED \_\_\_\_ NO \_\_\_\_ YES (If YES, describe) \_\_\_\_\_  
\_\_\_\_\_ CONT. \_\_\_\_\_

5) PMK APPROVALS PROJECT MANAGER: \_\_\_\_\_ Date: \_\_\_\_\_  
SITE MANAGER: \_\_\_\_\_ Date: \_\_\_\_\_  
H&S MANAGER: \_\_\_\_\_ Date: \_\_\_\_\_  
  
Client Approval Required: \_\_\_\_ NO \_\_\_\_ YES (If YES, date submitted) \_\_\_\_\_

6) CLIENT APPROVAL \_\_\_\_ APPROVED \_\_\_\_ REMANDED \_\_\_\_ REJECTED  
  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ CONT. \_\_\_\_\_  
  
Client Representative: \_\_\_\_\_ Date: \_\_\_\_\_

7) DISTRIBUTION AFTER APPROVAL  
  
☒ HASP UPDATE LIST --- OTHER: \_\_\_\_\_  
☒ CLIENT \_\_\_\_\_  
☒ PROJECT FILES \_\_\_\_\_

8) PREPARED BY: \_\_\_\_\_ Date: \_\_\_\_\_  
Title: \_\_\_\_\_

**ATTACHMENT 4**  
**INJURY REPORT FORM**

# OSHA's Form 301

## Injury and Illness Incident Report

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

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

Form approved OMB no. 1218-0176

### Information about the employee

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

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

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

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

- 1) Full name \_\_\_\_\_
- 2) Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_
- 3) Date of birth \_\_\_\_/\_\_\_\_/\_\_\_\_
- 4) Date hired \_\_\_\_/\_\_\_\_/\_\_\_\_
- 5) ☐ Male  
☐ Female

### Information about the physician or other health care professional

- 6) Name of physician or other health care professional \_\_\_\_\_

- 7) If treatment was given away from the worksite, where was it given?  
Facility \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_

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

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

### Information about the case

- 10) Case number from the *Log* \_\_\_\_\_ (Transfer the case number from the *Log* after you record the case.)
- 11) Date of injury or illness \_\_\_\_/\_\_\_\_/\_\_\_\_
- 12) Time employee began work \_\_\_\_ AM / PM
- 13) Time of event \_\_\_\_ AM / PM ☐ Check if time cannot be determined

- 14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

- 15) **What happened?** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

- 16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or "sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

- 17) **What object or substance directly harmed the employee?** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, leave it blank.

- 18) **If the employee died, when did death occur?** Date of death \_\_\_\_/\_\_\_\_/\_\_\_\_

Completed by _____
Title _____
Phone (____) _____ Date ____/____/____

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

Form approved OMB no. 1218-0176


City \_\_\_\_\_ State \_\_\_\_\_

### Describe the case

(F)  
Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., *Second degree burns on right forearm from acetylene torch*)

**CHECK ONLY ONE box for each case based on the most serious outcome for that case:**

**Check the "Injury" column or choose one type of illness:**

**Injury** 

**Skin disorder**

**Respiratory condition**

**Poisoning**

**Hearing loss**

**All other illnesses**

Page      of     

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

# Summary of Work-Related Injuries and Illnesses

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

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entire from every page of the Log. If you had no cases, write "0."

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

## Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
(g) _____	(h) _____	(i) _____	(j) _____

## Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
(k) _____	(l) _____

## Injury and Illness Types

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

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

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

## Establishment information

Your establishment name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_

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

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

OR

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

**Employment information** (If you don't have these figures, see the Worksheet on the back of this page to estimate.)

Annual average number of employees \_\_\_\_\_

Total hours worked by all employees last year \_\_\_\_\_

## Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive \_\_\_\_\_ Title \_\_\_\_\_  
( ) \_\_\_\_\_ / /  
Phone \_\_\_\_\_ Date \_\_\_\_\_

**ATTACHMENT 5**  
**SIGNATORY PAGE**

**Attachment 4 – Site-Specific Health and Safety Orientation Signatory Page**  
**HEALTH AND SAFETY PLAN**  
**200 Hamilton Ave - White Plains, NY**

<b>Title</b>	<b>Name</b>	<b>Signature</b>
Project Manager:	TBD	
Health and Safety Manager:	TBD	

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

<b>Signature</b>	<b>Printed Name</b>	<b>Company</b>	<b>Date</b>



**Attachment 4 – Health and Safety Orientation Signatory Page (continued)**

[illegible]

**Attachment 6**  
**Material Safety Data Sheets**

## SAFETY DATA SHEET

Version 4.9  
Revision Date 05/27/2016  
Print Date 11/09/2018

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Aluminum

Product Number : 11009  
Brand : Aldrich  
Index-No. : 013-002-00-1

CAS-No. : 7429-90-5

## 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)**

Flammable solids (Category 1), H228

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)  
H228 : Flammable solid.

Precautionary statement(s)  
P210 : Keep away from heat/sparks/open flames/hot surfaces. No smoking.  
P240 : Ground/bond container and receiving equipment.  
P241 : Use explosion-proof electrical/ ventilating/ lighting/ equipment.  
P280 : Wear protective gloves/ eye protection/ face protection.  
P370 + P378 : In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Formula : Al  
Molecular weight : 26.98 g/mol  
CAS-No. : 7429-90-5  
EC-No. : 231-072-3  
Index-No. : 013-002-00-1  
Registration number : 01-2119529243-45-XXXX

#### Hazardous components

Component	Classification	Concentration
	Flam. Sol. 1; H228	<= 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

Special powder against metal fire Dry sand Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

##### Unsuitable extinguishing media

Water Carbon dioxide (CO<sub>2</sub>) ABC powder

#### 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

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas.

For personal protection see section 8.

## 6.2 Environmental precautions

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

## 6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13). Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

## 6.4 Reference to other sections

For disposal see section 13.

---

# 7. HANDLING AND STORAGE

## 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

## 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Store in original container. Do not store near combustible materials. Keep in a cool place away from acids. Keep in a cool place away from bases. Keep in a cool place away from oxidizing agents. Keep container tightly closed in a dry and well-ventilated place.

Handle and store under inert gas. Keep in a dry place.

Storage class (TRGS 510): Flammable solid hazardous materials

## 7.3 Specific end use(s)

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

---

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## 8.1 Control parameters

### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	7429-90-5	TWA	1.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lower Respiratory Tract irritation Pneumoconiosis Neurotoxicity Not classifiable as a human carcinogen		

		TWA	15.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	15.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Lower Respiratory Tract irritation Pneumoconiosis Neurotoxicity Not classifiable as a human carcinogen varies		
		TWA	1.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Lower Respiratory Tract irritation Pneumoconiosis Neurotoxicity Not classifiable as a human carcinogen varies		
		TWA	15 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Lower Respiratory Tract irritation Pneumoconiosis Neurotoxicity Not classifiable as a human carcinogen varies		
		PEL	5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

Protective gloves against thermal risks

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an 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

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

#### Respiratory protection

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

#### Control of environmental exposure

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |  |  |
|--|--|
| a) Appearance                              | Form: powder<br>Colour: silver         |
| b) Odour                                   | odourless                              |
| c) Odour Threshold                         | No data available                      |
| d) pH                                      | No data available                      |
| e) Melting point/freezing point            | Melting point/range: 660 °C (1,220 °F) |
| f) Initial boiling point and boiling range | 2,467 °C (4,473 °F)                    |

- |   |  |
|---|--|
| g) Flash point                                  | Not applicable                                   |
| h) Evaporation rate                             | No data available                                |
| i) Flammability (solid, gas)                    | May form combustible dust concentrations in air. |
| j) Upper/lower flammability or explosive limits | No data available                                |
| k) Vapour pressure                              | No data available                                |
| l) Vapour density                               | No data available                                |
| m) Relative density                             | 2.7 g/mL at 25 °C (77 °F)                        |
| n) Water solubility                             | insoluble  |
| o) Partition coefficient: n-octanol/water       | No data available                                |
| p) Auto-ignition temperature                    | not auto-flammable                               |
| q) Decomposition temperature                    | Not applicable                                   |
| r) Viscosity                                    | No data available                                |
| s) Explosive properties                         | Risk of dust explosion.                          |
| 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

Risk of dust explosion. Reacts with water to generate Hydrogen gas. Reacts with the following substances: Acids, Bases, Oxidizing agents, Halogens

### 10.4 Conditions to avoid

Humid air water

Heat, flames and sparks. Extremes of temperature and direct sunlight.

### 10.5 Incompatible materials

Acids, Bases, Halogens, Oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Aluminum oxide

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - > 2,000 mg/kg

LC50 Inhalation - Rat - 4 h - > 888 mg/l

Dermal: No data available

No data available



**Skin corrosion/irritation**

No data available

**Serious eye damage/eye irritation**

No data available

**Respiratory or skin sensitisation**

No data available

**Germ cell mutagenicity**

No data available

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

**Reproductive toxicity**

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: BD0330000

Cough, weight loss, anemia, Weakness, Incoordination.

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

No data available

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

No data available

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

No data available

---

**13. DISPOSAL CONSIDERATIONS****13.1 Waste treatment methods****Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber 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: 1309      Class: 4.1      Packing group: II  
Proper shipping name: Aluminum powder, coated  
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

### IMDG

UN number: 1309      Class: 4.1      Packing group: II      EMS-No: F-G, S-G  
Proper shipping name: ALUMINIUM POWDER, COATED

### IATA

UN number: 1309      Class: 4.1      Packing group: II  
Proper shipping name: Aluminium powder, coated

---

## 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
Aluminium powder (non pyrophoric)	7429-90-5	1994-04-01

### SARA 311/312 Hazards

Fire Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Aluminium powder (non pyrophoric)	7429-90-5	1994-04-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Aluminium powder (non pyrophoric)	7429-90-5	1994-04-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Aluminium powder (non pyrophoric)	7429-90-5	1994-04-01

### 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.

Flam. Sol.	Flammable solids
H228	Flammable solid.

### HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	3

### NFPA Rating

Health hazard:	0
----------------	---

Fire Hazard: 3  
Reactivity Hazard: 3

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](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: 4.9

Revision Date: 05/27/2016

Print Date: 11/09/2018

## SAFETY DATA SHEET

Version 5.3

Revision Date 03/27/2018

Print Date 01/21/2019

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Aroclor 1260 Standard

Product Number : SK022

Brand : Sigma-Aldrich

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

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

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

## 1.4 Emergency telephone number

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

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Flammable liquids (Category 2), H225

Skin irritation (Category 2), H315

Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

Aspiration hazard (Category 1), H304

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 4), H413

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.

H400

Very toxic to aquatic life.

H413

May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P210

Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233

Keep container tightly closed.

P240

Ground/bond container and receiving equipment.

P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
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.
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.
P391	Collect spillage.
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

Molecular weight : (No data available)

#### Hazardous components

Component	Classification	Concentration
<b>2,2,4-Trimethylpentane</b>	Flam. Liq. 2; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 1; Aquatic Chronic 1; H225, H304, H315, H336, 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

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.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

#### **7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store at room temperature.

Storage class (TRGS 510): 3: Flammable liquids

#### **7.3 Specific end use(s)**

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

---

### **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

#### **8.1 Control parameters**

**Components with workplace control parameters**

Component	CAS-No.	Value	Control parameters	Basis
2,2,4-Trimethylpentane	540-84-1	TWA	300 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation		

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

#### Body Protection

Complete suit protecting against chemicals, 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   |
| b) Odour  | No data available  |
| c) Odour Threshold                              | No data available  |
| d) pH   | No data available  |
| e) Melting point/freezing point                 | -106.99 °C (-160.58 °F)  |
| f) Initial boiling point and boiling range      | 98 - 99 °C (208 - 210 °F) at 1,013 hPa (760 mmHg)                              |
| g) Flash point                                  | -11.99 °C (10.42 °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 %(V)<br>Lower explosion limit: 1 %(V)                 |
| k) Vapour pressure                              | 55 hPa (41 mmHg) at 21 °C (70 °F)<br>117 hPa (88 mmHg) at 37.80 °C (100.04 °F) |
| l) Vapour density                               | 3.94 - (Air = 1.0)   |
| m) Relative density                             | 0.690 g/cm <sup>3</sup>  |

- |   |                   |
|---|-------------------|
| n) Water solubility                       | insoluble         |
| o) Partition coefficient: n-octanol/water | log Pow: 4.6      |
| 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 3.94 - (Air = 1.0)

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

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  
In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a



known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is 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.

Liver - Irregularities - Based on Human Evidence

Liver - Irregularities - Based on Human Evidence

Nerves. - (Aroclor 1260)

---

## 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.

---

## 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: 1262      Class: 3      Packing group: II

Proper shipping name: Octanes

Reportable Quantity (RQ): 1001 lbsMarine pollutant:yes

Poison Inhalation Hazard: No

**IMDG**

UN number: 1262      Class: 3      Packing group: II      EMS-No: F-E, S-E

Proper shipping name: OCTANES

Marine pollutant:yes

Marine pollutant: yes

**IATA**

UN number: 1262      Class: 3

Packing group: II

Proper shipping name: Octanes

---

**15. REGULATORY INFORMATION**

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Fire Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.  
Aroclor 1260

CAS-No.	Revision Date
11096-82-5	2008-08-01

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.  
Aroclor 1260

CAS-No.	Revision Date
11096-82-5	2008-08-01

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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
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.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H413	May cause long lasting harmful effects to aquatic life.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure

**HMIS Rating**

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3

Physical Hazard 0

**NFPA Rating**

Health hazard: 2

Fire Hazard: 3

Reactivity Hazard: 0

**Further information**

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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: 03/27/2018

Print Date: 01/21/2019

## SAFETY DATA SHEET

Version 5.8

Revision Date 02/02/2018

Print Date 10/19/2018

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Benzo[a]pyrene

Product Number : 48564  
Brand : Supelco  
Index-No. : 601-032-00-3

CAS-No. : 50-32-8

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
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)**Skin sensitisation (Category 1), H317  
Germ cell mutagenicity (Category 1B), H340  
Carcinogenicity (Category 1B), H350  
Reproductive toxicity (Category 1B), H360  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H317 : May cause an allergic skin reaction.  
H340 : May cause genetic defects.  
H350 : May cause cancer.  
H360 : May damage fertility or the unborn child.  
H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 : Obtain special instructions before use.  
P202 : Do not handle until all safety precautions have been read and

P261	understood.
P272	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273	Contaminated work clothing should not be allowed out of the workplace.
P280	Avoid release to the environment.
	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Synonyms : 3,4-Benzpyrene  
3,4-Benzopyrene  
Benzo[def]chrysene  
benzo[pqr]tetraphene

Formula : C<sub>20</sub>H<sub>12</sub>  
Molecular weight : 252.31 g/mol  
CAS-No. : 50-32-8  
EC-No. : 200-028-5  
Index-No. : 601-032-00-3

#### Hazardous components

Component	Classification	Concentration
<b>Benzo[a]pyrene</b>		
	Skin Sens. 1; Muta. 1B; Carc. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H317, H340, H350, H360, H410	90 - 100 %

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

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

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

##### If inhaled

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

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Flush eyes with water as a precaution.

##### If swallowed

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

#### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

##### Suitable extinguishing media

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

#### 5.2 Special hazards arising from the substance or mixture

No data available

#### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

No data available

---

### 6. ACCIDENTAL RELEASE MEASURES

#### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

#### 6.2 Environmental precautions

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

#### 6.3 Methods and materials for containment and cleaning up

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

#### 6.4 Reference to other sections

For disposal see section 13.

---

### 7. HANDLING AND STORAGE

#### 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

#### 7.2 Conditions for safe storage, including any incompatibilities

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

Store at room temperature.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

#### 7.3 Specific end use(s)

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

---

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1 Control parameters

##### Components with workplace control parameters

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. Suspected human carcinogen		
		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		
Benzo[a]pyrene	50-32-8	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 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		
		TWA	0.2 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	0.1 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		
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological	Basis
-----------	---------	------------	-------	------------	-------

				specimen	
	-	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		1-Hydroxypyrene		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

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: 177 - 180 °C (351 - 356 °F)
f) Initial boiling point and boiling range	495 °C (923 °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	1.35 g/cm <sup>3</sup>
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	log Pow: 5.97
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

LD50 Subcutaneous - Rat - 50 mg/kg

**Skin corrosion/irritation**

Skin - Mouse

Result: Mild skin irritation

**Serious eye damage/eye irritation**

No data available

**Respiratory or skin sensitisation**

Chronic exposure may cause dermatitis.

**Germ cell mutagenicity**

May alter genetic material.

In vivo tests showed mutagenic effects

**Carcinogenicity**

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

Possible human carcinogen

IARC: 1 - Group 1: Carcinogenic to humans (Benzo[a]pyrene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benzo[a]pyrene)

OSHA: OSHA specifically regulated carcinogen (Benzo[a]pyrene)

**Reproductive toxicity**

May cause congenital malformation in the fetus.

Presumed human reproductive toxicant

May cause reproductive disorders.

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates      EC50 - Daphnia magna (Water flea) - 0.25 mg/l - 48 h

Toxicity to algae      EC50 - Pseudokirchneriella subcapitata (green algae) - 0.02 mg/l - 72 h

### 12.2 Persistence and degradability

### 12.3 Bioaccumulative potential

Bioaccumulation      Lepomis macrochirus (Bluegill) - 48 h  
- 0.0005 mg/l

Bioconcentration factor (BCF): 3,208

### 12.4 Mobility in soil

No data available

## 12.5 Results of PBT and vPvB assessment

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

## 12.6 Other adverse effects

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

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 3077      Class: 9      Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Benzo[a]pyrene)  
Reportable Quantity (RQ): 1 lbs  
Poison Inhalation Hazard: No

### IMDG

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

### IATA

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

### Further information

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

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
--	---------	---------------

Benzo[a]pyrene

50-32-8

2007-03-01

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.

Benzo[a]pyrene

CAS-No.  
50-32-8

Revision Date  
1990-01-01

---

**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
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Muta.	Germ cell mutagenicity

**HMIS Rating**

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

**NFPA Rating**

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

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

Version: 5.8

Revision Date: 02/02/2018

Print Date: 10/19/2018

## SAFETY DATA SHEET

Version 6.1  
Revision Date 07/17/2018  
Print Date 01/21/2019

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Benzo[**a**]fluoranthene

Product Number : 48490  
Brand : Supelco  
Index-No. : 601-034-00-4

CAS-No. : 205-99-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.  
3050 Spruce Street  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765  
Fax : +1 800 325-5052

## 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H350

May cause cancer.

H410

Very toxic to aquatic life with long lasting effects.

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

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms : 3,4-Benzofluoranthene

Formula : C<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	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

## 5.2 Special hazards arising from the substance or mixture

Carbon oxides

## 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

## 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

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

Recommended storage temperature 2 - 8 °C

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen
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#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benz[e]acephenant hrylene	205-99-2	1- Hydroxypyren e		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

#### Body Protection

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

#### Respiratory protection

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

#### Control of environmental exposure

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

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



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

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

TDLo Oral - Mouse - 7.57 mg/kg

Remarks: Liver:Changes in liver weight. Endocrine:Changes in thymus weight.

Inhalation: No data available

Dermal: No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

**Respiratory or skin sensitisation**

No data available

**Germ cell mutagenicity**

No data available

**Carcinogenicity**

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

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[e]acephenanthrylene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[e]acephenanthrylene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: Not available

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

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to daphnia and other aquatic invertebrates      Immobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h(Benz[e]acephenanthrylene)

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

No data available

**12.4 Mobility in soil**

No data available(Benz[e]acephenanthrylene)

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

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

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

Not dangerous goods

### IMDG

UN number: 3077      Class: 9      Packing group: III      EMS-No: F-A, S-F

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

(Benz[e]acephenanthrylene)

Marine pollutant : yes

### IATA

UN number: 3077      Class: 9      Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[e]acephenanthrylene)

### Further information

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

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

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

### SARA 311/312 Hazards

Chronic Health Hazard

### Massachusetts Right To Know Components

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

### Pennsylvania Right To Know Components

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

### California Prop. 65 Components

, which is/are known to the State of California to cause cancer.

For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

Benz[e]acephenanthrylene

CAS-No.	Revision Date
205-99-2	2007-09-28

---

## 16. OTHER INFORMATION

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

H350

May cause cancer.

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

**Further information**

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**Preparation Information**

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

Version: 6.1

Revision Date: 07/17/2018

Print Date: 01/21/2019

## SAFETY DATA SHEET

Version 6.1  
Revision Date 07/16/2018  
Print Date 01/21/2019

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Benzo[*k*]fluoranthene

Product Number : 48492  
Brand : Supelco  
Index-No. : 601-036-00-5

CAS-No. : 207-08-9

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.  
3050 Spruce Street  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765  
Fax : +1 800 325-5052

## 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

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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.
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>20</sub> H <sub>12</sub>
Molecular weight	: 252.31 g/mol
CAS-No.	: 207-08-9
EC-No.	: 205-916-6
Index-No.	: 601-036-00-5

#### Hazardous components

Component	Classification	Concentration
<b>Benzo[k]fluoranthene</b>		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

## 5.2 Special hazards arising from the substance or mixture

Carbon oxides

## 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

## 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

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

Recommended storage temperature 2 - 8 °C

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

Components with workplace control parameters

Biological occupational exposure limits

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

### 8.2 Exposure controls

Appropriate engineering controls

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

Personal protective equipment

Eye/face protection

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

**Skin protection**

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

**Full contact**

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

**Splash contact**

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

**Body Protection**

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

**Respiratory protection**

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

**Control of environmental exposure**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

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



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

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

Carcinogenicity- Rat- Implant

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

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benzo[k]fluoranthene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benzo[k]fluoranthene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

#### **Reproductive toxicity**

No data available

No data available

#### **Specific target organ toxicity - single exposure**

No data available

#### **Specific target organ toxicity - repeated exposure**

No data available

#### **Aspiration hazard**

No data available

#### **Additional Information**

RTECS: DF6350000

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

---

## **12. ECOLOGICAL INFORMATION**

### **12.1 Toxicity**

No data available

### **12.2 Persistence and degradability**

No data available

### **12.3 Bioaccumulative potential**

No data available

### **12.4 Mobility in soil**

No data available (Benzo[k]fluoranthene)

### **12.5 Results of PBT and vPvB assessment**

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

### **12.6 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

---

## **13. DISPOSAL CONSIDERATIONS**

### **13.1 Waste treatment methods**

#### **Product**

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

#### **Contaminated packaging**

Dispose of as unused product.

---

## **14. TRANSPORT INFORMATION**

### **DOT (US)**

UN number: 3077

Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

Reportable Quantity (RQ) : 5000 lbs

no

Poison Inhalation Hazard: No

#### IMDG

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

#### IATA

UN number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

#### Further information

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

---

### 15. REGULATORY INFORMATION

#### SARA 302 Components

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

#### SARA 313 Components

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

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzo[k]fluoranthene	207-08-9	1994-04-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[k]fluoranthene	207-08-9	1994-04-01

#### California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer. For more information go to <a href="http://www.P65Warnings.ca.gov">www.P65Warnings.ca.gov</a> . Benzo[k]fluoranthene	207-08-9	2007-09-28

---

### 16. OTHER INFORMATION

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

H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

#### Further information

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956  
Version: 6.1

Revision Date: 07/16/2018

Print Date: 01/21/2019

## SAFETY DATA SHEET

Version 6.1  
Revision Date 07/17/2018  
Print Date 01/21/2019

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Benz[*a*]anthracene

Product Number : 48563  
Brand : Supelco  
Index-No. : 601-033-00-9

CAS-No. : 56-55-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.  
3050 Spruce Street  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765  
Fax : +1 800 325-5052

## 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H350

May cause cancer.

H410

Very toxic to aquatic life with long lasting effects.

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

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms : 1,2-Benzanthracene  
Tetraphene

Formula : C<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	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### **Suitable extinguishing media**

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

### 5.2 Special hazards arising from the substance or mixture

Carbon oxides

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

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

Store at room temperature.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### **Components with workplace control parameters**

Contains no substances with occupational exposure limit values.

### 8.2 Exposure controls

#### **Appropriate engineering controls**

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

#### **Personal protective equipment**

##### **Eye/face protection**

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

### **Skin protection**

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

#### **Full contact**

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

#### **Splash contact**

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

### **Body Protection**

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

### **Respiratory protection**

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

### **Control of environmental exposure**

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

---

## **9. PHYSICAL AND CHEMICAL PROPERTIES**

### **9.1 Information on basic physical and chemical properties**

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



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

## **9.2 Other safety information**

No data available

---

## **10. STABILITY AND REACTIVITY**

### **10.1 Reactivity**

No data available

### **10.2 Chemical stability**

Stable under recommended storage conditions.

### **10.3 Possibility of hazardous reactions**

No data available

### **10.4 Conditions to avoid**

No data available

### **10.5 Incompatible materials**

Strong oxidizing agents

### **10.6 Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## **11. TOXICOLOGICAL INFORMATION**

### **11.1 Information on toxicological effects**

#### **Acute toxicity**

No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - > 200 mg/kg

#### **Skin corrosion/irritation**

No data available

#### **Serious eye damage/eye irritation**

No data available

#### **Respiratory or skin sensitisation**

No data available

#### **Germ cell mutagenicity**

No data available

#### **Carcinogenicity**

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

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)  
IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)  
NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)  
NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)  
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.  
No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**Reproductive toxicity**

No data available  
No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: Not available

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

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

No data available

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available(Benz[a]anthracene)

### 12.5 Results of PBT and vPvB assessment

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

### 12.6 Other adverse effects

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

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

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

**Contaminated packaging**

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

Not dangerous goods

### IMDG

UN number: 3077

Class: 9

Packing group: III

EMS-No: F-A, S-F

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)

Marine pollutant : yes

### IATA

UN number: 3077

Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

### Further information

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

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

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

### SARA 313 Components

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

### SARA 311/312 Hazards

Chronic Health Hazard

### Massachusetts Right To Know Components

Benz[a]anthracene

CAS-No.  
56-55-3

Revision Date  
1993-04-24

### Pennsylvania Right To Know Components

Benz[a]anthracene

CAS-No.  
56-55-3

Revision Date  
1993-04-24

Benz[a]anthracene

CAS-No.  
56-55-3

Revision Date  
1993-04-24

### New Jersey Right To Know Components

Benz[a]anthracene

CAS-No.  
56-55-3

Revision Date  
1993-04-24

### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

Benz[a]anthracene

CAS-No.  
56-55-3

Revision Date  
2007-09-28

WARNING! This product contains a chemical known to the State of California to cause cancer.

Benz[a]anthracene

CAS-No.  
56-55-3

Revision Date  
2007-09-28

---

## 16. OTHER INFORMATION

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

H350

May cause cancer.

H400

Very toxic to aquatic life.

H410

Very toxic to aquatic life with long lasting effects.

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956  
Version: 6.1

Revision Date: 07/17/2018

Print Date: 01/21/2019

## SAFETY DATA SHEET

Version 4.10  
Revision Date 08/10/2016  
Print Date 11/10/2018

---

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Cadmium

Product Number : 265330  
Brand : Aldrich  
Index-No. : 048-002-00-0

CAS-No. : 7440-43-9

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

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

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

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

**1.4 Emergency telephone number**

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

---

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Acute toxicity, Inhalation (Category 2), H330  
Germ cell mutagenicity (Category 2), H341  
Carcinogenicity (Category 1B), H350  
Reproductive toxicity (Category 2), H361  
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.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: Cd
Molecular weight	: 112.41 g/mol
CAS-No.	: 7440-43-9
EC-No.	: 231-152-8
Index-No.	: 048-002-00-0

#### Hazardous components

Component	Classification	Concentration
<b>Cadmium</b> Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Acute Tox. 2; Muta. 2; Carc. 1B; Repr. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H341, H350, H361, 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

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

#### If inhaled

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

#### In case of skin contact

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

#### In case of eye contact

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.

Air sensitive.

#### 7.3 Specific end use(s)

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

---

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1 Control parameters

##### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Substance listed; for more information see OSHA document 1910.1027		
Cadmium	7440-43-9	TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the		

		Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.3 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		CEIL	0.6 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.5-1970 This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.		
		Potential Occupational Carcinogen See Appendix A		
		TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen varies		
		TWA	0.002 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen varies		
		PEL	0.005 mg/m3	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1027 This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, and in all industries covered by the Occupational Safety and Health Act, except the construction-related industries, which are covered under 29 CFR 1926.63. OSHA specifically regulated carcinogen		
		PEL	0.005 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		see Sections 1532 & 5207		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Cadmium	7440-43-9	cadmium	5 µg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			
		cadmium	5µg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		Not critical			



## 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: granular<br>Colour: light grey            |
| b) Odour                                   | odourless                                       |
| c) Odour Threshold                         | No data available                               |
| d) pH                                      | No data available                               |
| e) Melting point/freezing point            | Melting point/range: 320.9 °C (609.6 °F) - lit. |
| f) Initial boiling point and boiling range | 765 °C (1,409 °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	8.65 g/cm <sup>3</sup> at 25 °C (77 °F)
n)	Water solubility	0.0023 g/l at 20 °C (68 °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

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

Oxidizing agents, acids

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Cadmium/cadmium oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - 2,330 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**

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

NTP: Known to be human carcinogen The reference note has been added by TD based on the background information of the NTP. (Cadmium)

OSHA: OSHA specifically regulated carcinogen (Cadmium)

**Reproductive toxicity**

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: EU9800000

Damage to the lungs., Kidney injury may occur., prolonged or repeated exposure can cause:, Vomiting, Diarrhoea, Lung irritation

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) - 0.001 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 0.024 mg/l - 48 h

Toxicity to algae static test EC50 - Selenastrum capricornutum (green algae) - 0.023 mg/l - 72 h (OECD Test Guideline 201)

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

Bioaccumulation Oncorhynchus mykiss (rainbow trout) - 72 d - 1.27 µg/l

Bioconcentration factor (BCF): 55

**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**

Very toxic to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 3288      Class: 6.1      Packing group: II  
Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)  
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 3288      Class: 6.1      Packing group: II      EMS-No: F-A, S-A  
Proper shipping name: TOXIC SOLID, INORGANIC, N.O.S. (Cadmium)  
Marine pollutant: yes

### IATA

UN number: 3288      Class: 6.1      Packing group: II  
Proper shipping name: Toxic solid, inorganic, n.o.s. (Cadmium)

## 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
Cadmium	7440-43-9	2007-07-01

### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Cadmium	7440-43-9	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
Cadmium	7440-43-9	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
Cadmium	7440-43-9	2009-02-01

---

## 16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H330	Fatal if inhaled.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H361	Suspected of damaging 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.

### HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

### NFPA Rating

Health hazard:	4
Fire Hazard:	0
Reactivity Hazard:	0

### Further information

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

Revision Date: 08/10/2016

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 4.9  
Revision Date 05/24/2016  
Print Date 11/10/2018

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Calcium

Product Number : 215147  
Brand : Aldrich  
Index-No. : 020-001-00-X

CAS-No. : 7440-70-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

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

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

## 1.4 Emergency telephone number

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

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)  
H261

In contact with water releases flammable gases.

Precautionary statement(s)  
P223

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.

P280

Wear protective gloves/ eye protection/ face protection.

P335 + P334

Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.

P370 + P378

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

P402 + P404

Store in a dry place. Store in a closed container.

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 : Ca  
Molecular weight : 40.08 g/mol  
CAS-No. : 7440-70-2  
EC-No. : 231-179-5  
Index-No. : 020-001-00-X

##### Hazardous components

Component	Classification	Concentration
Calcium		
	Water-react. 2; H261	<= 100 %

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

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

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

##### If inhaled

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

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Flush eyes with water as a precaution.

##### If swallowed

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

#### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

##### Suitable extinguishing media

Dry powder

#### 5.2 Special hazards arising from the substance or mixture

No data available

#### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

No data available

### 6. ACCIDENTAL RELEASE MEASURES

#### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

#### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Further processing of solid materials may result in the formation of 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.

Handle and store under inert gas. Air sensitive.

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Contains no substances with occupational exposure limit values.

### 8.2 Exposure controls

#### Appropriate engineering controls

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

#### Personal protective equipment

##### Eye/face protection

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

##### Skin protection

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

##### Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

##### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an



industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### **Body Protection**

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: granular Colour: silver
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: 850 °C (1,562 °F) - lit.
f) Initial boiling point and boiling range	1,484 °C (2,703 °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	1.54 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

Strong oxidizing agents, Alcohols

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Calcium oxide

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

No data available

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

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

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

**Reproductive toxicity**

No data available

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

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.,  
Cough, Shortness of breath, Headache, Nausea

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

No data available

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

No data available

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

No data available

---

**13. DISPOSAL CONSIDERATIONS****13.1 Waste treatment methods****Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber 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: 1401      Class: 4.3

Packing group: II

Proper shipping name: Calcium

Reportable Quantity (RQ):

Poison Inhalation Hazard: No

**IMDG**

UN number: 1401      Class: 4.3

Packing group: II

EMS-No: F-G, S-O

Proper shipping name: CALCIUM

**IATA**

UN number: 1401      Class: 4.3

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

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

### SARA 311/312 Hazards

Reactivity Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Calcium	7440-70-2	1993-04-24

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Calcium	7440-70-2	1993-04-24

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Calcium	7440-70-2	1993-04-24

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

## 16. OTHER INFORMATION

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

H261	In contact with water releases flammable gases.
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

### HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	1

### NFPA Rating

Health hazard:	0
Fire Hazard:	3
Reactivity Hazard:	1
Special hazard.I:	W

### Further information

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**Preparation Information**

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

Version: 4.9

Revision Date: 05/24/2016

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 5.10  
Revision Date 09/28/2017  
Print Date 11/10/2018

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : Carbon tetrachloride

Product Number : 289116

Brand : Sigma-Aldrich

Index-No. : 602-008-00-5

CAS-No. : 56-23-5

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

Identified uses : Laboratory chemicals, Synthesis of substances

#### 1.3 Details of the supplier of the safety data sheet

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

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

#### 1.4 Emergency telephone number

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

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

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

Acute toxicity, Oral (Category 3), H301

Acute toxicity, Inhalation (Category 3), H331

Acute toxicity, Dermal (Category 3), H311

Skin sensitisation (Sub-category 1B), H317

Carcinogenicity (Category 2), H351

Specific target organ toxicity - repeated exposure, Inhalation (Category 1), Liver, Kidney, H372

Acute aquatic toxicity (Category 3), H402

Chronic aquatic toxicity (Category 3), H412

Hazardous to the ozone layer (Category 1), H420

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

#### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H301 + H311 + H331

H317

H351

H372

H412

Toxic if swallowed, in contact with skin or if inhaled.

May cause an allergic skin reaction.

Suspected of causing cancer.

Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure if inhaled.

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.
P271	Use only outdoors or in a well-ventilated area.
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.
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.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.
P502	Refer to manufacturer/ supplier for information on recovery/ recycling.

## 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	: Tetrachloromethane
Formula	: CCl <sub>4</sub> CCl <sub>4</sub>
Molecular weight	: 153.82 g/mol
CAS-No.	: 56-23-5
EC-No.	: 200-262-8
Index-No.	: 602-008-00-5

### Hazardous components

Component	Classification	Concentration
<b>Tetrachloromethane</b>		
	Acute Tox. 3; Skin Sens. 1B; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; Ozone 1; H301 + H311 + H331, H317, H351, H372, H412, 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

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

**If inhaled**

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

**In case of skin contact**

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

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

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

**4.2 Most important symptoms and effects, both acute and delayed**

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

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

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

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

No data available

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

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

For personal protection see section 8.

**6.2 Environmental precautions**

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

**6.3 Methods and materials for containment and cleaning up**

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

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.  
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**7.3 Specific end use(s)**

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



## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Tetrachloromethane	56-23-5	TWA	5.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		STEL	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		ST	2.000000 ppm 12.600000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	10.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		CEIL	25.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		Peak	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		See Table Z-2		
		TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		STEL	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		ST	2 ppm 12.6 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		Peak	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		

		TWA	2 ppm 12.6 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	2 ppm 12.6 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		C	200 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		STEL	10 ppm 63 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: 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: 240 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 Colour: colourless
b) Odour	sweet
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -23 °C (-9 °F) - lit.
f) Initial boiling point and boiling range	76 - 77 °C (169 - 171 °F) - lit.
g) Flash point	does not flash
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	45 hPa (34 mmHg) at 0.3 °C (32.5 °F) 120 hPa (90 mmHg) at 19.8 °C (67.6 °F) 14,549 hPa (10,913 mmHg) at 24 °C (75 °F)
l) Vapour density	No data available
m) Relative density	1.594 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	0.8461 g/l at 20 °C (68 °F)
o) Partition coefficient: n-octanol/water	log Pow: 2.83 at 25 °C (77 °F)
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

### 9.2 Other safety information

Surface tension	26.7 mN/m at 20 °C (68 °F) 19.5 mN/m at 80 °C (176 °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

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 - 2,350 mg/kg

LC50 Inhalation - Rat - 4 h - 8000 ppm

LD50 Dermal - Rabbit - > 20,000 mg/kg

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Mild skin irritation - 24 h

(Draize Test)

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Mild eye irritation - 24 h

(Draize Test)

#### Respiratory or skin sensitisation

- Mouse

Result: The product is a skin sensitizer, sub-category 1B.

(OECD Test Guideline 429)

#### 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. Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Tetrachloromethane)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Tetrachloromethane)

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. - Liver, Kidney

#### Aspiration hazard

No data available

#### Additional Information

RTECS: FG4900000

Vomiting, Diarrhoea, Abdominal pain, Nausea, Dizziness, Headache, Damage to the eyes., Liver injury may occur., Kidney injury may occur., Exposure to and/or consumption of alcohol may increase toxic effects., Contact with skin can cause: Pain, Erythema, hyperemia

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish	mortality LC50 - Danio rerio (zebra fish) - 24.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 35 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Growth inhibition EC50 - Algae - 20 mg/l - 72 h (OECD Test Guideline 201)

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 52.3 µg/l
	Bioconcentration factor (BCF): 30

### 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)

UN number: 1846      Class: 6.1      Packing group: II  
Proper shipping name: Carbon tetrachloride  
Reportable Quantity (RQ): 10 lbs  
Poison Inhalation Hazard: No

#### IMDG

UN number: 1846      Class: 6.1      Packing group: II      EMS-No: F-A, S-A  
Proper shipping name: CARBON TETRACHLORIDE  
Marine pollutant: yes

#### IATA

UN number: 1846      Class: 6.1      Packing group: II  
Proper shipping name: Carbon tetrachloride

---

## 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
Tetrachloromethane	56-23-5	2007-07-01

#### **SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

#### **Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

#### **Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

#### **New Jersey Right To Know Components**

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	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
Tetrachloromethane	56-23-5	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
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H311	Toxic in contact with skin.
H317	May cause an allergic skin reaction.
H331	Toxic if inhaled.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.

### **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: 5.10

Revision Date: 09/28/2017

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 3.18  
Revision Date 08/14/2018  
Print Date 11/10/2018

---

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Chloroform

Product Number : C2432  
Brand : Sigma-Aldrich  
Index-No. : 602-006-00-4

CAS-No. : 67-66-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

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

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

**1.4 Emergency telephone number**

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

---

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Acute toxicity, Oral (Category 4), H302  
Acute toxicity, Inhalation (Category 3), H331  
Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Carcinogenicity (Category 2), H351  
Reproductive toxicity (Category 2), H361d  
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336  
Specific target organ toxicity - repeated exposure (Category 1), Liver, Kidney, H372  
Acute aquatic toxicity (Category 3), H402

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

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word

Danger

Hazard statement(s)

H302 Harmful if swallowed.  
H315 Causes skin irritation.  
H319 Causes serious eye irritation.  
H331 Toxic if inhaled.  
H336 May cause drowsiness or dizziness.  
H351 Suspected of causing cancer.



H361d	Suspected of damaging the unborn child.
H372	Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure.
H402	Harmful 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.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms	: Trichloromethane Methyldiyne trichloride
Formula	: $\text{CHCl}_3$
Molecular weight	: 119.38 g/mol
CAS-No.	: 67-66-3
EC-No.	: 200-663-8
Index-No.	: 602-006-00-4

#### Hazardous components

Component	Classification	Concentration
<b>Chloroform</b>		
	Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; Repr. 2; STOT SE 3; STOT RE 1; Aquatic Acute 3; H302, H315, H319, H331, H336, H351, H361d, H372, H402	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

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

#### If inhaled

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

#### In case of skin contact

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

#### In case of eye contact

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

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

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
Chloroform	67-66-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Embryo/fetal damage Confirmed animal carcinogen with unknown relevance to humans		
		ST	2 ppm 9.78 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		C	50 ppm 240 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate. Ceiling limit is to be determined from breathing-zone air samples.		
		PEL	2 ppm 9.78 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

### 8.2 Exposure controls

#### Appropriate engineering controls

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

#### Personal protective equipment

##### Eye/face protection

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

##### Skin protection

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

##### Full contact

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

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid, clear Colour: colourless
b) Odour	sweet
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -63 °C (-81 °F)
f) Initial boiling point and boiling range	60.5 - 61.5 °C (140.9 - 142.7 °F)
g) Flash point	- DIN 51755 Part 1 does not flash
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	210 hPa (158 mmHg) at 20 °C (68 °F)
l) Vapour density	4.12 - (Air = 1.0)
m) Relative density	1.492 g/mL at 25 °C (77 °F)
n) Water solubility	8.7 g/l at 23 °C (73 °F) - OECD Test Guideline 105
o) Partition coefficient: n-octanol/water	log Pow: 1.97 at 25 °C (77 °F) - (ECHA), Bioaccumulation is not expected.
p) Auto-ignition temperature	> 600 °C (> 1,112 °F) at 1,013 hPa (760 mmHg) - DIN 51794
q) Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

**9.2 Other safety information**

Solubility in other solvents	organic solvent at 20 °C (68 °F) - miscible
Surface tension	27.1 mN/m at 20.0 °C (68.0 °F)
Relative vapour density	4.12 - (Air = 1.0)

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

Contains the following stabiliser(s):

2-Methyl-2-butene ( $\geq 0.001$  -  $\leq 0.015$  %)

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

various plastics, Rubber

### 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 - male - 908 mg/kg

(OECD Test Guideline 401)

Remarks: Behavioral:Change in motor activity (specific assay). Behavioral:Ataxia. Lungs, Thorax, or

Respiration:Respiratory stimulation.

LOEC Inhalation - Rat - male - 6 h - 500 ppm

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

LD50 Dermal - Rabbit -  $> 20,000$  mg/kg

Remarks: (RTECS)

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: Irritating to skin. - 24 h

Remarks: (ECHA)

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Irritating to eyes.

Remarks: (ECHA)

#### Respiratory or skin sensitisation

Sensitisation test: - Guinea pig

Result: negative

(Maximisation Test)

Remarks: (ECHA)

#### Germ cell mutagenicity

Ames test

Salmonella typhimurium

Result: negative

reverse mutation assay

Escherichia coli

Result: negative

(ECHA)

OECD Test Guideline 474  
Rat - male and female - Bone marrow  
Result: negative

OECD Test Guideline 486  
Rat - male - Other cell types  
Result: negative

### **Carcinogenicity**

Carcinogenicity - Rat - Oral  
Tumorigenic: Carcinogenic by RTECS criteria. Leukaemia  
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Chloroform)  
NTP: RAHC - Reasonably anticipated to be a human carcinogen (Chloroform)  
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

### **Reproductive toxicity**

Suspected of damaging the unborn child.

### **Specific target organ toxicity - single exposure**

May cause drowsiness or dizziness.

### **Specific target organ toxicity - repeated exposure**

Causes damage to organs through prolonged or repeated exposure. - Liver, Kidney

### **Aspiration hazard**

No data available

### **Additional Information**

RTECS: FS9100000

Vomiting, Cough, irritant effects, Shortness of breath, respiratory arrest, narcosis, Dizziness, Nausea, agitation, spasms, inebriation, Headache, Stomach/intestinal disorders, ataxia (impaired locomotor coordination), cardiovascular disorders  
Drying-out effect resulting in rough and chapped skin.

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 - Danio rerio (zebra fish) - 121 mg/l - 48 h (OECD Test Guideline 203)
	static test LC50 - Pimephales promelas (fathead minnow) - 103 - 171 mg/l - 96 h Remarks: (ECHA)
	flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 18.2 mg/l - 96 h Remarks: (ECHA)
	flow-through test LC50 - Micropterus dolomieu - 51 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 79 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test ErC50 - Chlamydomonas reinhardtii (green algae) - 13.3 mg/l - 72 h Remarks: (ECHA)

### **12.2 Persistence and degradability**

Biodegradability aerobic - Exposure time 14 d

Result: 0 % - Not readily biodegradable.  
(OECD Test Guideline 301C)

### 12.3 Bioaccumulative potential

#### Bioaccumulation

Cyprinus carpio (Carp) - 42 d  
at 25 °C - 0.1 mg/l

Bioconcentration factor (BCF): 4.1 - 13  
(OECD Test Guideline 305)

Cyprinus carpio (Carp) - 42 d  
at 25 °C - 1 mg/l

Bioconcentration factor (BCF): 1.4 - 4.7  
(OECD Test Guideline 305)

### 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.

---

## 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: 1888      Class: 6.1      Packing group: III  
Proper shipping name: Chloroform  
Reportable Quantity (RQ): 10 lbs Reportable Quantity (RQ): 10 lbs  
Poison Inhalation Hazard: No

#### IMDG

UN number: 1888      Class: 6.1      Packing group: III      EMS-No: F-A, S-A  
Proper shipping name: CHLOROFORM

#### IATA

UN number: 1888      Class: 6.1      Packing group: III  
Proper shipping name: Chloroform

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

Chloroform

CAS-No.  
67-66-3

Revision Date  
2008-11-03

### SARA 313 Components

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

Chloroform

CAS-No.  
67-66-3

Revision Date  
2008-11-03

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

Reportable Quantity : D022 lbs

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

**California Prop. 65 Components**

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to <a href="http://www.P65Warnings.ca.gov">www.P65Warnings.ca.gov</a> . Chloroform	67-66-3	2011-09-01

---

**16. OTHER INFORMATION**

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H361d	Suspected of damaging the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H402	Harmful to aquatic life.
Repr.	Reproductive toxicity
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](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: 3.18

Revision Date: 08/14/2018

Print Date: 11/10/2018



## SAFETY DATA SHEET

Version 5.5  
Revision Date 01/10/2018  
Print Date 01/21/2019

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : Chrysene

Product Number : 35754  
Brand : Sigma-Aldrich  
Index-No. : 601-048-00-0

CAS-No. : 218-01-9

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

Identified uses : Laboratory chemicals, Synthesis of substances

#### 1.3 Details of the supplier of the safety data sheet

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

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

#### 1.4 Emergency telephone number

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

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

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

Germ cell mutagenicity (Category 2), H341  
Carcinogenicity (Category 1B), H350  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

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

#### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H341 Suspected of causing genetic defects.  
H350 May cause cancer.  
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

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

P391 Collect spillage.  
P405 Store locked up.  
P501 Dispose of contents/ container to an approved waste disposal plant.

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

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Formula : 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	90 - 100 %

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

---

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

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

##### If inhaled

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

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Flush eyes with water as a precaution.

##### If swallowed

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

#### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

##### Suitable extinguishing media

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

#### 5.2 Special hazards arising from the substance or mixture

No data available

#### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.  
Provide appropriate exhaust ventilation at places where dust is formed.  
For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.  
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen with unknown relevance to humans		
Chrysene	218-01-9	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		

		NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C See Appendix A		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

#### Body Protection

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

#### Respiratory protection

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

#### Control of environmental exposure

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

a) Appearance	Form: solid
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

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

LD50 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.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 3077 Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)

Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

#### IMDG

UN number: 3077 Class: 9

Packing group: III

EMS-No: F-A, S-F

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)

Marine pollutant: yes

#### IATA

UN number: 3077 Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

#### Further information

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

---

## 15. REGULATORY INFORMATION

#### SARA 302 Components

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

#### SARA 313 Components

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

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

#### SARA 311/312 Hazards

Chronic Health Hazard

#### Massachusetts Right To Know Components

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

#### Pennsylvania Right To Know Components

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

Chrysene

CAS-No.  
218-01-9

Revision Date  
1994-04-01

#### New Jersey Right To Know Components

Chrysene

CAS-No.  
218-01-9

Revision Date  
1994-04-01

#### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

Chrysene

CAS-No.  
218-01-9

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
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

### HMIS Rating

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

### NFPA Rating

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

### Further information

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### Preparation Information

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

Version: 5.5

Revision Date: 01/10/2018

Print Date: 01/21/2019



## SAFETY DATA SHEET

Version 4.8  
Revision Date 09/03/2017  
Print Date 11/10/2018

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Copper

Product Number : 31284

Brand : Aldrich

CAS-No. : 7440-50-8

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
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

Not a hazardous substance or mixture.

## 2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

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

---

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		
		90 - 100 %

## SAFETY DATA SHEET

Version 5.6  
Revision Date 05/07/2018  
Print Date 01/21/2019

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : 4,4'-DDT

Product Number : 31041  
Brand : Sigma-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)

### 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

---

## 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

---

## 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

---

## 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.

---

## 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)



---

## 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
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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

---

## 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

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#### Preparation Information

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

Version: 5.6

Revision Date: 05/07/2018

Print Date: 01/21/2019

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## 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

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing vapours, mist or gas.

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.

### 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
		TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Irritation Gastrointestinal metal fume fever		
		TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Irritation Gastrointestinal metal fume fever		
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

### 8.2 Exposure controls

#### Appropriate engineering controls

General industrial hygiene practice.

## Personal protective equipment

### Eye/face protection

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

### Skin protection

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

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: 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: Wire<br>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

Hazardous decomposition products formed under fire conditions. - Copper oxides

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - 3.5 mg/kg

#### Skin corrosion/irritation

No data available

#### Serious eye damage/eye irritation

No data available

#### Respiratory or skin sensitisation

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is 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**

Not dangerous goods

**IATA**  
Not dangerous goods

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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

No SARA Hazards

### 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
Copper	7440-50-8	1989-08-11

	CAS-No.	Revision Date
Copper	7440-50-8	1989-08-11

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Copper	7440-50-8	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

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### Preparation Information

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

Version: 4.8

Revision Date: 09/03/2017

Print Date: 11/10/2018



## SAFETY DATA SHEET

Version 6.1  
Revision Date 07/17/2018  
Print Date 01/21/2019

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Dibenz[*a,h*]anthracene

Product Number : 48574

Brand : Supelco

Index-No. : 601-041-00-2

CAS-No. : 53-70-3

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.  
3050 Spruce Street  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765

Fax : +1 800 325-5052

## 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H350

May cause cancer.

H410

Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms	: 1,2:5,6-Dibenzanthracene
Formula	: C <sub>22</sub> H <sub>14</sub>
Molecular weight	: 278.35 g/mol
CAS-No.	: 53-70-3
EC-No.	: 200-181-8
Index-No.	: 601-041-00-2

#### Hazardous components

Component	Classification	Concentration
<b>Dibenz[a,h]anthracene</b>		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### **Suitable extinguishing media**

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

### 5.2 Special hazards arising from the substance or mixture

Carbon oxides

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

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

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

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

Store at room temperature.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### **Components with workplace control parameters**

### 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: 262 - 265 °C (504 - 509 °F) - lit. |
| f) Initial boiling point and boiling range      | 524 °C (975 °F) - lit.                                  |
| g) Flash point                                  | No data available                                       |
| h) Evaporation rate                             | No data available                                       |
| i) Flammability (solid, gas)                    | No data available                                       |
| j) Upper/lower flammability or explosive limits | No data available                                       |
| k) Vapour pressure                              | No data available                                       |
| l) Vapour density                               | No data available                                       |
| m) Relative density                             | No data available                                       |

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

## **9.2 Other safety information**

No data available

---

## **10. STABILITY AND REACTIVITY**

### **10.1 Reactivity**

No data available

### **10.2 Chemical stability**

Stable under recommended storage conditions.

### **10.3 Possibility of hazardous reactions**

No data available

### **10.4 Conditions to avoid**

No data available

### **10.5 Incompatible materials**

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**

Laboratory experiments have shown 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

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: HN2625000

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

Lungs -

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates

Immobilization EC50 - Daphnia magna (Water flea) - 0.496 mg/l - 24 h(Dibenz[a,h]anthracene)

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available(Dibenz[a,h]anthracene)

### 12.5 Results of PBT and vPvB assessment

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

### 12.6 Other adverse effects

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

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

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

**Contaminated packaging**

Dispose of as unused product.

---

## 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. (Dibenz[a,h]anthracene)

Marine pollutant : yes

**IATA**

UN number: 3077

Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenz[a,h]anthracene)

**Further information**

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

---

**15. REGULATORY INFORMATION**

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Dibenz[a,h]anthracene	53-70-3	

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Dibenz[a,h]anthracene	53-70-3	

	CAS-No.	Revision Date
Dibenz[a,h]anthracene	53-70-3	

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Dibenz[a,h]anthracene	53-70-3	

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Dibenz[a,h]anthracene	53-70-3	

---

**16. OTHER INFORMATION**

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

H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956  
Version: 6.1

Revision Date: 07/17/2018

Print Date: 01/21/2019



## 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

according to Regulation (EC) No. 1907/2006

Version 6.0 Revision Date 10.11.2016

Print Date 21.01.2019

GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

---

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

#### 1.1 Product identifiers

Product name : Iron Metal Clinical

Product Number : NIST937

Brand : Sigma-Aldrich

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

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

Identified uses : Laboratory chemicals, Manufacture of substances

#### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.  
3050 Spruce Street  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765  
Fax : +1 800 325-5052

#### 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

---

### SECTION 2: Hazards identification

#### 2.1 Classification of the substance or mixture

#### 2.2 Label elements

#### 2.3 Other hazards - none

---

### SECTION 3: Composition/information on ingredients

---

### SECTION 4: First aid measures

#### 4.1 Description of first aid measures

No data available

#### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available



---

## SECTION 5: Firefighting measures

- 5.1 Extinguishing media**  
No data available
- 5.2 Special hazards arising from the substance or mixture**  
No data available
- 5.3 Advice for firefighters**  
No data available
- 5.4 Further information**  
No data available

---

## SECTION 6: Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures**  
For personal protection see section 8.
- 6.2 Environmental precautions**  
No data available
- 6.3 Methods and materials for containment and cleaning up**  
No data available
- 6.4 Reference to other sections**  
For disposal see section 13.

---

## SECTION 7: Handling and storage

- 7.1 Precautions for safe handling**  
For precautions see section 2.2.
- 7.2 Conditions for safe storage, including any incompatibilities**  
No data available
- 7.3 Specific end use(s)**  
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

## SECTION 8: Exposure controls/personal protection

- 8.1 Control parameters**
- 8.2 Exposure controls**  
No data available

---

## SECTION 9: Physical and chemical properties

- 9.1 Information on basic physical and chemical properties**
  - a) Appearance No data available
  - b) Odour No data available
  - c) Odour Threshold No data available
  - d) pH No data available
  - e) Melting point/freezing point No data available
  - f) Initial boiling point and boiling range No data available
  - g) Flash point No data available
  - h) Evaporation rate No data available
  - i) Flammability (solid, gas) No data available

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

## 9.2 Other safety information

No data available

---

## SECTION 10: Stability and reactivity

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

No data available

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

No data available

### 10.6 Hazardous decomposition products

In the event of fire: see section 5

---

## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

**Acute toxicity**

**Skin corrosion/irritation**

**Serious eye damage/eye irritation**

**Respiratory or skin sensitisation**

**Germ cell mutagenicity**

RTECS: Not available

SDS preview

# LEAD

**DANGER**

7439-92-1

by Fisher Scientific

---

## Synonyms

C.I. 77575, C.I. Pigment Metal 4, EINECS 231-100-4, Glover, HSDB 231, Lead flake, Olow, Plumbum, CI 77575, Plumbum metallicum, Blei, CI pigment metal 4, EC 231-100-4, KS-4, Lead, Lead element, Lead S2, Olow [Polish], Omaha & grant, Pb-S 100, Rough lead bullion, CCRIS 1581, Lead metal, Lead S 2, SSO 1, UNII-2P299V784P

## Hazard statements

Harmful if inhaled

Harmful if swallowed

May cause cancer

May cause damage to organs through prolonged or repeated exposure

May cause drowsiness or dizziness

## Precautions

Obtain special instructions before use

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

Use personal protective equipment as required

Do not eat, drink or smoke when using this product

Use only outdoors or in a well-ventilated area

Rinse mouth

Store locked up

## Hazard category

Acute toxicity, inhalation, Acute toxicity, oral, Carcinogenicity, Specific target organ toxicity, repeated exposure, Specific target organ toxicity, single exposure; Narcotic effects



20000200GHS0208&param1=ZmRwLjFfNzE0NjEwMDNORQ==&unique=1525284976)

The information contained herein is based on data compiled from the chemical components of the (M)SDS and may not accurately represent the safety hazards for the product. Only the manufacturer of the product can make actual representations about the hazard profile of a chemical product. No warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.

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## SAFETY DATA SHEET

Version 3.15  
Revision Date 03/05/2018  
Print Date 11/10/2018

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : Mercury

Product Number : 215457

Brand : Sigma-Aldrich

Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

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

Identified uses : Laboratory chemicals, Synthesis of substances

#### 1.3 Details of the supplier of the safety data sheet

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

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

#### 1.4 Emergency telephone number

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

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

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

Acute toxicity, Inhalation (Category 2), H330

Reproductive toxicity (Category 1B), H360

Specific target organ toxicity - repeated exposure (Category 1), H372

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

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

#### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H330 Fatal if inhaled.

H360 May damage fertility or the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.

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

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Formula	: Hg
Molecular weight	: 200.59 g/mol
CAS-No.	: 7439-97-6
EC-No.	: 231-106-7
Index-No.	: 080-001-00-0

#### Hazardous components

Component	Classification	Concentration
<b>Mercury</b>		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, H410	90 - 100 %

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

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

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

##### If inhaled

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

##### In case of skin contact

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

##### In case of eye contact

Flush eyes with water as a precaution.

##### If swallowed

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

#### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

For personal protection see section 8.

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method. Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.

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

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	0.1 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		



		TWA	0.025 mg/m <sup>3</sup>	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/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

#### Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

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

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

#### Body Protection

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

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

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

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |               |                                       |
|---------------|---------------------------------------|
| a) Appearance | Form: liquid<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) 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

Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/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: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

#### Reproductive toxicity

Presumed human reproductive toxicant

#### Specific target organ toxicity - single exposure

No data available

#### Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

#### Aspiration hazard

No data available

#### Additional Information

RTECS: OV4550000

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

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish                      mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

Bioaccumulation                      Carassius auratus (goldfish) - 1,789 d  
- 0.25 µg/l

Bioconcentration factor (BCF): 155,986

#### 12.4 Mobility in soil

No data available

#### 12.5 Results of PBT and vPvB assessment

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

#### 12.6 Other adverse effects

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

---

### 13. DISPOSAL CONSIDERATIONS

#### 13.1 Waste treatment methods

##### Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

##### Contaminated packaging

Dispose of as unused product.

---

### 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 2809      Class: 8 (6.1)  
Proper shipping name: A. W. Mercury  
Reportable Quantity (RQ): 1 lbs  
Poison Inhalation Hazard: No

Packing group: III

#### IMDG

#### IATA

UN number: 2809      Class: 8 (6.1)  
Proper shipping name: Mercury

Packing group: III

---

### 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

Mercury

CAS-No.  
7439-97-6

Revision Date  
2015-11-23

#### Pennsylvania Right To Know Components

Mercury

CAS-No.  
7439-97-6

Revision Date  
2015-11-23

Mercury

CAS-No.  
7439-97-6

Revision Date  
2015-11-23

#### New Jersey Right To Know Components

Mercury

CAS-No.  
7439-97-6

Revision Date  
2015-11-23

#### California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.  
Mercury

CAS-No.  
7439-97-6

Revision Date  
2013-12-20

---

## 16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

### HMIS Rating

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

### NFPA Rating

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

### Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](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: 3.15

Revision Date: 03/05/2018

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 4.9

Revision Date 04/24/2018

Print Date 10/19/2018

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Nickel

Product Number : 577995

Brand : Aldrich

Index-No. : 028-002-01-4

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

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Skin sensitisation (Category 1), H317

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.	: 028-002-01-4

#### Hazardous components

Component	Classification	Concentration
<b>Nickel, powder [particle diameter &lt; 1 mm]</b>		
	Skin Sens. 1; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H412	90 - 100 %

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

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

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

##### If inhaled

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

##### In case of skin contact

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

##### In case of eye contact

Flush eyes with water as a precaution.

##### If swallowed

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

#### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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.

Handle and store under inert gas. Keep in a dry place.

Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

### 7.3 Specific end use(s)

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Nickel, powder [particle diameter < 1 mm]	7440-02-0	TWA	1.5 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Dermatitis Pneumoconiosis Not suspected as a human carcinogen		



		PEL	0.5 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	1 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015 mg/m <sup>3</sup>	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: powder |
|               | Colour: grey |

b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point: 1,455 °C (2,651 °F)
f) Initial boiling point and boiling range	2,730 °C (4,946 °F)
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/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	insoluble
o) Partition coefficient: n-octanol/water	Not applicable for inorganic substances
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

Hazardous decomposition products formed under fire conditions. - Nickel/nickel 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 - > 9,000 mg/kg  
(OECD Test Guideline 401)

Dermal: No data available

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation - 4 h  
(OECD Test Guideline 404)

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: No eye irritation  
(OECD Test Guideline 405)

#### Respiratory or skin sensitisation

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC: 1 - Group 1: Carcinogenic to humans (Nickel, powder [particle diameter < 1 mm])  
2B - Group 2B: Possibly carcinogenic to humans (Nickel, powder [particle diameter < 1 mm])

IARC: 1 - Group 1: Carcinogenic to humans (Nickel, powder [particle diameter < 1 mm])  
2B - Group 2B: Possibly carcinogenic to humans (Nickel, powder [particle diameter < 1 mm])

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Nickel, powder [particle diameter < 1 mm])

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

Inhalation - Causes damage to organs through prolonged or repeated exposure.

#### Aspiration hazard

No data available

#### Additional Information

Repeated dose toxicity Rat - male and female - Inhalation - LOAEL : 0.0001 mg/l - OECD Test Guideline 451

RTECS: Not available

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

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish                      semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - 15.3 mg/l - 96 h

### 12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

### 12.3 Bioaccumulative potential

### 12.4 Mobility in soil

### 12.5 Results of PBT and vPvB assessment

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

### 12.6 Other adverse effects

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.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 3089              Class: 4.1                      Packing group: II  
Proper shipping name: Metal powders, flammable, n.o.s.  
Reportable Quantity (RQ): 100 lbs  
Poison Inhalation Hazard: No

#### IMDG

#### IATA

UN number: 3089              Class: 4.1                      Packing group: II  
Proper shipping name: Metal powder, flammable, n.o.s.

---

## 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
Nickel, powder [particle diameter < 1 mm]	7440-02-0	2007-07-01

#### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Nickel, powder [particle diameter < 1 mm]	7440-02-0	2007-07-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Nickel, powder [particle diameter < 1 mm]	7440-02-0	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).  
Nickel, powder [particle diameter < 1 mm]

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

### NFPA Rating

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

### Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](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: 4.9

Revision Date: 04/24/2018

Print Date: 10/19/2018

## SAFETY DATA SHEET

Version 4.9

Revision Date 05/04/2017

Print Date 10/19/2018

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Silver

Product Number : 576832

Brand : Aldrich

CAS-No. : 7440-22-4

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

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

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

## 1.4 Emergency telephone number

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

---

2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

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

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)

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

Precautionary statement(s)

P273 : Avoid release to the environment.

P391 : Collect spillage.

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

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

---

3. COMPOSITION/INFORMATION ON INGREDIENTS

## 3.1 Substances

Formula : Ag

Molecular weight : 107.87 g/mol

CAS-No. : 7440-22-4  
EC-No. : 231-131-3

#### Hazardous components

Component	Classification	Concentration
<b>Silver</b>		
	Aquatic Acute 1; Aquatic Chronic 1; H410	90 - 100 %

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

---

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

### 4.2 Most important symptoms and effects, both acute and delayed

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

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### Suitable extinguishing media

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

### 5.2 Special hazards arising from the substance or mixture

No data available

### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

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

### 6.2 Environmental precautions

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

### 6.3 Methods and materials for containment and cleaning up

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

## 6.4 Reference to other sections

For disposal see section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

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

Air sensitive. Handle and store under inert gas. Keep in a dry place.

### 7.3 Specific end use(s)

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

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Silver	7440-22-4	TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Argyria		
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Argyria		
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Argyria		
		TWA	0.01 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.01 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

### 8.2 Exposure controls

#### Appropriate engineering controls

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



## Personal protective equipment

### Eye/face protection

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

### Skin protection

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

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: 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

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |   |
|---|---|
| a) Appearance                                   | Form: powder                                  |
| b) Odour  | No data available                             |
| c) Odour Threshold                              | No data available                             |
| d) pH   | No data available                             |
| e) Melting point/freezing point                 | Melting point/range: 960 °C (1,760 °F) - lit. |
| f) Initial boiling point and boiling range      | 2,212 °C (4,014 °F) - lit.                    |
| g) Flash point                                  | No data available                             |
| h) Evaporation rate                             | No data available                             |
| i) Flammability (solid, gas)                    | No data available                             |
| j) Upper/lower flammability or explosive limits | No data available                             |

k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	10.49 g/mL
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

## 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Oxygen, Strong acids and strong bases

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Silver/silver oxides

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

No data available

LD50 Oral - Rat - male - > 5,000 mg/kg

Inhalation: No data available

Inhalation: No data available

Dermal: No data available

Dermal: No data available

No data available

No data available

#### Skin corrosion/irritation

No data available

No data available

**Serious eye damage/eye irritation**

No data available

No data available

**Respiratory or skin sensitisation**

No data available

No data available

**Germ cell mutagenicity**

No data available

No data available

**Carcinogenicity**

Carcinogenicity - Rat - Unreported

Tumorigenic: Tumors at site or application.

Carcinogenicity classification not possible from current data.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

**Reproductive toxicity**

No data available

No data available

No data available

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: Not available

May cause argyria (a slate-gray or bluish discoloration of the skin and deep tissues due to the deposit of insoluble albuminate of silver).

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

No data available

No data available

**12.2 Persistence and degradability**

No data available

**12.3 Bioaccumulative potential**

No data available

**12.4 Mobility in soil**

No data available

## 12.5 Results of PBT and vPvB assessment

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

## 12.6 Other adverse effects

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

No data available

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Offer surplus and non-recyclable solutions to a licensed disposal company.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 3077      Class: 9      Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Silver)  
Reportable Quantity (RQ): 1 lbs  
Poison Inhalation Hazard: No

### IMDG

UN number: 3077      Class: 9      Packing group: III      EMS-No: F-A, S-F  
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.  
Marine pollutant:yes

### IATA

UN number: 3077      Class: 9      Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s.

### Further information

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

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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
Silver	7440-22-4	1993-04-24

### SARA 311/312 Hazards

No SARA Hazards

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

### New Jersey Right To Know Components

	CAS-No.	Revision Date
--	---------	---------------

**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.**

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

**HMIS Rating**

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

**NFPA Rating**

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

**Further information**

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**Preparation Information**

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

Version: 4.9

Revision Date: 05/04/2017

Print Date: 10/19/2018

## SAFETY DATA SHEET

Version 4.11  
Revision Date 06/28/2017  
Print Date 11/10/2018

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : Tetrachloroethylene

Product Number : 371696

Brand : Sigma-Aldrich

Index-No. : 602-028-00-4

CAS-No. : 127-18-4

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

Identified uses : Laboratory chemicals, Synthesis of substances

#### 1.3 Details of the supplier of the safety data sheet

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

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

#### 1.4 Emergency telephone number

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

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

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

Skin irritation (Category 2), H315

Eye irritation (Category 2A), H319

Skin sensitisation (Category 1), H317

Carcinogenicity (Category 2), H351

Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

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

Warning

Hazard statement(s)

H315 Causes skin irritation.

H317 May cause an allergic skin reaction.

H319 Causes serious eye irritation.

H336 May cause drowsiness or dizziness.

H351 Suspected of causing cancer.

H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
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.
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.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
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

Synonyms	: Perchloroethylene PCE
Formula	: C <sub>2</sub> Cl <sub>4</sub>
Molecular weight	: 165.83 g/mol
CAS-No.	: 127-18-4
EC-No.	: 204-825-9
Index-No.	: 602-028-00-4

#### Hazardous components

Component	Classification	Concentration
<b>Tetrachloroethylene</b>		
	Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 2; STOT SE 3; Aquatic Acute 2; Aquatic Chronic 2; H315, H317, H319, H336, H351, 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. Consult a physician.

**In case of eye contact**

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

**If swallowed**

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

**4.2 Most important symptoms and effects, both acute and delayed**

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

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

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

**5.2 Special hazards arising from the substance or mixture**

No data available

**5.3 Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**

No data available

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

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

For personal protection see section 8.

**6.2 Environmental precautions**

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

**6.3 Methods and materials for containment and cleaning up**

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

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**7.3 Specific end use(s)**

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

---

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****8.1 Control parameters**

**Components with workplace control parameters**



Component	CAS-No.	Value	Control parameters	Basis
Tetrachloroethylene	127-18-4	TWA	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central 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		
		STEL	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central 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		
		Potential Occupational Carcinogen Minimize workplace exposure concentrations. See Appendix A		
		See Table Z-2		
		TWA	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	300.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central 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		
		STEL	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central 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		
		Potential Occupational Carcinogen Minimize workplace exposure concentrations. See Appendix A		
		See Table Z-2		

		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	25 ppm 170 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	100 ppm 685 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	300 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	25 ppm 170 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
Tetrachloroethylene	127-18-4	Tetrachloroethylene	3ppm	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	0.5000 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	3ppm	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	0.5 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours 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: 0.2 mm

Break through time: 49 min

Material tested: Dermatrill® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

### Body Protection

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

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type 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<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: -22 °C (-8 °F) - lit.   |
| f) Initial boiling point and boiling range      | 121 °C (250 °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                              | 25.3 hPa (19.0 mmHg) at 25.0 °C (77.0 °F)<br>17.3 hPa (13.0 mmHg) at 20.0 °C (68.0 °F) |
| l) Vapour density                               | No data available  |
| m) Relative density                             | 1.623 g/cm <sup>3</sup> at 25 °C (77 °F)   |
| n) Water solubility                             | 0.15 g/l at 25 °C (77 °F)  |
| o) Partition coefficient: n-octanol/water       | log Pow: 2.53 at 23 °C (73 °F)   |
| p) Auto-ignition temperature                    | No data available  |
| q) Decomposition temperature                    | No data available  |
| r) Viscosity                                    | No data available  |
| s) Explosive properties                         | No data available  |

t) Oxidizing properties      No data available

## 9.2 Other safety information

Surface tension      32.1 mN/m at 20 °C (68 °F)

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents, Strong bases

### 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 - female - 3,385 mg/kg  
(OECD Test Guideline 401)

Inhalation: No data available

Dermal: No data available

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: Mild eye irritation - 24 h

#### Respiratory or skin sensitisation

- Mouse

Result: May cause sensitisation by skin contact.  
(OECD Test Guideline 429)

#### Germ cell mutagenicity

Hamster

ovary

Result: negative

OECD Test Guideline 474

Mouse - male

Result: negative

#### Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:      2A - Group 2A: Probably carcinogenic to humans (Tetrachloroethylene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Tetrachloroethylene)  
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**

May cause drowsiness or dizziness.

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

Repeated dose toxicity      Mouse - female - Oral - LOAEL : 390 mg/kg

RTECS: KX3850000

narcosis, Liver injury may occur., Kidney injury may occur.

---

**12. ECOLOGICAL INFORMATION**

**12.1 Toxicity**

Toxicity to fish                      flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 5 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates      EC50 - Daphnia magna (Water flea) - 7.50 mg/l - 48 h

Toxicity to algae                      static test EC50 - Skeletonema costatum - > 16 mg/l - 7 h

**12.2 Persistence and degradability**

Biodegradability                      aerobic - Exposure time 28 d  
Result: 11 % - Not readily biodegradable.  
(OECD Test Guideline 301C)

**12.3 Bioaccumulative potential**

Bioaccumulation                      Lepomis macrochirus (Bluegill) - 21 d  
- 0.00343 mg/l

Bioconcentration factor (BCF): 49

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

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

**12.6 Other adverse effects**

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

---

**13. DISPOSAL CONSIDERATIONS**

**13.1 Waste treatment methods**

**Product**

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

**Contaminated packaging**  
Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1897      Class: 6.1      Packing group: III  
Proper shipping name: Tetrachloroethylene  
Reportable Quantity (RQ): 100 lbs Reportable Quantity (RQ): 100 lbs  
Poison Inhalation Hazard: No

### IMDG

UN number: 1897      Class: 6.1      Packing group: III      EMS-No: F-A, S-A  
Proper shipping name: TETRACHLOROETHYLENE  
Marine pollutant: yes

### IATA

UN number: 1897      Class: 6.1      Packing group: III  
Proper shipping name: Tetrachloroethylene

---

## 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
Tetrachloroethylene	127-18-4	2007-07-01

### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Reportable Quantity : D039 lbs

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Tetrachloroethylene	127-18-4	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

Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

#### HMIS Rating

Health hazard:	3
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: 06/28/2017

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 4.10  
Revision Date 01/04/2018  
Print Date 11/10/2018

---

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Trichloroethylene

Product Number : 251402  
Brand : Sigma-Aldrich  
Index-No. : 602-027-00-9

CAS-No. : 79-01-6

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

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

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

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

**1.4 Emergency telephone number**

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

---

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Skin irritation (Category 2), H315  
Eye irritation (Category 2A), H319  
Germ cell mutagenicity (Category 2), H341  
Carcinogenicity (Category 1B), H350  
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336  
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)

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
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.
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 eye protection/ face protection.
P280	Wear protective gloves.
P281	Use personal protective equipment as required.
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.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Synonyms	: TCE Trichloroethene
Formula	: C <sub>2</sub> HCl <sub>3</sub>
Molecular weight	: 131.39 g/mol
CAS-No.	: 79-01-6
EC-No.	: 201-167-4
Index-No.	: 602-027-00-9

#### Hazardous components

Component	Classification	Concentration
Trichloroethylene	Skin Irrit. 2; Eye Irrit. 2A; Muta. 2; Carc. 1B; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H315, H319, H336, H341, H350, H412	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. Evacuate personnel to safe areas.

For personal protection see section 8.

**6.2 Environmental precautions**

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

**6.3 Methods and materials for containment and cleaning up**

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

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive. Handle and store under inert gas.

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
Trichloroethylene	79-01-6	TWA	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		STEL	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		Potential Occupational Carcinogen See Appendix C See Appendix A		
		See Table Z-2		
		TWA	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		CEIL	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		Peak	300.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		Peak	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		

		STEL	100 ppm 537 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	300 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	25 ppm 135 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	Trichloroacetic acid	15.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Trichloroethanol	0.5000 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Trichloroethylene		In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Trichloroethylene		In end-exhaled air	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: 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, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: liquid, clear Colour: colourless
b) Odour	No data available
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -84.8 °C (-120.6 °F) - lit.
f) Initial boiling point and boiling range	86.7 °C (188.1 °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	Upper explosion limit: 10.5 %(V) Lower explosion limit: 8 %(V)
k) Vapour pressure	81.3 hPa (61.0 mmHg) at 20.0 °C (68.0 °F)
l) Vapour density	No data available
m) Relative density	1.463 g/mL at 25 °C (77 °F)
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	log Pow: 2.29log Pow: 5
p) Auto-ignition temperature	410.0 °C (770.0 °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**

No data available

**10.4 Conditions to avoid**

No data available

**10.5 Incompatible materials**

Oxidizing agents, Strong bases, Magnesium

**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 - 4,920 mg/kg

LC50 Inhalation - Mouse - 4 h - 8450 ppm

LD50 Dermal - Rabbit - > 20,000 mg/kg

No data available

**Skin corrosion/irritation**

Skin - Rabbit

Result: Severe skin irritation - 24 h

**Serious eye damage/eye irritation**

Eyes - Rabbit

Result: Eye irritation - 24 h

**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: 1 - Group 1: Carcinogenic to humans (Trichloroethylene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Trichloroethylene)

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: KX4550000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., Gastrointestinal disturbance, Kidney injury may occur., narcosis  
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) - 41 mg/l - 96.0 h LOEC - other fish - 11 mg/l - 10.0 d NOEC - Oryzias latipes - 40 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 18.00 mg/l - 48 h
Toxicity to algae	IC50 - Pseudokirchneriella subcapitata (green algae) - 175.00 mg/l - 96 h

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

Does not bioaccumulate.

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

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

### 12.6 Other adverse effects

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

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

---

## 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: 1710      Class: 6.1      Packing group: III  
Proper shipping name: Trichloroethylene  
Reportable Quantity (RQ): 100 lbs  
Poison Inhalation Hazard: No

### IMDG

UN number: 1710      Class: 6.1      Packing group: III      EMS-No: F-A, S-A  
Proper shipping name: TRICHLOROETHYLENE

### IATA

UN number: 1710      Class: 6.1      Packing group: III

Proper shipping name: Trichloroethylene

---

## 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
Trichloroethylene	79-01-6	2007-07-01

### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	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
Trichloroethylene	79-01-6	2011-09-01

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2011-09-01

---

## 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
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H402	Harmful to aquatic life.

### 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: 4.10

Revision Date: 01/04/2018

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 4.9

Revision Date 07/27/2018

Print Date 11/10/2018

---

1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : 1,1,1-Trichloroethane solution

Product Number : 48614  
Brand : Supelco  
Index-No. : 603-001-00-X

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

Identified uses : Laboratory chemicals, Synthesis of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
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)**Flammable liquids (Category 2), H225  
Acute toxicity, Oral (Category 3), H301  
Acute toxicity, Inhalation (Category 3), H331  
Acute toxicity, Dermal (Category 3), H311  
Specific target organ toxicity - single exposure (Category 1), H370

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

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.  
H301 + H311 + H331 Toxic if swallowed, in contact with skin or if inhaled.  
H370 Causes damage to organs.

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.  
P233 Keep container tightly closed.  
P240 Ground/bond container and receiving equipment.  
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.  
P242 Use only non-sparking tools.  
P243 Take precautionary measures against static discharge.

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P311	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician.
P307 + P311	IF exposed: Call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.2 Mixtures

Synonyms : Methyl chloroform

Molecular weight : 32.04 g/mol

#### Hazardous components

Component	Classification	Concentration
<b>Methanol</b>		
CAS-No. 67-56-1	Flam. Liq. 2; Acute Tox. 3; STOT SE 1; H225, H301 + H311 + H331, H370	90 - 100 %
EC-No. 200-659-6		
Index-No. 603-001-00-X		
Registration number 01-2119433307-44-XXXX		

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

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

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

#### If inhaled

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

#### In case of skin contact

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

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

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

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

##### Suitable extinguishing media

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

#### 5.2 Special hazards arising from the substance or mixture

No data available

#### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

Use water spray to cool unopened containers.

---

### 6. ACCIDENTAL RELEASE MEASURES

#### 6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

#### 6.2 Environmental precautions

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

#### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

#### 6.4 Reference to other sections

For disposal see section 13.

---

### 7. HANDLING AND STORAGE

#### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

#### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store at room temperature.

Storage class (TRGS 510): 3: Flammable liquids

#### 7.3 Specific end use(s)

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

---

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1 Control parameters

##### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Methanol	67-56-1	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Headache Nausea Dizziness Eye damage		

		Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption		
		STEL	250 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Headache Nausea Dizziness Eye damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Danger of cutaneous absorption		
		TWA	200 ppm 260 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		ST	250 ppm 325 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	200 ppm 260 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		C	1,000 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		PEL	200 ppm 260 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		STEL	250 ppm 325 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

#### Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	Methanol	15 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

## 8.2 Exposure controls

### Appropriate engineering controls

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

### Personal protective equipment

#### Eye/face protection

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

#### Skin protection

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

Full contact

Material: butyl-rubber

Minimum layer thickness: 0.3 mm

Break through time: 480 min

Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 30 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

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

### 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 AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |  |
|---|--|
| a) Appearance                                   | Form: liquid   |
| b) Odour  | No data available  |
| c) Odour Threshold                              | No data available  |
| d) pH   | No data available  |
| e) Melting point/freezing point                 | Melting point/range: -98 °C (-144 °F)  |
| f) Initial boiling point and boiling range      | 64.6 - 64.7 °C (148.3 - 148.5 °F) at 1,013 hPa (760 mmHg)                        |
| g) Flash point                                  | 11 °C (52 °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: 36 %(V)<br>Lower explosion limit: 6 %(V)                  |
| k) Vapour pressure                              | 130.23 hPa (97.68 mmHg) at 20 °C (68 °F)<br>547 hPa (410 mmHg) at 50 °C (122 °F) |
| l) Vapour density                               | No data available  |
| m) Relative density                             | 0.791 g/cm <sup>3</sup>  |
| n) Water solubility                             | No data available  |
| o) Partition coefficient: n-octanol/water       | No data available  |
| p) Auto-ignition temperature                    | 385 °C (725 °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, Oxidizing agents, Alkali metals, Acid chlorides, Acid anhydrides, Reducing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - No data available

In the event of fire: see section 5

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## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - male and female - > 1,187 - 2,769 mg/kg

Remarks: (ECHA) (Regulation (EC) No 1272/2008, Annex VI)

LDLO Oral - Human - 143 mg/kg

Remarks: Lungs, Thorax, or Respiration: Dyspnea. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

LC50 Inhalation - Rat - male and female - 4 h - 131.25 mg/l

Remarks: (ECHA) (Regulation (EC) No 1272/2008, Annex VI)

LD50 Dermal - Rabbit - 17,100 mg/kg

Remarks: (External MSDS) (Regulation (EC) No 1272/2008, Annex VI)

No data available

No data available

#### Skin corrosion/irritation

No data available

Skin - Rabbit

Result: No skin irritation

Remarks: (ECHA) Drying-out effect resulting in rough and chapped skin.

#### Serious eye damage/eye irritation

No data available

Eyes - Rabbit

Result: No eye irritation

Remarks: (ECHA) Irritation of mucous membranes

#### Respiratory or skin sensitisation

Maximisation Test - Guinea pig

Result: negative

(OECD Test Guideline 406)

## **Germ cell mutagenicity**

No data available

Based on available data the classification criteria are not met.

Ames test

*S. typhimurium*

Result: negative

In vitro mammalian cell gene mutation test

fibroblast

Result: negative

OECD Test Guideline 474

Mouse - male and female - Bone marrow

Result: negative

## **Carcinogenicity**

Did not show carcinogenic effects in animal experiments.

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 on OSHA's list of regulated carcinogens.

## **Reproductive toxicity**

No data available

No data available

Based on available data the classification criteria are not met.

## **Specific target organ toxicity - single exposure**

No data available

Acute inhalation toxicity - Irritation symptoms in the respiratory tract.

## **Specific target organ toxicity - repeated exposure**

No data available

## **Aspiration hazard**

No data available

## **Additional Information**

Repeated dose toxicity      Rat - male and female - Inhalation - 28 d - NOAEL : 6.66 mg/l - OECD Test Guideline 412 -Subacute toxicity

Rat - male and female - Inhalation - 365 d - NOAEL : 0.13 mg/l - LOAEL : 1.3 mg/l - OECD Test Guideline 453

RTECS: Not available

Methyl alcohol may be fatal or cause blindness if swallowed., Cannot be made non-poisonous., Effects due to ingestion may include:, Nausea, Dizziness, Gastrointestinal disturbance, Weakness, Confusion., Drowsiness, Unconsciousness, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Headache, Dizziness, Drowsiness, Coma, narcosis, Blindness, Impairment of vision, irritant effects, Nausea, Vomiting, agitation, spasms, inebriation

Drying-out effect resulting in rough and chapped skin., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence



---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

No data available

Toxicity to fish	flow-through test LC50 - <i>Lepomis macrochirus</i> (Bluegill) - 15,400.0 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	EC50 - <i>Daphnia magna</i> (Water flea) - > 10,000 mg/l - 48 h Remarks: (ECHA)  semi-static test EC50 - <i>Daphnia magna</i> (Water flea) - 18,260 mg/l - 96 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - <i>Pseudokirchneriella subcapitata</i> (green algae) - ca. 22,000.0 mg/l - 96 h (OECD Test Guideline 201)
Toxicity to bacteria	EC5 - <i>Pseudomonas fluorescens</i> - 6,600 mg/l - 16 h Remarks: (IUCLID)  static test IC50 - activated sludge - > 1,000 mg/l - 3 h (OECD Test Guideline 209)

### 12.2 Persistence and degradability

No data available

Biochemical Oxygen Demand (BOD)	600 - 1,120 mg/g Remarks: (IUCLID)
Chemical Oxygen Demand (COD)	1,420 mg/g Remarks: (IUCLID)
Theoretical oxygen demand	1,500 mg/g Remarks: (Lit.)
Ratio BOD/ThBOD	76 % Remarks: Closed Bottle test(IUCLID)

### 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

Additional ecological information	Avoid release to the environment.
Stability in water	at 19 °C83 - 91 % - 72 h Remarks: Hydrolyses on contact with water.Hydrolyses readily.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1230      Class: 3      Packing group: II  
Proper shipping name: Methanol  
Reportable Quantity (RQ): 5000 lbs  
Poison Inhalation Hazard: No

### IMDG

UN number: 1230      Class: 3 (6.1)      Packing group: II      EMS-No: F-E, S-D  
Proper shipping name: METHANOL

### IATA

UN number: 1230      Class: 3 (6.1)      Packing group: II  
Proper shipping name: Methanol

---

## 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
Methanol	67-56-1	2007-07-01

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01
1,1,1-Trichloroethane	71-55-6	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Methanol	67-56-1	2007-07-01

### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	67-56-1	2012-03-16

Methanol

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## 16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H301	Toxic if swallowed.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H311	Toxic in contact with skin.
H331	Toxic if inhaled.
H370	Causes damage to organs.
STOT SE	Specific target organ toxicity - single exposure

#### 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: 4.9

Revision Date: 07/27/2018

Print Date: 11/10/2018

## SAFETY DATA SHEET

Version 6.0  
Revision Date 05/25/2018  
Print Date 01/21/2019

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**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : 1,1,2-Trichloroethane

Product Number : 46262  
Brand : Sigma-Aldrich  
Index-No. : 602-014-00-8

CAS-No. : 79-00-5

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

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

Company : Sigma-Aldrich Inc.  
3050 Spruce Street  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765  
Fax : +1 800 325-5052

**1.4 Emergency telephone number**

Emergency Phone # : (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)**

Acute toxicity, Oral (Category 4), H302

Acute toxicity, Inhalation (Category 3), H331

Acute toxicity, Dermal (Category 4), H312

Carcinogenicity (Category 2), H351

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)	
H302 + H312	Harmful if swallowed or in contact with skin.
H331	Toxic if inhaled.
H351	Suspected of causing cancer.
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.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
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.
P311	Call a POISON CENTER /doctor.
P322	Specific measures (see supplemental first aid instructions on this label).
P330	Rinse mouth.
P363	Wash contaminated clothing before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Repeated exposure may cause skin dryness or cracking.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Formula	: C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>
Molecular weight	: 133.40 g/mol
CAS-No.	: 79-00-5
EC-No.	: 201-166-9
Index-No.	: 602-014-00-8

#### Hazardous components

Component	Classification	Concentration
<b>1,1,2-Trichloroethane</b>		
	Acute Tox. 4; Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 3; Aquatic Chronic 3; H302 + H312, H331, H351, 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

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

#### If inhaled

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

**In case of skin contact**

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

**In case of eye contact**

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**

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

---

**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.

---

**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

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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-Trichloroethane	79-00-5	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	10 ppm 45 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix C See Appendix A Potential for dermal absorption		
		TWA	10 ppm 45 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation The value in mg/m3 is approximate.		
		PEL	10 ppm 45 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: 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**

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	-37.0 °C (-34.6 °F)
f) Initial boiling point and boiling range	110 - 115 °C (230 - 239 °F) - lit.
g) Flash point	No data available
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	No data available
l) Vapour density	No data available
m) Relative density	1.435 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	No data available
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

### 9.2 Other safety information

No data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available



#### 10.4 Conditions to avoid

No data available

#### 10.5 Incompatible materials

Strong bases, Strong oxidizing agents, Reacts violently with:, Sodium/sodium oxides, Potassium, Magnesium, Aluminum

#### 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 - 836.0 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

##### Skin corrosion/irritation

Skin - Rabbit

Result: Severe skin irritation - 24 h

Skin - Rabbit

Result: Mild skin irritation - 24 h

##### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Mild eye irritation - 24 h

##### Respiratory or skin sensitisation

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. The National Cancer Institute (NCI) has found clear evidence for carcinogenicity. 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 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: KJ3150000

Central nervous system depression, prolonged or repeated exposure can cause:, narcosis, 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 - Lepomis macrochirus (Bluegill) - 40.00 mg/l - 96 h(1,1,2-Trichloroethane)
	LC50 - Pimephales promelas (fathead minnow) - 81.60 mg/l - 96 h(1,1,2-Trichloroethane)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 43.00 mg/l - 48 h(1,1,2-Trichloroethane)

### 12.2 Persistence and degradability

No data available

### 12.3 Bioaccumulative potential

No data available

### 12.4 Mobility in soil

No data available(1,1,2-Trichloroethane)

### 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.

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.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 2810	Class: 6.1	Packing group: III
Proper shipping name: Toxic, liquids, organic, n.o.s. (1,1,2-Trichloroethane)		
Reportable Quantity (RQ)	:	100 lbs

no

Poison Inhalation Hazard: No

### IMDG

UN number: 2810	Class: 6.1	Packing group: III	EMS-No: F-A, S-A
Proper shipping name: TOXIC LIQUID, ORGANIC, N.O.S. (1,1,2-Trichloroethane)			

### IATA

UN number: 2810	Class: 6.1	Packing group: III
Proper shipping name: Toxic liquid, organic, n.o.s. (1,1,2-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
1,1,2-Trichloroethane	79-00-5	2007-07-01

### SARA 311/312 Hazards

Acute Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1,2-Trichloroethane	79-00-5	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1,2-Trichloroethane	79-00-5	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,2-Trichloroethane	79-00-5	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
1,1,2-Trichloroethane	79-00-5	2007-09-28

---

## 16. OTHER INFORMATION

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

H302	Harmful if swallowed.
H302 + H312	Harmful if swallowed or in contact with skin.
H312	Harmful in contact with skin.
H331	Toxic if inhaled.
H351	Suspected of causing cancer.
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:	1
Fire Hazard:	0
Reactivity Hazard:	0

### Further information

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956  
Version: 6.0

Revision Date: 05/25/2018

Print Date: 01/21/2019

## SAFETY DATA SHEET

Version 5.8  
Revision Date 10/12/2015  
Print Date 05/01/2016

---

**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Zinc

Product Number : 96454  
Brand : Sigma-Aldrich

CAS-No. : 7440-66-6

**1.2 Relevant identified uses of the substance or mixture and uses advised against**

Identified uses : Laboratory chemicals, Synthesis of substances

**1.3 Details of the supplier of the safety data sheet**

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

**1.4 Emergency telephone number**

Emergency Phone # : (314) 776-6555

---

**2. HAZARDS IDENTIFICATION****2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Combustible dust,  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

**2.2 GHS Label elements, including precautionary statements**

Pictogram



Signal word : Warning

Hazard statement(s)

H410

May form combustible dust concentrations in air  
Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273

Avoid release to the environment.

P391

Collect spillage.

P501

Dispose of contents/ container to an approved waste disposal plant.

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS**

Combustible dust

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.2 Mixtures

Formula : Zn  
Molecular weight : 65.39 g/mol

##### Hazardous components

Component		Classification	Concentration
<b>Zinc powder (stabilized)</b>			
CAS-No.	7440-66-6	Aquatic Acute 1; Aquatic Chronic 1; H410	<= 100 %
EC-No.	231-175-3		
Index-No.	030-001-01-9		
<b>Zinc oxide</b>			
CAS-No.	1314-13-2	Aquatic Acute 1; Aquatic Chronic 1; H410	>= 5 - < 10 %
EC-No.	215-222-5		
Index-No.	030-013-00-7		

For the full text of the H-Statements mentioned in this Section, see Section 16.

---

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

##### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Flush eyes with water as a precaution.

##### If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

#### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

---

### 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

##### Suitable extinguishing media

Special powder against metal fire Dry sand Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

##### Unsuitable extinguishing media

Water

#### 5.2 Special hazards arising from the substance or mixture

Zinc/zinc oxides

#### 5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

Storage class (TRGS 510): Non Combustible Solids

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Zinc oxide	1314-13-2	TWA	2.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	metal fume fever		
		STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		metal fume fever		

		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	15.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	15.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

#### Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min

Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### Body Protection

Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.



**Respiratory protection**

Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****9.1 Information on basic physical and chemical properties**

a) Appearance	Form: powder Colour: grey
b) Odour	odourless
c) Odour Threshold	No data available
d) pH	Not applicable
e) Melting point/freezing point	Melting point/range: 420 °C (788 °F) - lit.
f) Initial boiling point and boiling range	907 °C (1,665 °F) - lit.
g) Flash point	Not applicable
h) Evaporation rate	No data available
i) Flammability (solid, gas)	May form combustible dust concentrations in air
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	Not applicable
l) Vapour density	No data available
m) Relative density	7.133 g/mL at 25 °C (77 °F)
n) Water solubility	insoluble
o) Partition coefficient: n-octanol/water	Not applicable
p) Auto-ignition temperature	does not ignite
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	During processing, dust may form explosive mixture in air.
t) Oxidizing properties	No data available

**9.2 Other safety information**

Bulk density	1.8 - 3.2 kg/m <sup>3</sup>
--------------	-----------------------------

---

**10. STABILITY AND REACTIVITY****10.1 Reactivity**

No data available

**10.2 Chemical stability**

Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**

Dust may form explosive mixture in air.

#### 10.4 Conditions to avoid

No data available

#### 10.5 Incompatible materials

Strong oxidizing agents, Acids and bases

#### 10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

---

### 11. TOXICOLOGICAL INFORMATION

#### 11.1 Information on toxicological effects

##### Acute toxicity

No data available (Zinc powder (stabilized))

Inhalation: No data available (Zinc powder (stabilized))

Dermal: No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

##### Skin corrosion/irritation

No data available (Zinc powder (stabilized))

##### Serious eye damage/eye irritation

No data available (Zinc powder (stabilized))

##### Respiratory or skin sensitisation

Did not cause sensitisation on laboratory animals. (Zinc powder (stabilized))

##### Germ cell mutagenicity

No data available (Zinc powder (stabilized))

##### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

##### Reproductive toxicity

No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

##### Specific target organ toxicity - single exposure

No data available (Zinc powder (stabilized))

##### Specific target organ toxicity - repeated exposure

No data available

##### Aspiration hazard

No data available (Zinc powder (stabilized))

##### Additional Information

RTECS: ZG8600000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Effects due to ingestion may include:, chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness, Contact with eyes or skin may cause:, Irritation (Zinc powder (stabilized))

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 450 µg/l - 96 h (Zinc powder (stabilized))
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h (Zinc powder (stabilized))
	mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d (Zinc powder (stabilized))

### 12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

### 12.3 Bioaccumulative potential

Bioaccumulation	Algae - 7 d at 16 °C - 5 µg/l (Zinc powder (stabilized))
	Bioconcentration factor (BCF): 466

### 12.4 Mobility in soil

No data available (Zinc powder (stabilized))

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Very toxic to aquatic life with long lasting effects.

No data available

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

Offer surplus and non-recyclable solutions to a licensed disposal company.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 3077      Class: 9      Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Zinc powder (stabilized))  
Reportable Quantity (RQ): 1020 lbs

Poison Inhalation Hazard: No

### IMDG

UN number: 3077      Class: 9      Packing group: III      EMS-No: F-A, S-F  
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Zinc powder (stabilized))  
Marine pollutant: yes

### IATA

UN number: 3077      Class: 9      Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Zinc powder (stabilized))

### Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

---

## 15. REGULATORY INFORMATION

### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Zinc oxide	1314-13-2	2007-03-01
Zinc powder (stabilized)	7440-66-6	1993-04-24

### SARA 311/312 Hazards

No SARA Hazards

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

	May form combustible dust concentrations in air
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

### HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

### NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

### Further information

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.8

Revision Date: 10/12/2015

Print Date: 05/01/2016

**APPENDIX E**

**COMMUNITY AIR MONITORING PLAN**

# **Community Air Monitoring Plan**

**10 and 16 Cottage Place, and  
25, 26, and 30 Garden Street  
New Rochelle, New York  
BCP # C360180**

## **1.0 INTRODUCTION**

This document presents a Community Air Monitoring Plan (CAMP) for the remedial investigation (RI) for the proposed development at 10 and 16 Cottage Place, and 25, 26, and 30 Garden Street, New Rochelle, New York.

The Site, which is the subject of this RIWP, is approximately 0.98-acres occupied by several commercial buildings. The Site properties are identified on the Westchester County Clerk's as a portion of tax parcel map Section-Block-Lot number 3-802-0020, 0032, 0033, 0036, 0038, 0041, and 0043, respectively. The Site is depicted on a United States Geological Survey (USGS) Topographic Map (Figure 2.1) and Survey Map (Figure 2.2).

The seven lots were historically comprised of four commercial buildings, one residential building, and asphalt parking lots. The residential parcel was constructed in the early 1990s, with conversion to multiple apartments over the years. The remaining commercial buildings have been used as a Kitchen and Bath dealer, warehouses, retail tire and auto repair facility, a gasoline station with tanks that were closed in 2001, and various other commercial, retail, and light manufacturing uses. The auto repair facility, former Plastic Works manufacturing and/or Strip-A-Way of New Rochelle, Inc. company on the Site were likely responsible for the VOCs and metals contamination. The buildings were demolished by the Requestors upon acquisition or leasing in late 2017.

## **1.1 OBJECTIVES**

The objective of this CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that may arise as a result of the planned remedial excavation and construction, which may include temporary soil stockpiling.

## **1.2 METHODS**

The CAMP will include monitoring for particulate matter (e.g., airborne “dust”) during the planned remedial excavation and construction activities. Readings will be recorded and will be available for State (DEC and DOH) personnel to review, as requested.

## **1.3 PARTICULATE MONITORING**

When deemed by SESI to be applicable, particulate (e.g. “dust”) emissions will be measured continuously at the upwind and downwind work zone boundaries. Real time monitoring equipment (e.g. Trak TSI Dust monitors or equivalent), with audible alarms and capable of measuring particulate matter less than 10 micrometers in size (PM-10), will be used. If the wind is calm, the monitors should be placed between each work area and the nearest sensitive receptors. If the wind is variable, the monitors must be placed accordingly to ensure there is a monitor downwind of each work area at all times. Air monitoring locations will be selected daily based on prevailing wind conditions and specific locations where field-work is to be conducted on a daily basis.

- If the downwind particulate level is 100 micrograms per cubic meter (ug/m3) greater than background (upwind) for a 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 provided that downwind particulate levels do not exceed 150 ug/m3 above upwind levels and provided that no visible dust is migrating from the work area.
- If, after dust suppression techniques, downwind particulate levels are greater than 150 ug/m3 above upwind levels, work will be stopped and a re-evaluation of activities will be initiated. Work will resume, provided that dust suppression measures and other controls are successful in reducing downwind particulate concentrations to within 150 ug/m3 of the upwind level and in preventing visible dust migration.
- All readings must be recorded and be available for State (NYSDEC and NYSDOH) and County Health personnel to review.



## **1.4 VOC MONITORING**

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

**APPENDIX F**  
**CITIZENS PARTICIPATION PLAN**



**Department of  
Environmental  
Conservation**

# **Brownfield Cleanup Program**

## **Citizen Participation Plan**

for

## **Cottage-Garden Auto Repair Site**

January 2019

C360180  
30 Garden Street and 16 Cottage Place  
New Rochelle  
Westchester County, New York

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\* \* \* \* \*

**Note:** The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site’s investigation and cleanup process.

Applicant: **The Mark 95 LLC and The Mark II LLC (“Applicants”)**  
Site Name: **Cottage-Garden Auto Repair Site (“Site”)**  
Site Address: **30 Garden Street and 16 Cottage Place, New Rochelle, NY**  
Site County: **Westchester**  
Site Number: **C360180**

## **1. What is New York’s Brownfield Cleanup Program?**

New York’s Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as “brownfields” so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:  
<http://www.dec.ny.gov/chemical/8450.html> .

## **2. Citizen Participation Activities**

### *Why NYSDEC Involves the Public and Why It Is Important*

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment
- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process
- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process
- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community
- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

#### *Project Contacts*

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

#### *Locations of Reports and Information*

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

### *Site Contact List*

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.

The site contact list includes, at a minimum:

- chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- residents, owners, and occupants of the site and properties adjacent to the site;
- the public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

**Note:** The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See <http://www.dec.ny.gov/chemical/61092.html> .

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

### *CP Activities*

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The

flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.
- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

#### *Technical Assistance Grant*

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, the significant threat determination for the site had not yet been made.



To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at <http://www.dec.ny.gov/regulations/2590.html>

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

{Citizen Participation Activities}	Timing of CP Activity(ies)
<b>Application Process:</b>	
<ul style="list-style-type: none"> <li>• Prepare site contact list</li> <li>• Establish document repository(ies)</li> </ul>	At time of preparation of application to participate in the BCP.
<ul style="list-style-type: none"> <li>• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period</li> <li>• Publish above ENB content in local newspaper</li> <li>• Mail above ENB content to site contact list</li> <li>• Conduct 30-day public comment period</li> </ul>	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
<b>After Execution of Brownfield Site Cleanup Agreement (BCA):</b>	
<ul style="list-style-type: none"> <li>• Prepare Citizen Participation (CP) Plan</li> </ul>	Before start of Remedial Investigation <b>Note:</b> Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA.
<b>Before NYSDEC Approves Remedial Investigation (RI) Work Plan:</b>	
<ul style="list-style-type: none"> <li>• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan</li> <li>• Conduct 30-day public comment period</li> </ul>	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
<b>After Applicant Completes Remedial Investigation:</b>	
<ul style="list-style-type: none"> <li>• Distribute fact sheet to site contact list that describes RI results</li> </ul>	Before NYSDEC approves RI Report
<b>Before NYSDEC Approves Remedial Work Plan (RWP):</b>	
<ul style="list-style-type: none"> <li>• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period</li> <li>• Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager)</li> <li>• Conduct 45-day public comment period</li> </ul>	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
<b>Before Applicant Starts Cleanup Action:</b>	

{Citizen Participation Activities}	Timing of CP Activity(ies)
<ul style="list-style-type: none"> <li>• Distribute fact sheet to site contact list that describes upcoming cleanup action</li> </ul>	Before the start of cleanup action.
<p style="text-align: center;"><b>After Applicant Completes Cleanup Action:</b></p> <ul style="list-style-type: none"> <li>• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report</li> <li>• Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)</li> </ul>	<p>At the time the cleanup action has been completed.</p> <p><b>Note:</b> The two fact sheets are combined when possible if there is not a delay in issuing the COC.</p>

### 3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

There will be areas on the Site where soil excavation is necessary and when underground storage tanks will be removed as part of what is caused an interim remedial measure (IRM). Therefore, once the IRM work, and then later the Site-wide remediation commences, there may be concerns regarding odors, noise or truck traffic coming from the Site. However, these impacts will be mitigated through implementation of a Health and Safety Plan and Soil Management Plan approved by the Department, which will be designed to minimize these impacts. A Community Air Monitoring Plan will also be implemented to monitor dust and vapors to ensure the community is not impacted.

### 4. Site Information

Appendix C contains a map identifying the location of the site.

#### *Site Description*

- **location – 30 Garden Street and 16 Cottage Place**
- **setting - urban**
- **site size – 0.98 acres**
- **adjacent properties – commercial, residential**

#### *History of Site Use, Investigation, and Cleanup*

- The site was historically occupied by four commercial buildings and one residential building. The combined parcels comprise approximately 0.98 acres of land according to combining the acreage listed on the Tax Roll Assessment for each of the lots. All on-Site buildings were demolished by the Requestors upon acquisition or leasing of the parcels in late 2017. The site historically housed four commercial buildings, one residential building, and asphalt parking lots. The residential parcel was constructed in the early 1990s, with conversion to multiple apartments over the years. The remaining commercial buildings were used as a Kitchen and Bath dealer, warehouses, retail tire and auto repair facility, a gasoline station with tanks that were closed in place in 2000-2001, and various other commercial, retail, and light manufacturing uses. An auto repair facility present for 60 years, former Plastic Works manufacturing and/or Strip-A-Way of New Rochelle, Inc. company present on the site for 20 years were likely

responsible for the volatile organic compound (VOC) vapor and metals soil contamination found to date. The Site is a currently vacant lot. Interstate I-95 lies along the northwesterly border of the site. The Metro North Railroad station is located to the east of the site. There are commercial and residential properties bordering the site to the north and south.

## **5. Investigation and Cleanup Process**

### *Application*

The Applicants have applied for and been accepted into New York's Brownfield Cleanup Program as Volunteers, which means that the Applicants were not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteers must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicants in its Application proposes that the site will be used for residential use. Whether the site can be remediated to Restricted Residential or Unrestricted soil cleanup objectives will be determined after the Remedial Investigation is complete.

To achieve this goal, the Applicant will conduct investigation activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

### *Investigation*

The Applicant will conduct an investigation of the site officially called a "remedial investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

- 1) define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
- 2) identify the source(s) of the contamination;
- 3) assess the impact of the contamination on public health and the environment; and
- 4) provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant submits a draft “Remedial Investigation Work Plan” to NYSDEC for review and approval. NYSDEC makes the draft plan available to the public review during a 30-day public comment period.

When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a “significant threat,” it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

#### *Interim Remedial Measures*

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period. At this site an IRM will be performed to remove some underground storage tanks that were closed in place so that an investigation can be performed under the tanks once removed to determine if the tanks leaked.

#### *Remedy Selection*

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a “Certificate of Completion” (described below) to the Applicant.

**or**

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a “Remedial Work Plan”.

The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

### *Cleanup Action*

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

### *Certificate of Completion*

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

### *Site Management*

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional

control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

## **Appendix A - Project Contacts and Locations of Reports and Information**

### **Project Contacts**

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

#### **New York State Department of Environmental Conservation (NYSDEC):**

Michael Kilmer  
Project Manager  
NYSDEC  
21 South Putt Corners Road  
New Paltz, NY 12561  
Michael.kilmer@dec.ny.gov

Daniel Bendall  
NYSDEC  
21 South Putt Corners  
New Paltz, NY 12561  
Daniel.bendall@dec.ny.gov

#### **New York State Department of Health (NYSDOH):**

Maureen Schuck  
Project Manager  
NYSDOH  
Bureau of Environmental Exposure  
Investigation  
Empire State Plaza  
Corning Tower Room 1787 Albany, NY  
12237  
maureen.schuck@health.ny.gov

### **Locations of Reports and Information**

The facilities identified below are being used to provide the public with convenient access to important project documents:

New Rochelle Public Library  
Tom Geoffino, Director  
1 Library Plaza  
New Rochelle, NY 10801  
Phone: (914) 632-7878

Hours:	
Mon, Tues, Thurs.	9am-8pm
Wednesday	10am-6pm
Friday, Saturday	9am-5pm
Sunday	1pm-5pm



## Appendix B - Site Contact List

<b>Federal &amp; State Government Officials</b>	
<p>Chuck E. Schumer U.S. Senate 780 Third Avenue, Suite 2301 New York, NY 10017</p>	<p>Kirsten Gillibrand U.S. Senate 780 Third Avenue, Suite 2601 New York, NY 10017</p>
<p>Andrea Stewart-Cousins 35th Senate District New York State Senator 28 Wells Avenue, Building #3 Yonkers, NY 10701</p>	<p>Nita Lowery 17th District U.S. House of Representatives 222 Mamaroneck Avenue #312 White Plains, NY 10605</p>
<p>New York State Assemblyperson Amy Paulin 700 White Plains Road, Suite 252 Scarsdale, NY 10583</p>	
<b>Local Government Officials</b>	
<p>George Latimer Westchester County Executive 148 Martine Ave. Room 900 White Plains, NY 10601</p>	<p>Edward Burroughs Westchester County Commissioner of Planning 148 Martine Avenue White Plains, NY 10601</p>
<p>Sarah C. Dodds-Brown New Rochelle Planning Board Chairperson 515 North Avenue New Rochelle, NY 10801</p>	<p>Noam Bramson Mayor of The City of New Rochelle 515 North Avenue New Rochelle, NY 10801</p>
<p>Eileen O'Rourke New Rochelle City Zoning Board of Appeals Chairperson 90 Beaufort Place/City Hall Annex, Rm B1 New Rochelle, NY 10801</p>	
<b>Public Water Supplier</b>	
<p>Westchester Joint Water Works Westchester Public Water Supplier 1625 Mamaroneck Ave Mamaroneck, NY 10543</p>	

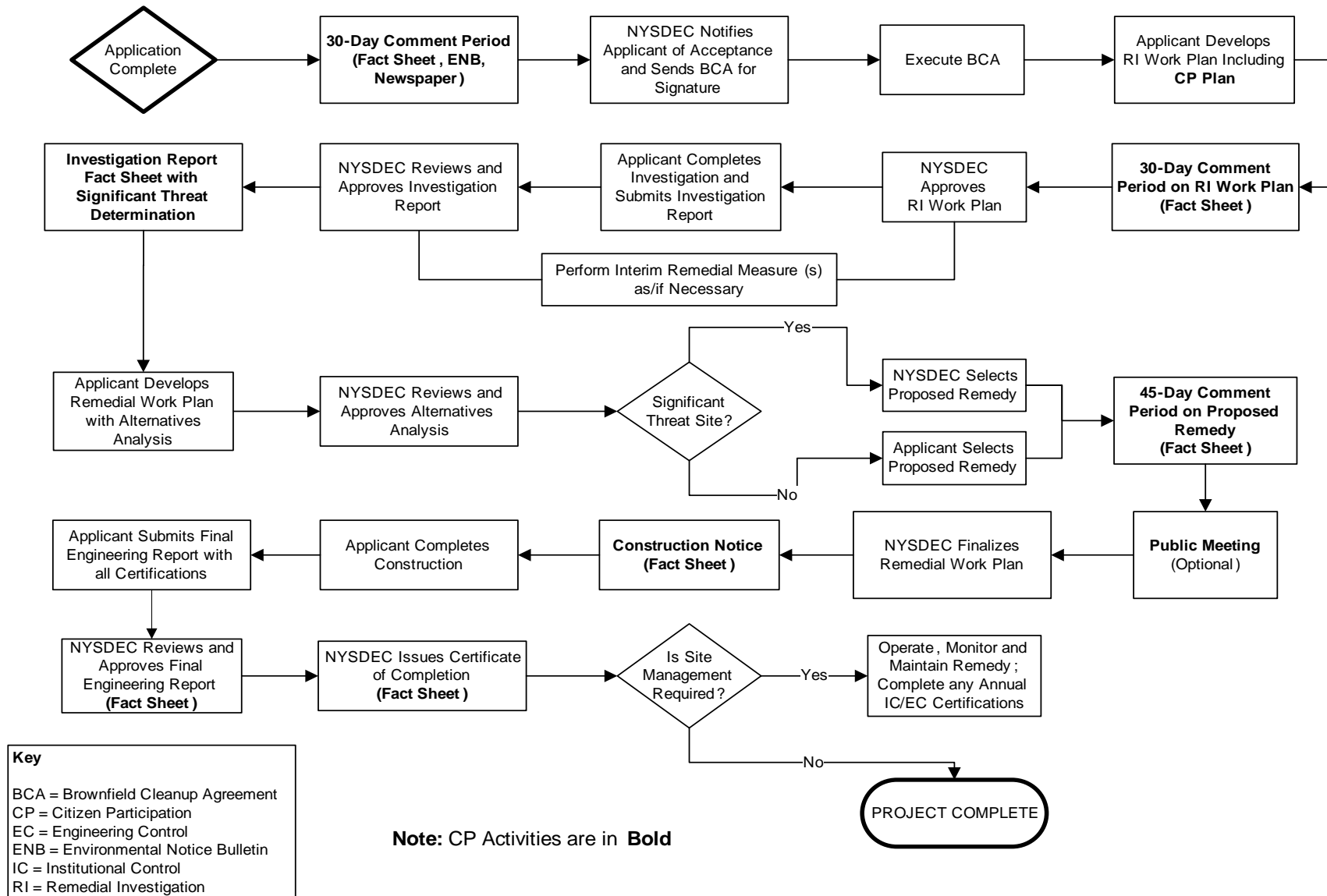
<b>Adjacent Property Owners</b>	
Simba Properties LLC Adjacent Property Owner of 21 Cottage Place 21 Cottage Place New Rochelle, NY 10801	Eagle Auto Sales Adjacent Property Operator of 21 Cottage Place 21 Cottage Place New Rochelle, NY 10801
3 Cottage Place LLC Adjacent Property Operator of 3 Cottage Place 3 Cottage Place New Rochelle, NY 10801	Lexington Center for Recovery Adjacent Property Operator of 3 Cottage Place 3 Cottage Place New Rochelle, NY 10801
Parole Division Adjacent Property Operator of 3 Cottage Place 3 Cottage Place New Rochelle, NY 10801	Thoulton Surgeon Adjacent Property Owner of 1 Cottage Place 1 Cottage Place New Rochelle, NY 10801
ANC Veterinary Center Adjacent Property Operator of 1 Cottage Place 1 Cottage Place New Rochelle, NY 10801	Consolidated Rail Corp. Adjacent Property Owner of North Avenue 54 Meadow Street New Haven, CT 06501
City of New Rochelle Adjacent Property Owner of Garden Street 515 North Avenue New Rochelle, NY 10801	Pebbles Properties 20G Inc Adjacent Property Owner of 20 Garden Street 20 Garden Street New Rochelle, NY 10801
Stina Provisions, Inc. Adjacent Property Operator of 20 Garden Street 20 Garden Street New Rochelle, NY 10801	Tiran Rentals Adjacent Property Operator of 20 Garden Street 20 Garden Street New Rochelle, NY 10801
New York State Adjacent Property Owner of North Avenue and Garden Street 4 Burnett Blvd. Poughkeepsie, NY 12603	David Zucker Adjacent Property Owner of 20 Cottage Place 20 Cottage Place New Rochelle, NY 10801
Dave's Cast of Characters Inc Adjacent Property Operator of 20 Cottage Place 20 Cottage Place	

New Rochelle, NY 10801	
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## Appendix C - Site Location Map



## Appendix D– Brownfield Cleanup Program Process



# Remedial Programs Scoping Sheet for Major Issues of Public Concern



Division of Environmental Remediation

## Remedial Programs Scoping Sheet for Major Issues of Public Concern (see instructions)

**Site Name:** Cottage Garden Auto Repair Site

**Site Number:** C360180

**Site Address and County:** 10 & 16 Cottage Place and 25, 26 & 30 Garden Street, New Rochelle, NY  
Westchester County

**Remedial Party(ies):** The Mark 95 LLC, The Mark 95 II LLC

**Note: For Parts 1. – 3. the individuals, groups, organizations, businesses and units of government identified should be added to the site contact list as appropriate.**

**Part 1.** List major issues of public concern and information the community wants. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and information needs. **Use this information as an aid to prepare or update the Major Issues of Public Concern section of the site Citizen Participation Plan.**

None to date other than standard odor noise and truck traffic impacts during remediation

How were these issues and/or information needs identified?

Standard remediation impacts

**Part 2.** List important information needed **from** the community, if applicable. Identify individuals, groups, organizations, businesses and/or units of government related to the information needed.

None at this time

How were these information needs identified?

Not applicable

**Part 3.** List major issues and information that need to be communicated **to** the community. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and/or information.

CPP and Fact Sheet process should keep community updated

How were these issues and/or information needs identified?

Standard BCP CPP process.

**Part 4.** Identify the following characteristics of the affected/interested community. This knowledge will help to identify and understand issues and information important to the community, and ways to effectively develop and implement the site citizen participation plan (mark all that apply):

**a.** Land use/zoning at and around site:

☒ **Residential**   ☐ **Agricultural**   ☐ **Recreational**   ☒ **Commercial**   ☐ **Industrial**

**b.** Residential type around site:

☒ **Urban**   ☐ **Suburban**   ☐ **Rural**

c. Population density around site:

☒ **High**   ☐ **Medium**   ☐ **Low**

d. Water supply of nearby residences:

☒ **Public**   ☐ **Private Wells**   ☐ **Mixed**

e. Is part or all of the water supply of the affected/interested community currently impacted by the site?

☐ **Yes**   ☒ **No**

Provide details if appropriate:

[Click here to enter text.](#)

f. Other environmental issues significantly impacted/impacting the affected community?

☒ **Yes**   ☐ **No**

Provide details if appropriate:

There are other brownfield sites in the area.

g. Is the site and/or the affected/interested community wholly or partly in an Environmental Justice Area?

☐ **Yes**   ☒ **No**

h. Special considerations:

☐ **Language**   ☐ **Age**   ☐ **Transportation**   ☐ **Other**

Explain any marked categories in h:

[Click here to enter text.](#)

**Part 5.** The site contact list must include, at a minimum, the individuals, groups, and organizations identified in Part 2. of the Citizen Participation Plan under 'Site Contact List'. Are *other* individuals, groups, organizations, and units of government affected by, or interested in, the site, or its remedial program? (Mark and identify all that apply, then adjust the site contact list as appropriate.)

☐ **Non-Adjacent Residents/Property Owners:** [Click here to enter text.](#)

☐ **Local Officials:** [Click here to enter text.](#)

☐ **Media:** [Click here to enter text.](#)

☐ **Business/Commercial Interests:** [Click here to enter text.](#)

☐ **Labor Group(s)/Employees:** [Click here to enter text.](#)

☐ **Indian Nation:** [Click here to enter text.](#)

☐ **Citizens/Community Group(s):** [Click here to enter text.](#)

☐ **Environmental Justice Group(s):** [Click here to enter text.](#)

☐ **Environmental Group(s):** [Click here to enter text.](#)

☐ **Civic Group(s):** [Click here to enter text.](#)

☐ **Recreational Group(s):** [Click here to enter text.](#)

☐ **Other(s):** [Click here to enter text.](#)

**Prepared/Updated By:** Linda Shaw, Esq.

**Date:** 1/21/2019

**Reviewed/Approved By:** [Click here to enter text.](#)

**Date:** [Click here to enter text.](#)