

**140-15 & 140-19 QUEENS BOULEVARD**  
**QUEENS, NEW YORK**

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**Remedial Action Work Plan**

**NYC VCP Number: 14CVCP161Q**  
**E-designation Site number: 13EH-N523Q**

**Prepared for:**  
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**Prepared by:**

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**JULY 2013**

# **REMEDIAL ACTION WORK PLAN**

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## LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CSOP	Contractors Site Operation Plan
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
VCA	Voluntary Cleanup Agreement
NOC	Notice of Completion
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	NYSDEC Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

# CERTIFICATION

I, Ariel Czemerinski, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the Redevelopment Project located at 140-15 & 140-19 Queens Blvd, Queens, NY, VCP Site number 14CVCP161Q and E-Site number 13EH-N523Q.

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

\_\_\_\_\_  
Name

\_\_\_\_\_  
NYS PE License Number

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date



## EXECUTIVE SUMMARY

USAC Towing has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 5,900-ft<sup>2</sup> Site located at 140-15 & 140-19 Queens Boulevard in Queens, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

### Site Location and Current Usage

The Site is located at 140-15 & 140-19 Queens Boulevard in the Jamaica section of Queens, New York, and is identified as Block 9620 and Lots 60 and 61 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 5,900-square feet and is bounded by Block 9260 Lot 1 (a commercial gasoline station), to the north, Block 9620 Lot 59 (multi story commercial building) to the south, Block 9260 Lots 13, 14 and 15 (residential buildings) to the east, and Queens Boulevard, Block 9619 Lot 12 (a commercial building) to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is vacant land.

### Summary of Proposed Redevelopment Plan

The development project consists of redeveloping the lot with a 4-story commercial hotel. The building will cover approximately 65% of the lot and includes a cellar and sub-cellar beneath the footprint of the building. The sub-cellar will be utilized for utility rooms, office space and four hotel units. The cellar level will contain five hotel units, the lobby/reception area, and a lounge. Both the cellar and sub-cellar will have elevator and stair access. The first floor will be comprised entirely of hotel units. The sub-cellar level and foundation will require excavation of 65% of the Site to a total depth of approximately 18 feet below grade. The remaining portions of the lot will be excavated to a depth of 15 feet below grade and completed with a paved rear yard. The site will be equipped with an elevator. Additional excavation of approximately 7 feet below the sub-cellar slab will be need for the elevator pit. Layout of the proposed site development is presented in Figure 3. The current zoning designation is residential (R6A) and commercial (C24). The proposed use is consistent with existing zoning for the property.



## Summary of the Remedy

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs. The footprint of the new building will be excavated to a depth of approximately 18 feet below grade and the remainder of the Site will be excavated to approximately 15 feet below grade for development purposes.
6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.

9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
10. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
11. As part of development, installation of a vapor barrier system below the concrete slab underneath the building, as well as behind foundation walls of the proposed building. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from polyethylene and EVOH resins.
12. As part of development, installation of a passive Sub slab Depressurization System.
13. As part of development, construction and maintenance of an engineered composite cover consisting of 6" thick concrete slab across the footprint of the new building.
14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
16. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.
17. If Track 1 Unrestricted Use SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for maintenance, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency
18. If Track 1 Unrestricted Use SCOs are not achieved, the property will continue to be registered with an E-Designation by the NYC Department of Buildings. Establishment of Engineering Controls and Institutional Controls; a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farmings; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and

(4) higher level of land usage without OER-approval.



## COMMUNITY PROTECTION STATEMENT

The Office of Environmental Remediation created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies that show the location of contamination at the Site, and describes the plans to clean up the Site to protect public health and the environment.

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

**Remedial Investigation and Cleanup Plan.** Under the NYC VCP, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

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

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



addressed under this cleanup plan.

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

**Site Safety Coordinator.** This project has a designated Site Safety Coordinator to implement the Health and Safety Plan. The Site Safety Coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site Safety Coordinator is Mr. Kevin Waters of Environmental Business Consultants. Mr. Waters can be reached at (631) 504-6000.

**Worker Training.** Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains only to workers performing specific tasks including removing hazardous material and installing cleanup systems in contaminated areas.

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

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the on-Site Project Manager, Chawinie Miller at (631) 504-6000 or NYC Office of Environmental Remediation Project Manager, Horace Zhang (212) 788-8484.

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

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

**Hours of Operation.** The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 7:00AM to 6:00PM Monday through Friday.

**Signage.** While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Voluntary Cleanup Program, provides project contact names and numbers, and locations of project documents can be viewed.

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager, Ms. Chawinie Miller (EBC) at (631) 504-6000, the NYC Office of Environmental Remediation Project Manager, Horace Zhang at (212) 788-8484, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

**Stockpile Management.** Soil stockpiles will be kept covered with tarps to prevent dust, odors and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed to protect storm water catch basins and other discharge points.

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

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

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

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

**Truck Routing.** Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total

distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

**Final Report.** The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review in the public document repositories located at the Queens Central Library (89-11 Merrick Blvd, Jamaica).

**Long-Term Site Management.** To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan (if Track 1 cleanup is not achieved) that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC OER. Requirements that the property owner must comply with are established through a city environmental designation. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

# REMEDIAL ACTION WORK PLAN

## 1.0 SITE BACKGROUND

USAC Towing has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 140-15 & 140-19 Queens Boulevard in the Jamaica section of Queens, New York (the Site). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

### 1.1 Site Location and Current Usage

The Site is located at 140-15 & 140-19 Queens Boulevard in the Jamaica section of Queens, New York, and is identified as Block 9620 and Lots 60 and 61 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 5,900-square feet and is bounded by Block 9260 Lot 1 (a commercial gasoline station), to the north, Block 9620 Lot 59 (multi story commercial building) to the south, Block 9260 Lots 13, 14 and 15 (residential buildings) to the east, and Queens Boulevard, Block 9619 Lot 12 (a commercial building) to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is vacant land.

### 1.2 Proposed Redevelopment Plan

The development project consists of redeveloping the lot with a 4-story commercial hotel. The building will cover approximately 65% of the lot and includes a cellar and sub-cellar beneath the footprint of the building. The sub-cellar will be utilized for utility rooms, office space and four hotel units. The cellar level will contain five hotel units, the lobby/reception area, and a lounge. Both the cellar and sub-cellar will have elevator and stair access. The first floor will be comprised entirely of hotel units. The sub-cellar level and foundation will require excavation of



65% of the Site to a total depth of approximately 18 feet below grade. The remaining portions of the lot will be excavated to a depth of 15 feet below grade and completed with a paved rear yard. The site will be equipped with an elevator. Additional excavation of approximately 7 feet below the sub-cellar slab will be need for the elevator pit. Layout of the proposed site development is presented in Figure 3. The current zoning designation is residential (R6A) and commercial (C24). The proposed use is consistent with existing zoning for the property.

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

### 1.3 Description of Surrounding Property

The area surrounding the Site consists of a mix of residential and commercial properties. Figure 4 shows the surrounding land usage of the adjacent properties listed below as well as additional properties located up to 500 feet away from the Site. No hospitals, daycare facilities or schools are located within a 250 ft radius of the Site.

#### Surrounding Property Usage

Direction	Property Description
<b>North</b> – Adjacent property	<u>Block 9620, Lot 1</u> – Developed with a commercial gasoline station.
<b>South</b> – Adjacent property	<u>Block 9620, Lot 59</u> – A commercial multi level building, utilized as office space
<b>East</b> – Adjacent property	<u>Block 9620, Lots 13, 14 and 15</u> – developed with multi level residential buildings
<b>West</b> – Opposite side of Queens Boulevard	<u>Block 9619, Lot 12</u> – Developed with a commercial building occupied by a fast food restaurant (KFC)

Figure 4 shows the surrounding land usage.

### 1.4 Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 140-15 & 140-19 Queens Boulevard, Queens, NY*”, dated July 2013 (RIR).

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

EBC was able to establish a history for the property dating back to 1901. From approximately 1901 to 1911, the site was developed with vacant land. In 1911, the site is developed with a portion of a wagon shed (140-15) and a two-story residential building (140-19). In 1925, the site is vacant land (140-15) and a two-story residential building (140-19). From approximately 1935 to 1951 the site was developed with a single story commercial building occupied by a glass storage company (140-15) and a two-story residential building (140-19). From 1963 to 1967 the site is developed with one single-story commercial building occupied by an auto repair facility (140-15) and a two story residential building (140-19). From 1981 to 2004, the site is developed with one commercial building, occupied by an auto repair facility (140-15) and vacant land (140-19). From 2005 to present, the site was vacant land (140-15 & 140-19). Commercial tenants for 140-15 Queens Boulevard include; Green Glass Co, N & T Auto Body, Kamborian VD Co Rug Cleaning, R & P Auto Finance Outlet and Steel Brother Fredrick and William Steel Electric Contractors. Based on the former occupancy of the site as an auto repair facility, and the use of petroleum and solvent based products during operations, this represents an AOC.

The site adjacent to the north, Mobile gasoline station, is located at 138-50 Hillside Avenue and is hydraulically cross gradient from the site. According to the regulatory database, this site was identified as a NY Spills site five (5) times. Four (4) of these releases have received closure from the NYSDEC. However one (1) release remains open. On May 6, 2001 a release of gasoline occurred, due to tank overfill. The spill number associated with this release is 0101410 and its status is currently open. According to the regulatory database, a release occurred due to tank over fill. The DEC memo notes that several rounds of chemical injections and quarterly sampling have been taking place since September 9, 2009. As of November 23, 2012, data shows no reduction in groundwater contamination concentrations. A pilot study and installation of AS/SVE system is planned for early 2013. No further information regarding this release was available from the regulatory database. Based on the current status of the release, current remedial action taking place and proximity to the site, this release represents an AOC.

The AOCs identified for this Site include:

1. Historic use of the Site as an automotive repair facility.
2. Property adjacent to the north Mobile Gasoline Station with open SPILLS # 0101410.
3. Historic fill layer is present at the Site from grade to depths as great as 2 feet below grade.

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

USAC Towing performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed six soil borings across the entire project Site, and collected twelve soil samples and one duplicate soil sample for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three groundwater monitoring wells throughout the Site to establish groundwater flow and collected three groundwater samples and one duplicate groundwater sample for chemical analysis to evaluate groundwater quality; and
4. Installed four soil vapor probes around Site perimeter and collected four samples for chemical analysis.

### **Summary of Environmental Findings**

1. Elevation of the property ranges from 56 to 58 feet.
2. Depth to groundwater ranges from 35.05 to 36.58 feet at the Site.
3. Groundwater flow is generally from south to northwest beneath the Site.
4. Depth to bedrock at the Site is greater than 100 feet.
5. The stratigraphy of the Site, from the surface down, consists of two feet of historic fill underlain by brown native silty sand.
6. Soil/fill samples collected during the RI showed no PCBs detected above Unrestricted Use SCOs. One VOC, acetone, was detected above Unrestricted Use SCOs in one of the

six deep soil samples at a concentration of 71 µg/Kg. No other VOCs were detected in any of the other 11 soil samples. Several SVOCs were detected in soil samples and none exceeded Unrestricted Use SCOs. Three pesticides were detected in four of the six shallow samples above Unrestricted Use SCOs and include 4,4' -DDD (maximum concentrations of 3.6 µg/Kg) 4,4' -DDE (maximum concentrations of 6 µg/Kg) and 4,4' -DDT (maximum concentration of 11 µg/Kg). Chlordane was also detected at a maximum concentration of 232 µg/Kg. Two metals, including lead (maximum of 232 mg/Kg) and zinc (maximum of 352 mg/Kg) were detected above the UUSCOs in three of the six shallow samples. No VOCs, with the exception of acetone, SVOCs, pesticides, PCBs or metals were detected in any of the 6 deep soil samples collected on-site. Findings of the RI were unremarkable and did not show an onsite contaminant source and were consistent with observations for historical fill sites in areas throughout NYC.

7. Groundwater samples collected during the RI showed no pesticides. One VOC, butylbenzene was detected at trace levels in one well, below the New York State 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). One SVOC, benzo(a)anthracene (maximum concentration 0.02 µg/L), was detected in two wells above GQS. One PCB, PCB-1248 (0.096 µg/L) was detected in the duplicate sample above GQS. Four metals including iron (maximum concentration of 1.79 mg/L), magnesium (maximum concentration of 52 mg/L), manganese (maximum concentration of 15 mg/L) and sodium (maximum concentration of 169 mg/L) were detected in the three wells above GQS.
  
8. Soil vapor samples collected during the RI detected several petroleum related and chlorinated VOCs. Total concentrations of petroleum-related VOCs (BTEX) ranged from 4.82 µg/m<sup>3</sup> to 108 µg/m<sup>3</sup>. Acetone was detected at a highest concentration of 216 µg/m<sup>3</sup> and ethanol was detected at a maximum concentration of 322 µg/m<sup>3</sup>. Chlorinated VOCs including tetrachloroethene (PCE) was detected in all soil vapor samples at a maximum concentration of 258 µg/m<sup>3</sup>. Carbon tetrachloride was also detected in all samples at a maximum concentration of 1.07 µg/m<sup>3</sup>. Trichloroethene (TCE) was detected in all four soil vapor samples at a maximum concentration of 5.42 µg/m<sup>3</sup> and 1,1,1-

Trichloroethane (TCA) was detected in one soil vapor sample at a concentration of 1.14  $\mu\text{g}/\text{m}^3$ . The PCE and TCE concentrations were above the monitoring level ranges established within the State DOH soil vapor guidance matrix. TCA and carbon tetrachloride were below the monitoring level ranges established within the State DOH soil vapor guidance matrix.

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

## 2.0 REMEDIAL ACTION OBJECTIVES

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

### Groundwater

- Prevent direct exposure to contaminated groundwater.

### Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater contamination.

### Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

### **3.0 REMEDIAL ALTERNATIVES ANALYSIS**

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

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

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

#### **Alternative 1 involves:**

- Establishment of Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs has been achieved with post-excavation endpoint sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would require excavation across the entire Site to a depth of approximately to 2 feet to removal all historic fill. Excavation for construction of the new building's subceller/cellar level would take place to a depth of approximately 18 feet for

65% of the Site with the remaining portions being excavated to a depth of 15 feet for the rear paved yard. The site will be equipped with an elevator. Additional excavation of approximately 7 feet below the sub-cellar slab will be need for the elevator pit. If soil/fill containing analytes at concentrations above Unrestricted Use SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building's cellar level is complete, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs.

- No Engineering or Institutional Controls are required for a Track 1 cleanup, but a vapor barrier would be installed beneath the basement foundation and behind foundation sidewalls of the new building as a part of development to prevent any potential future exposures from off-Site soil vapor.
- Installation of a passive Sub Slab Depressurization system as part of new construction.
- Placement of a final cover over the entire Site as part of new development.

#### **Alternative 2 involves**

- Establishment of Track 4 Site-Specific SCOs.
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-Specific SCOs have been achieved with post-excavation endpoint sampling. Excavation for construction of the new building's cellar level would take place to a depth of approximately 18 feet for footprint of the new building and to a depth of 15 feet for the rear paved yard. The site will be equipped with an elevator. Additional excavation of approximately 7 feet below the sub-cellar slab will be need for the elevator pit. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs.
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a soil vapor barrier system beneath the building slab and along foundation side walls to prevent any potential future exposures from off-Site soil vapor;

- Installation of a passive Sub Slab Depressurization system.
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended; and
- Continued registration as an E-designated property to memorialize the remedial action and the Engineering and Institutional Controls required by the RAWP.

### **3.1 Threshold Criteria**

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

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

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

**Alternative 2** would achieve comparable protections of human health and the environment by excavating the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCOs, as well as by placement of Institutional and Engineering controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching

into groundwater.

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil/Materials Management Plan and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier below the new building's basement slab and continuing the vapor barrier around foundation walls.

### **3.2. Balancing Criteria**

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

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

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Groundwater Protection Standards. Compliance with SCGs for soil vapor would also be achieved by installing a SSDS and a vapor barrier system below the new building's basement slab and continuing the vapor barrier around foundation walls, as part of development.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a SSDS and a vapor barrier below the new building's basement slab and continuing the vapor barrier around foundation walls. A Site Management Plan would ensure that these controls remained protective for the long term.

Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) that comply with the applicable SCGs shall be implemented during Site redevelopment under this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

### **Short-term effectiveness and impacts**

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

Both alternatives 1 and 2 have similar short-term effectiveness during their respective implementations, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short term impacts could potentially be higher for Alternative 1 if excavation of greater amounts of historical fill material is encountered below the excavation depth of the proposed building. However, focused attention to means and methods during the remedial action during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of these activities.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 232, 25-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

The effects of these potential adverse impacts to the community, workers and the environment will be minimized through implementation of corresponding control plans including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short term effectiveness in protecting the surrounding community by decreasing the risk of

contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) would be protected from on-Site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones).

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

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

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill and enabling unrestricted usage of the property.

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

Both alternatives would result in removal of soil contamination exceeding the SCOs providing the highest level, most effective and permanent remedy over the long-term with respect to a remedy for contaminated soil, which would eliminate any migration to groundwater. Potential sources of soil vapor and groundwater contamination would also be eliminated as part of the

remedy.

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

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 - Unrestricted Use SCOs.

Alternative 2 would remove most of the historic fill at the Site, and any remaining on-Site soil beneath the new building will meet Track 4 - Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on Site.

The removal of soil from 15 to 18 feet for the new development in both scenarios would probably result in relatively minor differences between these two alternatives.

### **Implementability**

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

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

### **Cost effectiveness**

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Since historic fill at the Site was only found during the RI to extend to a depth of up to 2 feet below grade, and the new building requires excavation of 65% of the Site to 18 feet and the remainder of the Site to 15ft, the costs associated with both Alternative 1 and Alternative 2 will likely be the comparable.

Costs associated with Alternative 1 could potentially be higher than Alternative 2 if soil with analytes above Unrestricted Use SCOs is encountered below the excavation depth required for new development. Additional costs would include installation of additional shoring/underpinning, disposal of additional soil, and import of clean soil for backfill. However, long-term costs for Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

The remedial plan creates an approach that combines the remedial action with the redevelopment of the Site, including the construction of the building foundation and subgrade structures. The remedial plan is also cost effective in that it will take into consideration the selection of the closest and most appropriate disposal facilities to reduce transportation and disposal costs during the excavation of historic fill and other soils during the redevelopment of the Site.

### **Community Acceptance**

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

Based on the overall goals of the remedial program and initial permitting associated with the proposed site development, no adverse community opinion is anticipated for either alternative. This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Attachment B.

### **Land use**

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

The proposed redevelopment of the Site is compatible with its current zoning and is consistent with recent development patterns. Following remediation, the Site will meet either Track 1 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are appropriate for its planned residential use. Improvements in the current environmental condition of the property achieved by both alternatives are also consistent with the City's goals for cleanup of contaminated land and bringing such properties into productive reuse. Both alternatives are equally protective of natural resources and cultural resources.

### **Sustainability of the Remedial Action**

This criterion evaluates the overall sustainability of the remedial action alternatives and the

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

Both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. New York City Clean Soil Bank program may be utilized for reuse of native soils. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix D.

## **4.0 REMEDIAL ACTION**

### **4.1 Summary of Preferred Remedial Action**

The preferred remedial action alternative is the Track 1 Alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs. 65% of the property will be excavated to a depth of approximately 18 feet below grade and the remainder of the Site will be excavated to approximately 15 feet below grade for development purposes.
6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal,

- and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
  10. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
  11. As part of development, installation of a vapor barrier system below the concrete slab underneath the building, as well as behind foundation walls of the proposed building. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from polyethylene and EVOH resins.
  12. As part of development, installation of a passive Sub slab Depressurization System.
  13. As part of development, construction and maintenance of an engineered composite cover consisting of 6" thick concrete slab across the footprint of the new building.
  14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
  15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
  16. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.
  17. If Track 1 Unrestricted Use SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency
  18. If Track 1 Unrestricted Use SCOs are not achieved, the property will continue to be registered with an E-Designation at the NYC Department of Buildings. Establishment of Engineering Controls and Institutional Controls; a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will

include prohibition of the following: (1) vegetable gardening and farmings; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

#### 4.2 Soil Cleanup Objectives and Soil/Fill Management

Track 1 Soil Cleanup Objectives (SCOs) are proposed for this project. The SCOs for this Site are listed in Table 1. If Track 1 is not achieved, the following Track 4 Site-Specific SCOs will be used:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	250 ppm
Lead	800 ppm
Zinc	Residential SCO (2,200 ppm)

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Attachment D. The location of planned excavations is shown in Figure 5.

No over-excavation beyond the development cut is anticipated. If any hot-spot areas are identified during development and remediation at the Site, they will be removed to the extent practical.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

#### Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed off-Site is 5,796 tons.

Disposal location(s) will be reported promptly to the OER Project Manager prior to the start of the remedial action.

#### End-Point Sampling

Removal actions under this plan will be performed in conjunction with remedial end-point sampling. The RI provided endpoint data that met Track 4 - Site Specific SCOs at the 8 to 10 feet

interval. Additional post-excavation end-point sampling and testing will be performed promptly following materials removal and completed prior to Site development activities. To evaluate attainment of Track 1 - Site-Specific SCOs, six post excavation soil samples will be collected and analyzed for pesticides and Metals (lead and zinc). The approximate collection location of the endpoint soil samples is shown on Figure 6.

In addition, if hotspots are encountered, hotspot removal end-point sampling frequency will consist of the following:

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

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

New York State ELAP certified labs will be used for all end-point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be analyzed for trigger analytes (those for which SCO exceedence is identified) utilizing the following methodology:

Soil analytical methods will include:

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

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and required regulatory reporting (i.e. spills hotline) will be performed.

### **Quality Assurance/Quality Control**

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or “cold-paks” to maintain a temperature of 4°C.

Dedicated disposable sampling materials will be used for the collection endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash withalconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. Trip blanks will not be used for samples to be analyzed for metals, SVOCs or pesticides. One blind duplicate sample will be prepared and submitted for analysis every 20 samples.

### **Import and Reuse of Soils**

Import of soils onto the property and reuse of soils already on-Site will be performed in conformance with the Soil/Materials Management Plan in Attachment D. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 0 tons. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is 0 tons.

### **4.3 Engineering Controls**

The excavation required for the proposed Site development will achieve Track 1 Unrestricted Use SCOs. No engineering controls are required to address residual contamination at the Site. However, the following elements will be incorporated into the foundation design as part of the development: (1) composite cover system; and (2) vapor barrier system. If Track 1 is not achieved, these two elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

### **Composite Cover System**

As part of new development, the entire property will be covered by an engineered permanent cover system. This cover system will be comprised of a 6 inch thick concrete-building slab beneath the area of the proposed building.

If Track 1 SCO's are not achieved at the Site, the composite cover system will be a permanent engineering control to address residual soils. Under Alternative 2, the composite cover system

will serve as a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR.

Figure 5 shows the typical design for each remedial cover type used on this Site.

### **Vapor Barrier**

As part of development, migration of potential soil vapor from offsite in the future will be achieved with a combination of building slab and vapor barrier and a passive SSDS. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins. The vapor barrier will be installed prior to pouring the building's concrete slab. The vapor barrier will extend throughout the area occupied by the footprint of the new building and up the foundation sidewalls in accordance with manufacturer specifications. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The extent of the proposed vapor barrier membrane is provided in Figure 8. Installation details (penetrations, joints, etc.) with respect to the proposed building foundation, footings, slab, and sidewalls are provided in Figure 8. Product specification sheets are provided in Attachment E. The Remedial Closure Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturers certificate of warranty.

### **Passive Sub-Slab Depressurization System**

A passive sub-slab depressurization system will be installed beneath the footprint of the new building slab to address residual soil vapors.

Migration of soil vapor beneath the building will be mitigated with the construction of a passive sub-slab depressurization system. The SSDS will consist of one loop installed within porous granular material beneath the basement foundation. The loop will provide the correct coverage in accordance with USEPA sub-slab depressurization design specifications which recommend a separate vent loop for every 4,000 ft<sup>2</sup> of slab area. The loop will be outfitted with a collection point and riser. The riser will be placed at a minimum distance of 15ft from all air intakes. The layout plan for the SSDS system is provided as Figure 8. Details of the SSD system are provided in Figure 9.

#### **4.4 Institutional Controls**

Institutional Controls are not required on sites that achieve Track 1 Remedial Action. If Track 1 Unrestricted Use SCOs are not achieved, Institutional Controls (IC) will be utilized in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR.

Institutional Controls for this remedial action are:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Site Management Plan approved by OER that provides procedures for appropriate operation, maintenance, inspection, and certification of ECs and IC's. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to

protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determined by OER in the SMP and will comply with RCNY §43-1407(1)(3).

- Vegetable gardens and farming on the Site are prohibited;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

#### **4.5 Site Management Plan**

Site Management is not required on sites that achieve Track 1 Remedial Actions. However, if Track 1 Unrestricted Use SCOs are not achieved, site management will be performed and will be the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The SMP describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all site management responsibilities defined in the SMP are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) reporting.

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

submission to OER by July 31 of the year following the reporting period.

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

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA).

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

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

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

Historic fill material is present at the Site from grade to approximately 2 feet below grade. Based on the results of the Remedial Investigation Report, the contaminants of concern found are:

##### Soil

- Several SVOCs were identified but did not exceed Track 1 Unrestricted Use SCOs;
- Metals, including lead and zinc exceeding Track 1 Unrestricted Use SCOs; and
- Pesticides, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT and chlordane were identified but did not exceed Restricted Residential SCOs.

##### Groundwater

- One SVOC, benzo(a)anthracene detected below GQS;
- Metals including iron, magnesium, sodium and manganese exceeding GQSs;

#### Soil vapor

- Chlorinated VOCs including PCE and TCE were detected above NYSDOH monitoring thresholds;
- Acetone and ethanol at moderate levels; and
- Petroleum VOCs detected at low concentrations including benzene, toluene, ethylbenzene and xylenes.

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

Metals and pesticides are present in the historic fill materials throughout the Site. One SVOC found in soil was also detected in groundwater samples at a concentration above its respective GQSs. Pesticides were detected in four shallow samples. Dissolved metals including iron, magnesium, manganese, and sodium were detected above GQS. The chlorinated VOCs including PCE and TCE in soil vapor were detected above monitoring thresholds established by New York State DOHPCE and TCE were not found in any of the on-Site soil or groundwater samples collected.

#### **Receptor Populations**

On-Site Receptors – The Site is currently vacant and uncapped. Access to Site is restricted by an 8 foot high, chained and locked, perimeter fence. Onsite receptors are limited to trespassers and site representatives and visitors granted access to the property. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents, workers and visitors.

Off-Site Receptors - Potential off-Site receptors within a 0.25-mile radius of the Site include: adult and child residents, and commercial and construction workers, pedestrians, trespassers, and cyclists, based on the following:

1. Commercial Businesses (up to 0.25 mile) – existing and future
2. Residential Buildings (up to 0.25 mile) – existing and future

3. Building Construction/Renovation (up to 0.25 mile) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to .25 mile) – existing and future
5. Schools (up to .25 mile) – existing and future

### **Potential Routes of Exposure**

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of water, fill, or soil;
- Inhalation of vapors and particulates; and
- Dermal contact with water, fill, soil, or building materials

### **Existence of Human Health Exposure**

Current Conditions: The potential for exposure to surficial historic fill exists under current conditions but is limited due the 8 foot high chained and lock perimeter fence. Groundwater is marginally contaminated but is not exposed at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site and there is no potential for exposure. As there is currently no structure onsite, accumulation of soil vapor cannot pose an exposure threat.

Construction/ Remediation Activities: Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils and groundwater, as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with any exposed impacted soil, and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. During

construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan, dust controls, and through the implementation of the Community Air-Monitoring Program and a Construction Health and Safety Plan.

Proposed Future Conditions: Under future remediated conditions, all soils in excess of Track 1 SCOs will be removed. The Site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and a vapor barrier system will prevent any exposure to potential off site soil vapors in the future. The Site is served by a public water supply, and groundwater is not used at the Site for potable supply. There are no plausible off-Site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

### **Overall Human Health Exposure Assessment**

There are potential complete exposure pathways for the current site condition. There is a potential complete, exposure pathway that requires mitigation during implementation of the remedy. There is no complete exposure pathway under future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide impervious surface cover cap, and a subsurface vapor barrier system for the building. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

Based upon this analysis, complete on-Site exposure pathways appear to be present only during the current unremediated phase and the remedial action phase. Under current conditions, on-Site exposure pathways exist for those given access to the Site or trespassers. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill, as all soil above Unrestricted Use SCOs will have been removed and a vapor barrier

system will have been installed as part of development.

## **5.0 REMEDIAL ACTION MANAGEMENT**

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

Principal personnel who will participate in the remedial action include Chawinie Miller, Project Manager-EBC and Kevin Waters, Field Operations Officer-EBC. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Ariel Czemerinski P.E., AMC Engineering and Charles Sosik P.G. EBC.

### **5.2 Site Security**

Site access will be controlled by a chain link or wooden construction fence, which will surround the property.

### **5.3 Work Hours**

The hours for operation of remedial construction will be from 7:00AM to 6:00PM. These hours conform to the New York City Department of Buildings construction code requirements.

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

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be Kevin Waters - EBC. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

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

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed.

Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

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

### **5.5 Community Air Monitoring Plan**

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

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

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

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work.

Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

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

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

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In

addition, fugitive dust migration should be visually assessed during all work activities.

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

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

## **5.6 Agency Approvals**

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

## **5.7 Site Preparation**

### **Pre-Construction Meeting**

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

### **Mobilization**

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

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

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

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

### **Dewatering**

Groundwater is 35 feet deep. Excavations of 18 feet are required for new development. Site dewatering is not necessary.

In the event that dewatering of groundwater during construction will be necessary, the water will be disposed into the New York City combined sanitary/storm sewer system. A permit to discharge will be obtained from the New York City Department of Environmental Protection (NYCDEP). As part of the permit to discharge, the location of discharge will be based on the Site-Specific requirements of the DEP. The need for pretreatment will be determined by DEP's requirements for the discharge permit. If pretreatment is required by the DEP, it will be performed in accordance with the requirements of the DEP.

### **Equipment and Material Staging**

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations. Staging locations will be reported to OER prior to the start of the remedial

action.

### **Stabilized Construction Entrance**

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

### **Truck Inspection Station**

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

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

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

### **Storm Preparedness**

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from holes, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and

fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, haybales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

### **Storm Response**

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Storm-water control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off-Site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If on-Site petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should

be stopped it this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

### **Storm Response Reporting**

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

### **5.8 Traffic Control**

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

- a) Continue North on Queens Boulevard to Hillside Avenue
- b) Turn Left on Hillside Avenue
- c) Follow the signs for I-678 (Van Wyck Expressway) North or South

### **5.9 Demobilization**

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been

disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);

- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

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

## **5.10 Reporting and Record Keeping**

### **Daily Reports**

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

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

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

will be included as an Appendix in the Remedial Action Report.

### **Record Keeping and Photo-Documentation**

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

### **5.11 Complaint Management**

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

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

All changes to the RAWP will be reported to the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

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

## 6.0 REMEDIAL ACTION REPORT

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

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan;
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Continue registration of the property with an E-Designation at the NYC Department of Buildings.
- Reports and supporting material will be submitted in digital form.

## **Remedial Action Report Certification**

The following certification will appear in front of the Executive Summary of the Remedial Action Report. The certification will include the following statements:

*I, \_\_\_\_\_, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the Site name Site Site number.*

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

## 7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 6 month remediation period is anticipated.

<b>Schedule Milestone</b>	<b>Weeks from Remedial Action Start</b>	<b>Duration (weeks)</b>
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	1	1
Remedial Excavation	2	6
Demobilization	10	1
Submit Remedial Action Report	20	-

## **ATTACHMENT B**

### **CITIZEN PARTICIPATION PLAN**

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

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



**Repositories.** A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. USAC Towing will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Repository Name: Queens Central Library

Repository Address: 89-11 Merrick Boulevard, Jamaica, NY 11432

Repository Telephone Number: 718-990-0700

Repository Hours of Operation:

Mon	9:00 AM - 9:00 PM
Tue	1:00 PM - 9:00 PM
Wed	9:00 AM - 9:00 PM
Thu	9:00 AM - 9:00 PM
Fri	9:00 AM - 7:00 PM
Sat	9:00 AM - 7:00 PM
Sun	12:00 AM - 5:00 PM

**Digital Documentation.** NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

**Identify Issues of Public Concern.** The major issues of concern to the public will be potential impacts of nuisance odors and dust during the disturbance of historic fill soils at the Site. This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to

monitor the potential for exposure including a Construction Health and Safety Plan and a Community Air Monitoring Plan are required components of the remedial program. Implementation of these plans will be under the direct oversight of the New York City Department of Environmental Remediation (NYCOER).

These plans will specify the following worker and community health and safety activities during remedial activity at the Site:

- On-Site air monitoring for worker protection,
- Perimeter air monitoring for community protection.

The Health and Safety Plan and the Community Air Monitoring Plan prepared as part of the Remedial Action Work Plan will be available for public review at the document repository.

**Public Notice and Public Comment.** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by USAC Towing, reviewed and approved by OER prior to distribution and mailed by USAC Towing. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

**Citizen Participation Milestones.** Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial

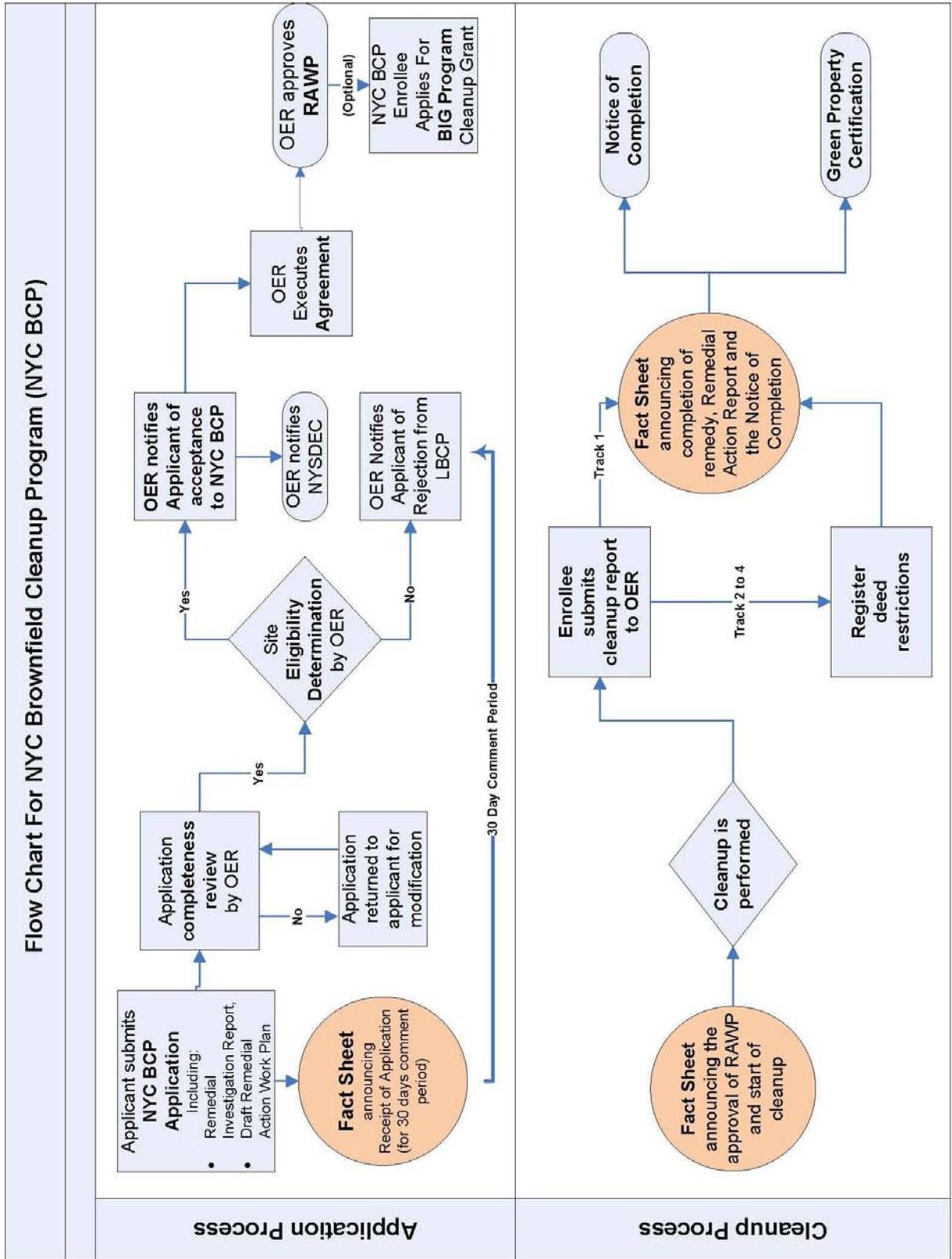
Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion



## ATTACHMENT C SUSTAINABILITY STATEMENT

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

**Reuse of Clean, Recyclable Materials.** Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

This project intends to use recycled concrete aggregate wherever possible in grading and backfilling the Site. An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

**Reduce Consumption of Virgin and Non-Renewable Resources.** Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

The project will reduce the consumption of virgin materials by substituting recycled concrete aggregate for mined gravel and/or sand backfill whenever possible. An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

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

Recycled concrete materials and other backfill materials will be locally sourced reducing the energy consumption associated with transporting these materials to the Site. Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.



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

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

## **ATTACHMENT D**

### **SOIL/MATERIALS MANAGEMENT PLAN**

#### **1.1 SOIL SCREENING METHODS**

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

#### **1.2 STOCKPILE METHODS**

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

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

#### **1.3 CHARACTERIZATION OF EXCAVATED MATERIALS**

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

#### **1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE**

The PE/QEP overseeing the remedial action will:

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

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

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

#### **1.5 OFF-SITE MATERIALS TRANSPORT**

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

Outbound truck transport routes are the following:

- a) Continue North on Queens Boulevard to Hillside Avenue
- b) Turn Left on Hillside Avenue
- c) Follow the signs for I-678 (Van Wyck Expressway) North or South

This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

## **1.6 MATERIALS DISPOSAL OFF-SITE**

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

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

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be

disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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

## **1.7 MATERIALS REUSE ON-SITE**

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in Table 1. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

## **1.8 DEMARCATION**

After completion of hotspot removal and any other invasive remedial activities, and prior to

backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

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

## **1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES**

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in Table 1.

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

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

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;

- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

### **Source Screening and Testing**

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

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

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

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

## **1.10 FLUIDS MANAGEMENT**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported

and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

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

### **1.11 STORM-WATER POLLUTION PREVENTION**

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

### **1.12 CONTINGENCY PLAN**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's

Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

### **1.13 ODOR, DUST AND NUISANCE CONTROL**

#### **Odor Control**

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

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

#### **Dust Control**

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

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

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will

not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

**Other Nuisances**

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

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

# **TABLES**

**TABLE 1**  
**Soil Cleanup Objectives**

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
<b>METALS</b>							
Arsenic	7440-38 -2	16 <sub>f</sub>	16 <sub>f</sub>	16 <sub>f</sub>	16 <sub>f</sub>	13 <sub>f</sub>	16 <sub>f</sub>
Barium	7440-39 -3	350 <sub>f</sub>	400	400	10,000 <sub>d</sub>	433	820
Beryllium	7440-41 -7	14	72	590	2,700	10	47
Cadmium	7440-43 -9	2.5 <sub>f</sub>	4.3	9.3	60	4	7.5
Chromium, hexavalent <sup>h</sup>	18540-29-9	22	110	400	800	1 <sub>e</sub>	19
Chromium, trivalent <sup>h</sup>	16065-83-1	36	180	1,500	6,800	41	NS
Copper	7440-50 -8	270	270	270	10,000 <sub>d</sub>	50	1,720
Total Cyanide <sup>h</sup>		27	27	27	10,000 <sub>d</sub>	NS	40
Lead	7439-92 -1	400	400	1,000	3,900	63 <sub>f</sub>	450
Manganese	7439-96 -5	2,000 <sub>f</sub>	2,000 <sub>f</sub>	10,000 <sub>d</sub>	10,000 <sub>d</sub>	1600 <sub>f</sub>	2,000 <sub>f</sub>
Total Mercury		0.81 <sub>j</sub>	0.81 <sub>j</sub>	2.8 <sub>j</sub>	5.7 <sub>j</sub>	0.18 <sub>f</sub>	0.73
Nickel	7440-02 -0	140	310	310	10,000 <sub>d</sub>	30	130
Selenium	7782-49 -2	36	180	1,500	6,800	3.9 <sub>f</sub>	4 <sub>f</sub>
Silver	7440-22 -4	36	180	1,500	6,800	2	8.3
Zinc	7440-66 -6	2200	10,000 <sub>d</sub>	10,000 <sub>d</sub>	10,000 <sub>d</sub>	109 <sub>f</sub>	2,480
<b>PESTICIDES / PCBs</b>							
2,4,5-TP Acid (Silvex)	93-72-1	58	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	3.8
4,4'-DDE	72-55-9	1.8	8.9	62	120	0.0033 <sub>e</sub>	17
4,4'-DDT	50-29-3	1.7	7.9	47	94	0.0033 <sub>e</sub>	136
4,4'-DDD	72-54-8	2.6	13	92	180	0.0033 <sub>e</sub>	14
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04 <sub>g</sub>	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	5103-71 -9	0.91	4.2	24	47	1.3	2.9
delta-BHC	319-86-8	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	0.04 <sub>g</sub>	0.25
Dibenzofuran	132-64-9	14	59	350	1,000 <sub>c</sub>	NS	210
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	959-98-8	4.8 <sub>i</sub>	24 <sub>i</sub>	200 <sub>i</sub>	920 <sub>i</sub>	NS	102
Endosulfan II	33213-65-9	4.8 <sub>i</sub>	24 <sub>i</sub>	200 <sub>i</sub>	920 <sub>i</sub>	NS	102
Endosulfan sulfate	1031-07 -8	4.8 <sub>i</sub>	24 <sub>i</sub>	200 <sub>i</sub>	920 <sub>i</sub>	NS	1,000 <sub>c</sub>
Endrin	72-20-8	2.2	11	89	410	0.014	0.06
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	1336-36 -3	1	1	1	25	1	3.2
<b>SEMI-VOLATILES</b>							
Acenaphthene	83-32-9	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	20	98
Acenaphthylene	208-96-8	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	107
Anthracene	120-12-7	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	1,000 <sub>c</sub>
Benz(a)anthracene	56-55-3	1 <sub>f</sub>	1 <sub>f</sub>	5.6	11	NS	1 <sub>f</sub>
Benzo(a)pyrene	50-32-8	1 <sub>f</sub>	1 <sub>f</sub>	1 <sub>f</sub>	1.1	2.6	22
Benzo(b) fluoranthene	205-99-2	1 <sub>f</sub>	1 <sub>f</sub>	5.6	11	NS	1.7
Benzo(g,h,i) perylene	191-24-2	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	1,000 <sub>c</sub>
Benzo(k) fluoranthene	207-08-9	1	3.9	56	110	NS	1.7
Chrysene	218-01-9	1 <sub>f</sub>	3.9	56	110	NS	1 <sub>f</sub>
Dibenz(a,h) anthracene	53-70-3	0.33 <sub>e</sub>	0.33 <sub>e</sub>	0.56	1.1	NS	1,000 <sub>c</sub>
Fluoranthene	206-44-0	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	1,000 <sub>c</sub>
Fluorene	86-73-7	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	30	386
Indeno(1,2,3-cd) pyrene	193-39-5	0.5 <sub>f</sub>	0.5 <sub>f</sub>	5.6	11	NS	8.2
m-Cresol	108-39-4	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	0.33 <sub>e</sub>
Naphthalene	91-20-3	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	12
o-Cresol	95-48-7	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	0.33 <sub>e</sub>
p-Cresol	106-44-5	34	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	0.33 <sub>e</sub>
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8 <sub>e</sub>	0.8 <sub>e</sub>
Phenanthrene	85-01-8	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	1,000 <sub>c</sub>
Phenol	108-95-2	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	30	0.33 <sub>e</sub>
Pyrene	129-00-0	100 <sub>a</sub>	100 <sub>a</sub>	500 <sub>b</sub>	1,000 <sub>c</sub>	NS	1,000 <sub>c</sub>

**TABLE 1**  
**Soil Cleanup Objectives**

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
<b>VOLATILES</b>							
1,1,1-Trichloroethane	71-55-6	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	0.33
1,2-Dichlorobenzene	95-50-1	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02 <sup>d</sup>
cis-1,2-Dichloroethene	156-59-2	59	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	0.25
trans-1,2-Dichloroethene	156-60-5	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1 <sup>e</sup>	0.1 <sup>e</sup>
Acetone	67-64-1	100 <sup>a</sup>	100 <sup>b</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	2.2	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06
Butylbenzene	104-51-8	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	40	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1
Hexachlorobenzene	118-74-1	0.33 <sup>e</sup>	1.2	6	12	NS	3.2
Methyl ethyl ketone	78-93-3	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	100 <sup>a</sup>	0.12
Methyl tert-butyl ether	1634-04 -4	62	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	0.93
Methylene chloride	75-09-2	51	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	12	0.05
n-Propylbenzene	103-65-1	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	3.9
sec-Butylbenzene	135-98-8	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	11
tert-Butylbenzene	98-06-6	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	NS	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3
Toluene	108-88-3	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	36	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6
1,3,5-Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20 -7	100 <sup>a</sup>	100 <sup>a</sup>	500 <sup>b</sup>	1,000 <sup>c</sup>	0.26	1.6

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD). Footnotes

a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

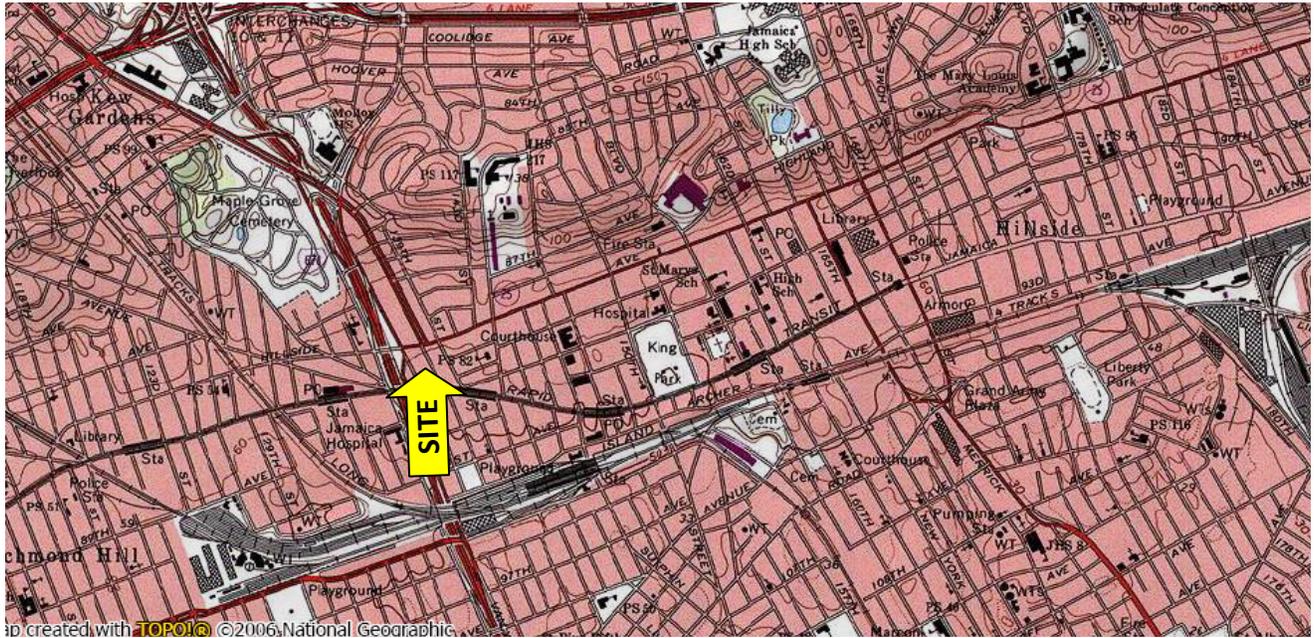
b The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

c The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

d The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

e For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

# **FIGURES**



**FIGURE 1 – SITE LOCATION MAP**

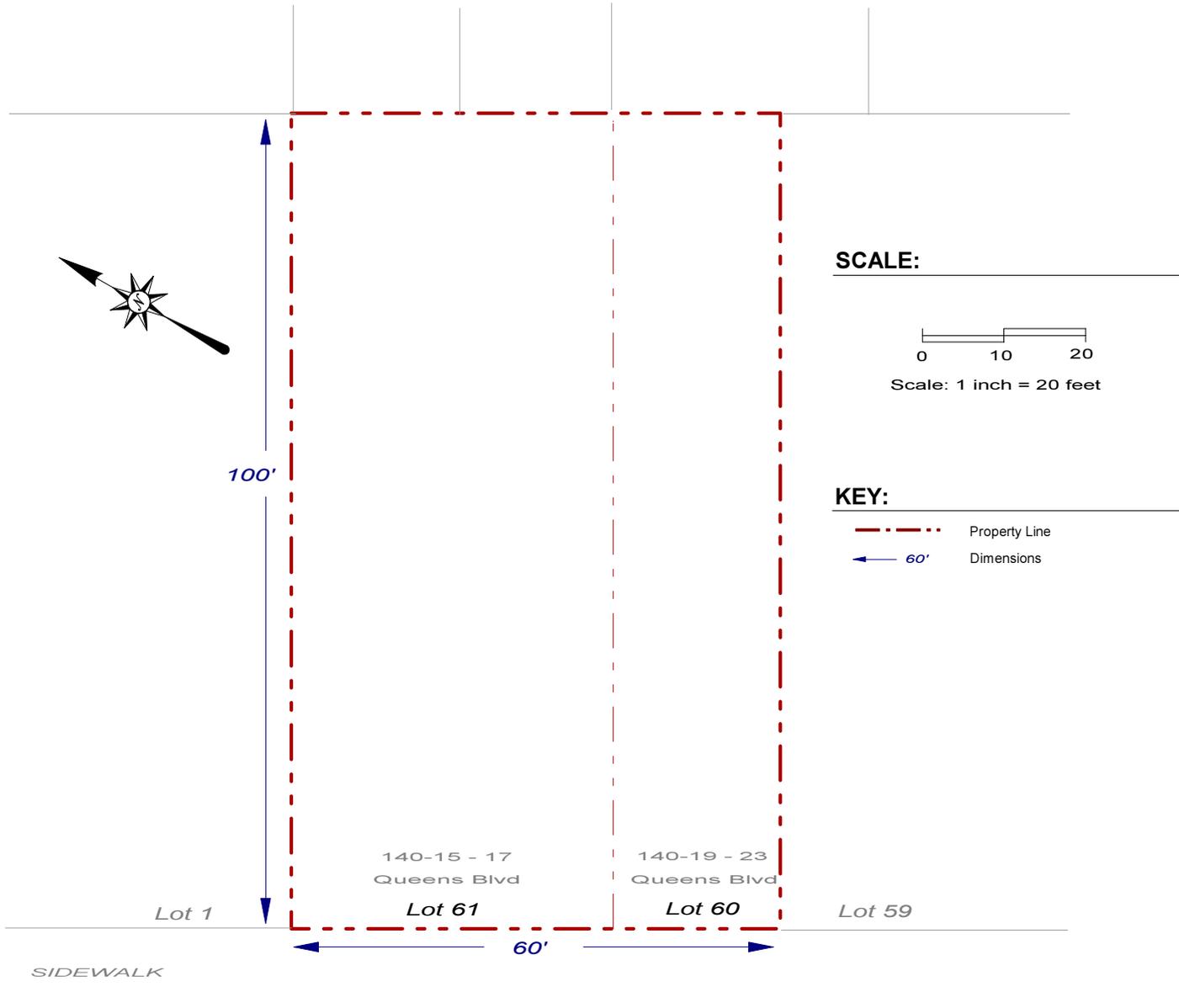


Phone 631.504.6000  
 Fax 631.924.2870

**ENVIRONMENTAL BUSINESS CONSULTANTS**

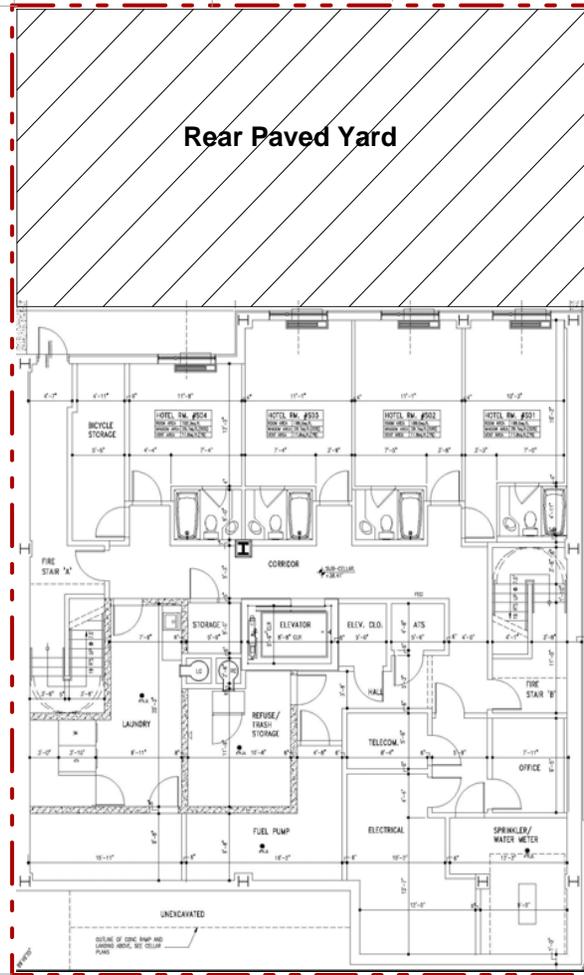
**SITE NAME:** 140-15 & 140-19 Queens Blvd  
**STREET ADDRESS:** 140-15 & 140-19 Queens Blvd  
**MUNICIPALITY, STATE, ZIP:** Queens, NY 11435

Source: National Geographic TOPO! - 2003



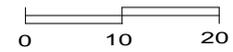
**QUEENS BOULEVARD**

 <p>Phone 631.504.6000 Fax 631.924.2870</p>	<p><b>Figure No.</b> <b>2</b></p>	Site Name: <b>Redevelopment Project</b>
		Site Address: <b>140-15 Queens Boulevard, Queens, NY</b>
		Drawing Title: <b>Site Boundary Map</b>



Rear Paved Yard

SCALE:



Scale: 1 inch = 20 feet

KEY:

--- Property Line

Lot 1

Lot 59

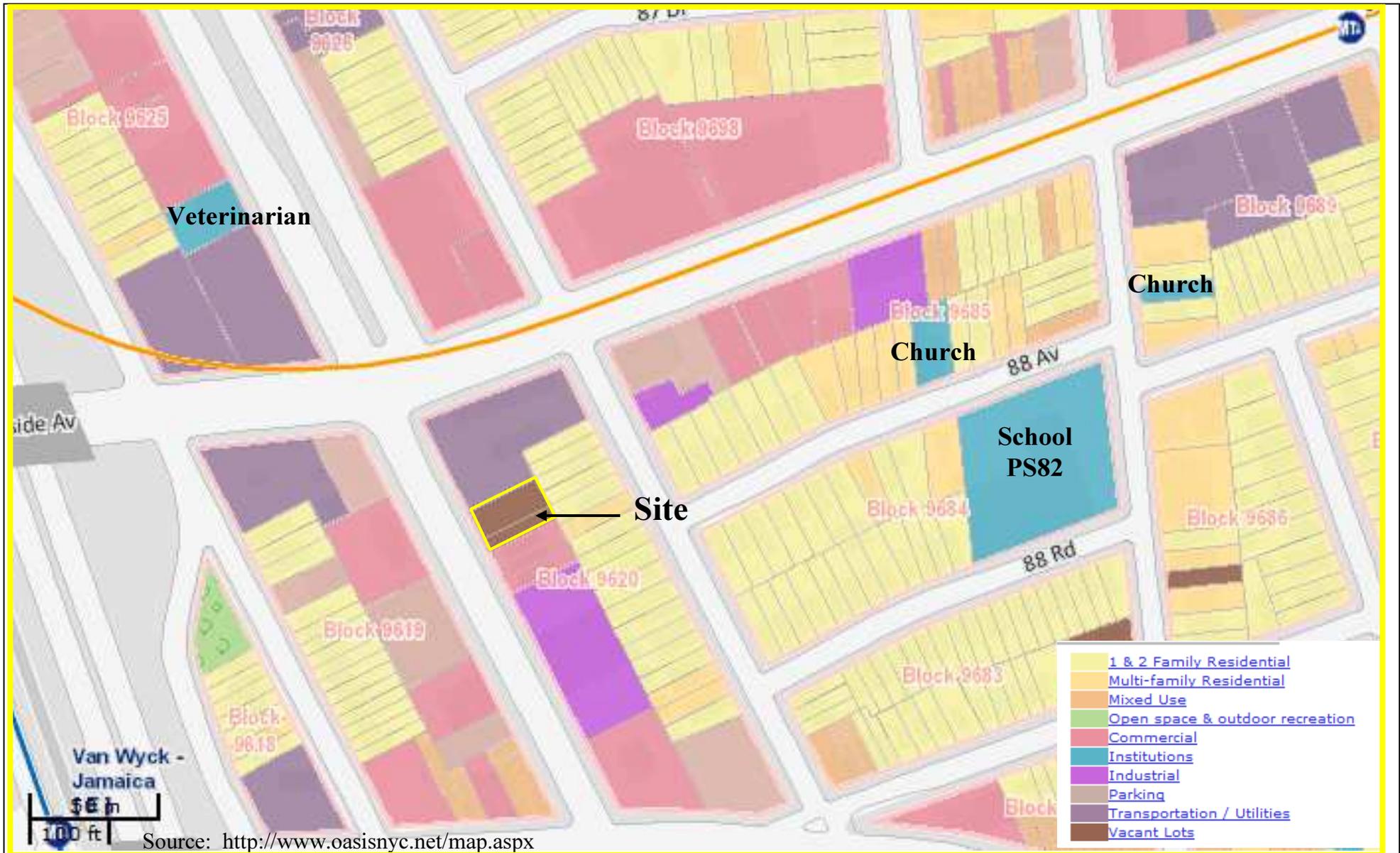
SIDEWALK

QUEENS BOULEVARD

**EBC**  
 ENVIRONMENTAL BUSINESS CONSULTANTS  
 Phone 631.504.6000  
 Fax 631.924.2870

Figure No.  
**3**

Site Name:	REDEVELOPMENT PROJECT
Site Address:	140-15 QUEENS BOULEVARD, QUEENS, NY
Drawing Title:	REDEVELOPMENT PLAN



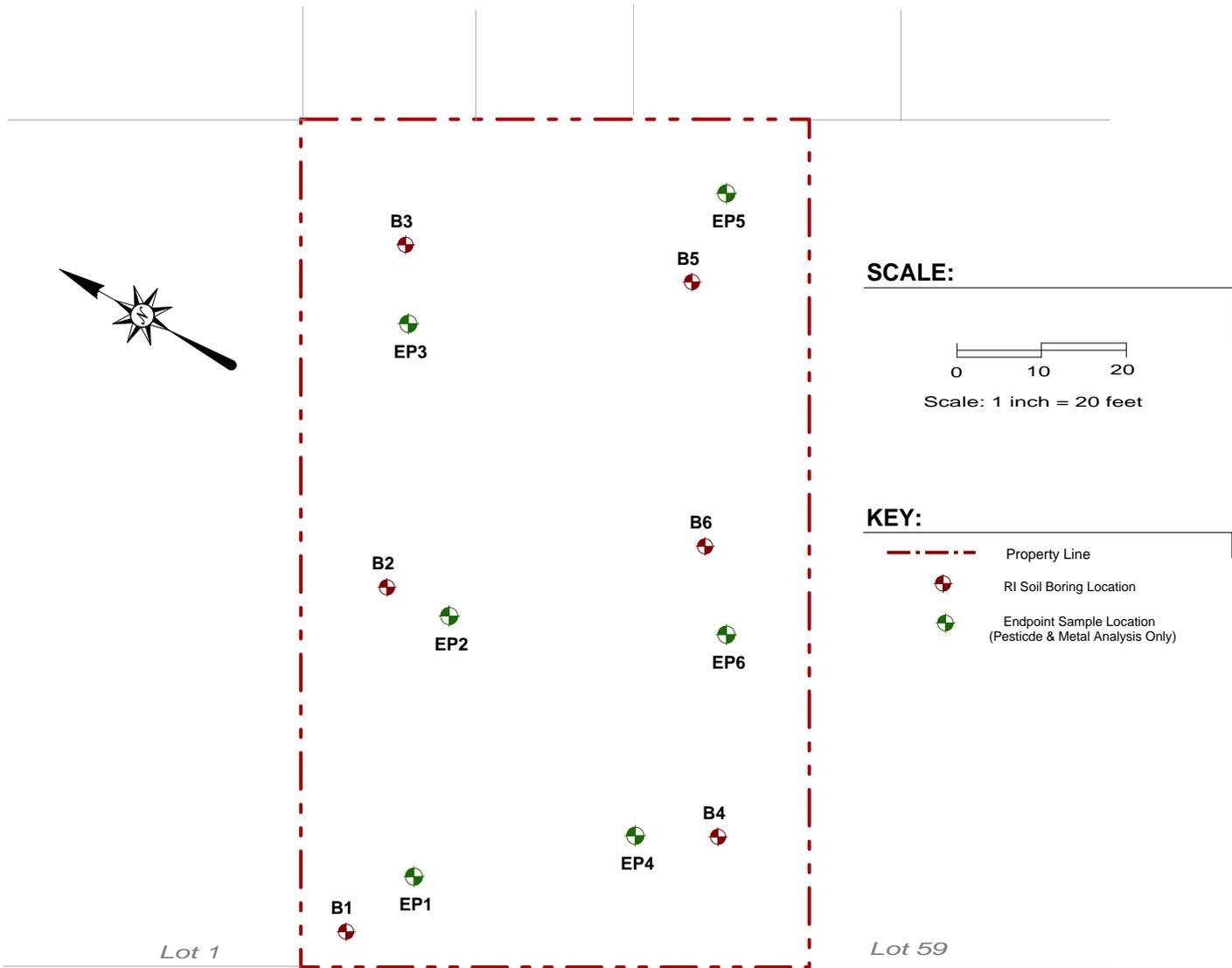
**FIGURE 4**  
**SURROUNDING LAND USE MAP**

140-15 QUEENS BLVD, QUEENS, NY  
 REMEDIAL INVESTIGATION REPORT



**ENVIRONMENTAL BUSINESS CONSULTANTS**  
 1808 Middle Country Road, Ridge, New York 11961  
 Phone: (631) 504-6000 Fax: (631) 924-2870

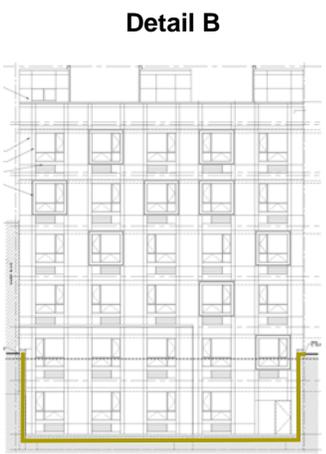
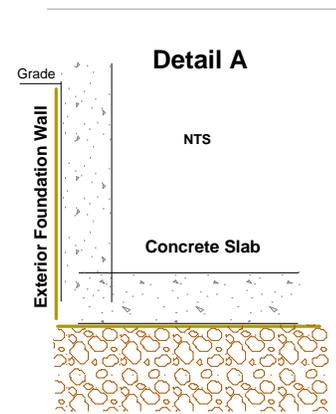




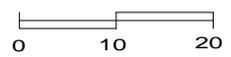
SIDEWALK

QUEENS BOULEVARD

 <p>Phone 631.504.6000 Fax 631.924.2870</p>	<p>Figure No. <b>6</b></p>	Site Name: <b>REDEVELOPMENT PROJECT</b>
		Site Address: <b>140-15 QUEENS BOULEVARD, QUEENS, NY</b>
		Drawing Title: <b>ENDPOINT SAMPLING LOCATIONS</b>



**SCALE:**



Scale: 1 inch = 20 feet

**KEY:**

- - - - - Property Line
- VaporBlock 20Plus



Lot 1

Lot 59

SIDEWALK

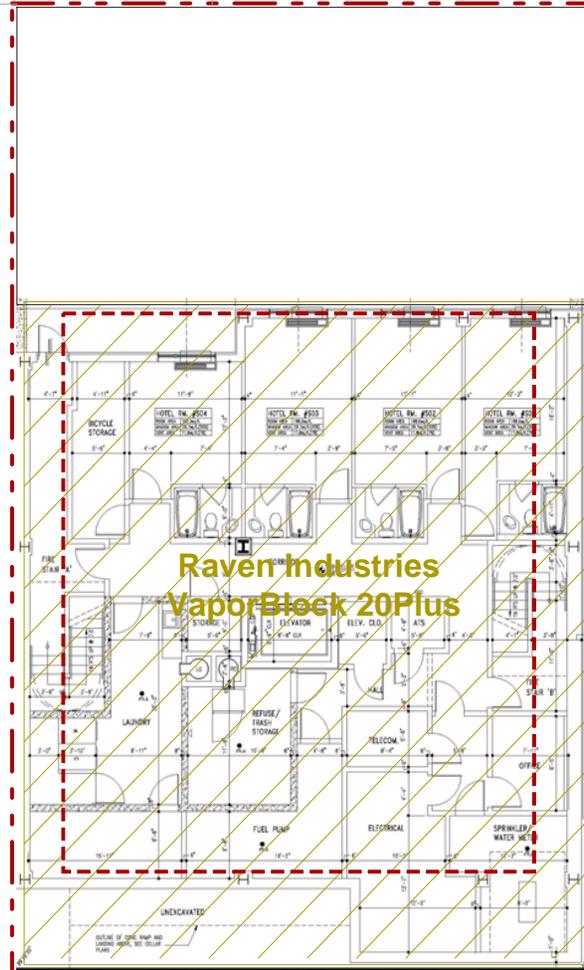
# QUEENS BOULEVARD

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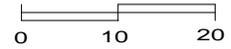
Phone 631.504.6000  
Fax 631.924.2870

**Figure No.**  
**7**

Site Name:	REDEVELOPMENT PROJECT
Site Address:	140-15 QUEENS BOULEVARD, QUEENS, NY
Drawing Title:	VAPOR BARRIER PLAN



**SCALE:**



Scale: 1 inch = 20 feet

**KEY:**

- · - · - Property Line
- - - - - VaporBlock 20Plus
- - - - - 4 inch Corrugated HDPE Pipe



Lot 1

Lot 59

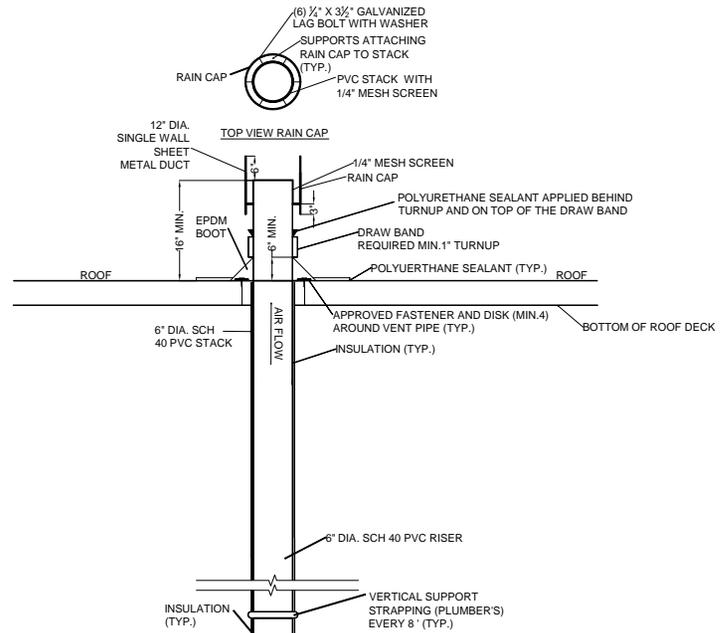
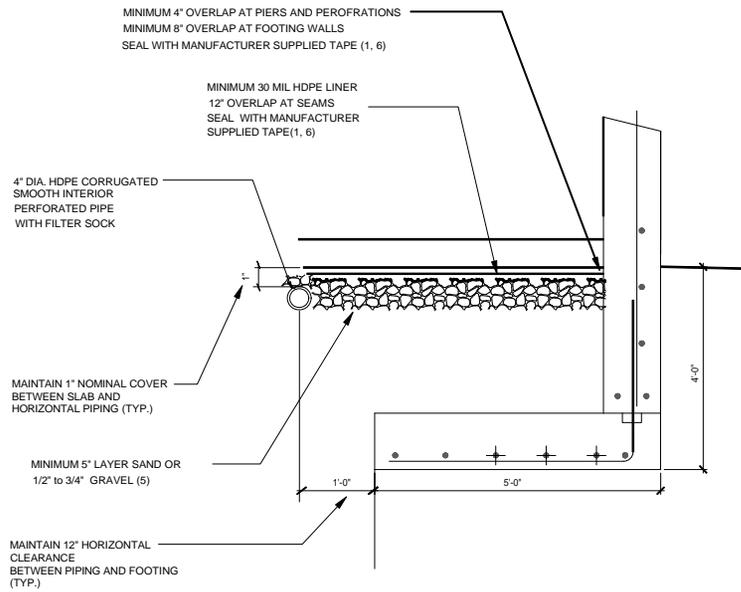
SIDEWALK

QUEENS BOULEVARD

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Figure No.  
**8**

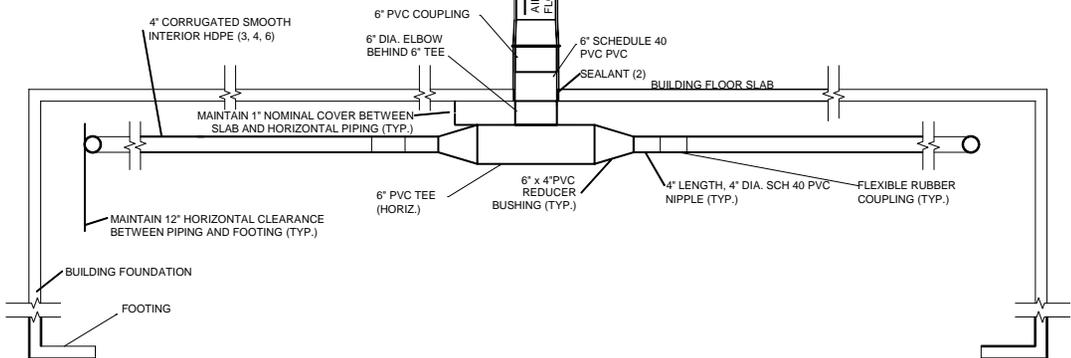
Site Name: **REDEVELOPMENT PROJECT**  
 Site Address: **140-15 QUEENS BOULEVARD, QUEENS, NY**  
 Drawing Title: **SSDS PLAN**



A - A'  
N.T.S.

**NOTES:**

1. SEAL ALL PERFORATIONS, JOINTS AND SEAMS WITH MANUFACTURER SUPPLIED TAPE
2. SEAL OPENING WITH ELASTOMERIC JOINT SEALANT AS DEFINED IN ASTM C920.
3. HIGH DENSITY POLYETHYLENE CORRUGATED PERFORATED PIPE WITH SMOOTH INTERIOR WATERWAY. ADS N-12 OR APPROVED EQUAL.
4. WRAP 4 HDPE PIPE WITH GEOTEXTILE FABRIC, GSE NW4 OR APPROVED EQUAL.
5. EBC MUST PRE-APPROVE ALL FILLMATERIAL BEFORE DELIVERY TO SITE. VIRGIN MINED MATERIAL ONLY.
6. EBC MUST INSPECT, PHOTO DOCUMENT AND APPROVE OF SUB-SLAB PIPING AND VAPOR BARRIER INSTALLATION BEFORE COVERING



**SUB - SLAB VENTING SYSTEM - DETAIL/ELEVATION**  
N.T.S.

**TYPICAL PLAN**

 <b>ENVIRONMENTAL BUSINESS CONSULTANTS</b> 1808 MIDDLE COUNTRY ROAD, RIDGE, NY 11961	Phone 631.504.6000 Fax 631.924.2870	140-15 TO 140-19 QUEENS BLVD, QUEENS, NY <b>SUBSLAB VENTING SYSTEM - DETAILS</b>
	<b>FIGURE 9</b>	

**ATTACHMENT A**  
**PROPOSED DEVELOPMENT PLANS**



- NOTES:
- 1) FOR ALL STL. BEAMS PROVIDE 2-HR. F.R. MASTIC COATING AS PER UL N606. TYP.
  - 2) FOR ALL STL. COLUMNS PROVIDE 2-HR. F.R. GYB. BD. AS PER UL X536. TYP.
  - 3) G.C. TO INSTALL ACRYLIC CORNER GUARDS @ ALL CORNERS EQUAL OR LESS THAN 135° ANGLE.
  - 4) ALL FINISHES TO BE COORDINATED W/ OWNER.
  - 5) ENTIRE BUILDING TO BE SPRINKLERED (TO BE FILED AS A SEPARATE). APPLICATION
  - 6) F. & I. SCALED SIGNS AT EACH STAIRWAY, ELEVATOR & STRATEGIC LOCATIONS SHOWING MEANS OF EGRESS AS PER MDL SEC. 64- TYPICAL FOR EACH FLOOR.
  - 7) CLOSED CIRCUIT FIRE ALARM REQUIRED AS PER MDL SEC. 64 TO BE FILED AS A SEPARATE APPLICATION.
  - 8) PROVIDE 17"x44" OPENING @ FOUNDATION WALL FOR FTAC UNITS. VERIFY ROUGH OPENING SIZE W/ MANUFACTURER PRIOR TO ANY WORK.(MANUFACTURED BY McQUAY INCREMENTAL COMFORT CONDITIONERS-PDMS/PDNC)
  - 9) MECHANICAL VENTILATION, EXHAUST... TO BE FILED AS A SEPARATE APPLICATION UNDER MEP PLANS
  - 10) PIT FLOOR BENEATH CYLINDERS AND BUFFER TO BE FLAT AND LEVEL WITHIN 1/8" (3MM) FULL WIDTH OF HOISTWAY.
  - 11) A FIXED VERTICAL STEEL LADDER TO PIT EXTENDING 4'-0" ABOVE THE SILL OF THE BOTTOM ENTRANCE AS LOCATED IN THE PLAN. LADDER WIDTH & PROJECTION FROM WALL PER LOCAL CODE.
  - 12) PROVIDE PHOTOLUMINESCENT EXIT PATH MARKINGS IN COMPLIANCE W/ BC 1026.11
  - 13) EXIT SIGNS TO COMPLY W/ BC 1026
  - 14) PROVIDE FRESH AIR (VIA POWER VENTILATION) IN TRASH COMPACTOR ROOM.
  - 15) ALL WALLS, PARTITIONS AND FLOOR/CEILING ASSEMBLIES SHALL HAVE A SOUND TRANSMISSION CLASS (STC) OF NOT LESS THAN 50. AS PER BC 1207.2. SEE LEGEND BELOW.

TABLE 601 BUILDING ELEMENTS			
FIRE-RESISTANCE RATING REQ. FOR BUILDING ELEMENTS (HRS.)			
CONSTRUCTION GROUP NON-COMBUSTIBLE			
BUILDING ELEMENT	TYPE I	TYPE II	TYPE III
STRUCTURAL FRAME			
INCLUDING COLUMNS, GIRDERS, TRUSSES		2b	
BEARING WALLS			
EXTERIOR		2	
INTERIOR		2b	
NONBEARING WALLS AND PARTITIONS			
EXTERIOR		SEE TABLE 602	
NONBEARING WALLS AND PARTITIONS			
INTERIOR		0	
FLOOR CONSTRUCTION			
INCLUDING SUPPORTING BEAMS AND JOIST		2	
ROOF CONSTRUCTION			
INCLUDING SUPPORTING BEAMS AND JOIST		1c	

TABLE 503 BUILDING HEIGHT			
HEIGHT LIMITATIONS SHOWN AS STORES AND FEET ABOVE GRADE PLANE			
AREA LIMITATIONS AS DETERMINED BY THE DEFINITION OF "AREA, BUILDING," PER FLOOR			
GROUP	HT(Feet)	HT(S)	TYPE 1B (160e)
R-1	S	A	UL (UNLIMITED)

- LEGEND
- POURED CONCRETE WALL. SEE DWG. FOR THICKNESS
  - 8" CONC. BLK. EXT. WALL OR AS SHOWN ON PLAN W/ 2 1/2" MTL. FRAMING + BATT INSUL. INSIDE 1/2" STUCCO OUTSIDE. 3-HR F.R.
  - 3 1/2" MTL. STUD WALL W/ 1/2" GYP.BD. ON E.S. (N.R.)
  - 3 1/2" MTL. STUD WALL W/ 5/8" GYP.BD. ON E.S.(F.C. 60) 1-HR F.R. 50 TO 54 STC.
  - 3 1/2" MTL. STUD WALL W/ 2-5/8" GYP.BD. ON E.S. 2-HR F.R. 55 TO 59 STC.
  - 5 1/2" MTL. STUD WALL W/ 2-5/8" GYP.BD. FROM INSIDE AND 2-5/8" CEMENTITIOUS BACKER UNITS FINISH STUCCO FROM OUTSIDE. 2-HR F.R.
  - 2-HR F.R. SHAFT WALL (SEE DETAIL PROVIDED). 50 TO 54 STC.
  - 1-HR F.R. SHAFT WALL (SEE DETAIL PROVIDED). 50 TO 54 STC.
  - SMOKE DETECTOR SHALL COMPLY W/ SEC. 907.2.8.3 & 907.2.9 OF NYC BLDG. and C.O. W/ SEC. 908.7 OF NYC BLDG
  - EXHAUST. CFM AS SHOWN
  - EMERGENCY LIGHT
  - LOCATION OF EXIT SIGN & LIGHT DIRECTION

CONSULTANTS:

MEP:

STRUCTURAL:

SITE:

NO. DATE DESCRIPTION OF REVISION

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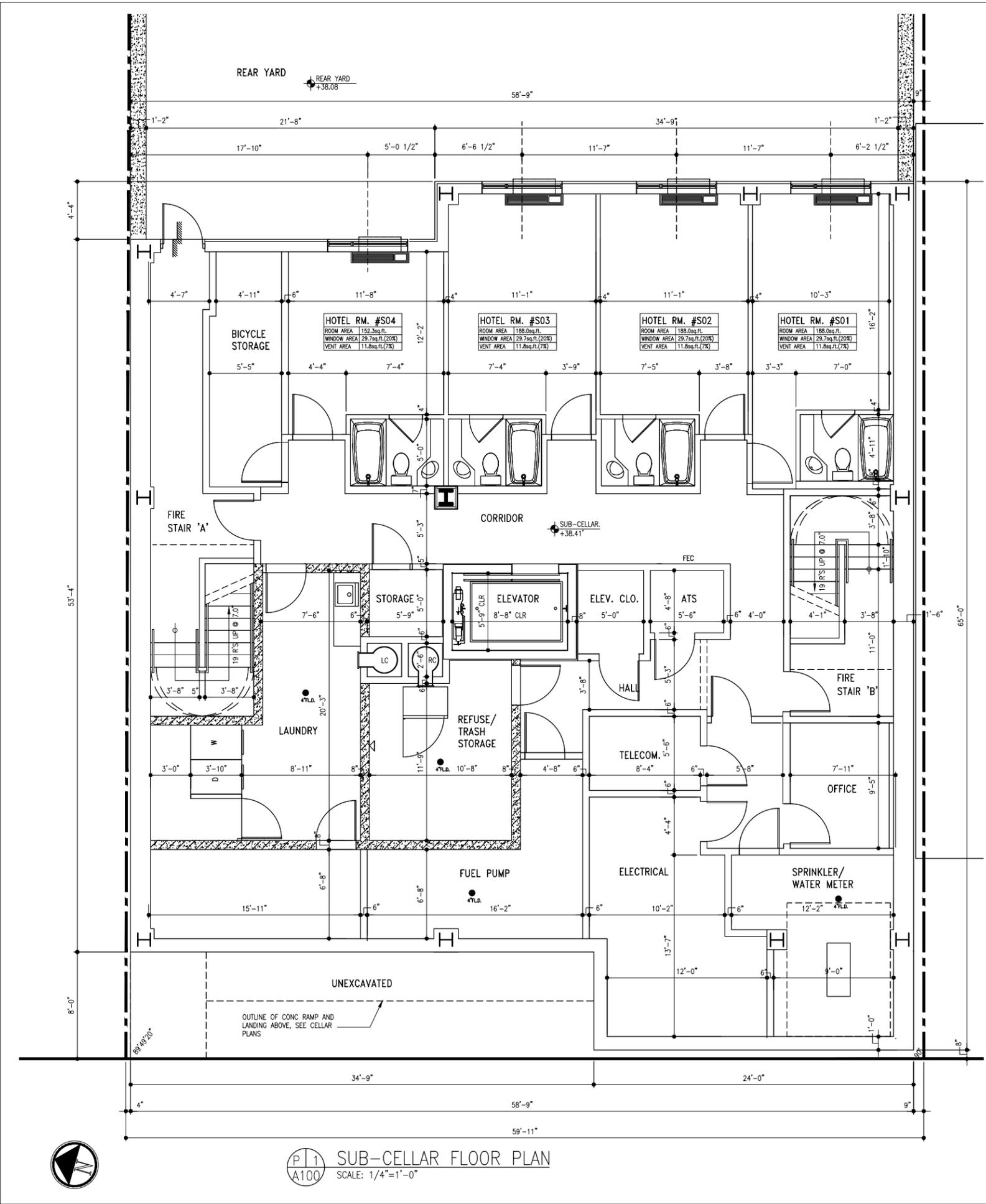
CLIENT:  
MR. RAJ PAWAR  
140-15 QUEENS BLVD.  
QUEENS, NY 11435

DOB STAMP & SIGNATURE:

PROJECT:  
PROPOSED 4-STORY  
TRANSIENT HOTEL

TITLE:  
SUB-CELLAR  
FLOOR PLAN

SEAL & SIGNATURE: DATE: 6.06.13  
PROJECT NO.: MSS 561  
DRAWING BY: SG  
CHK. BY: MSS  
DWG NO:  
**A-100.00**  
CAD FILE NO: 06  
Z: 1-MSS:



**P 1**  
**A100** SUB-CELLAR FLOOR PLAN  
SCALE: 1/4"=1'-0"

- NOTES:
- 1) FOR ALL STL. BEAMS PROVIDE 2-HR. F.R. MASTIC COATING AS PER UL N606. TYP.
  - 2) FOR ALL STL. COLUMNS PROVIDE 2-HR. F.R. GYB. BD. AS PER UL X536. TYP.
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  - 4) ALL FINISHES TO BE COORDINATED W/ OWNER.
  - 5) ENTIRE BUILDING TO BE SPRINKLERED (TO BE FILED AS A SEPARATE). APPLICATION
  - 6) F. & I. SCALED SIGNS AT EACH STAIRWAY, ELEVATOR & STRATEGIC LOCATIONS SHOWING MEANS OF EGRESS AS PER MDL SEC. 64- TYPICAL FOR EACH FLOOR.
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  - 9) MECHANICAL VENTILATION, EXHAUST... TO BE FILED AS A SEPARATE APPLICATION UNDER MEP PLANS
  - 10) PIT FLOOR BENEATH CYLINDERS AND BUFFER TO BE FLAT AND LEVEL WITHIN 1/8" (3MM) FULL WIDTH OF HOISTWAY.
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  - 13) EXIT SIGNS TO COMPLY W/ BC 1026
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  - 15) ALL WALLS, PARTITIONS AND FLOOR/CEILING ASSEMBLIES SHALL HAVE A SOUND TRANSMISSION CLASS (STC) OF NOT LESS THAN 50. AS PER BC 1207.2. SEE LEGEND BELOW.

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EXTERIOR	2		
INTERIOR	2b		
NONBEARING WALLS AND PARTITIONS			
EXTERIOR	SEE TABLE 602		
NONBEARING WALLS AND PARTITIONS			
INTERIOR	0		
FLOOR CONSTRUCTION			
INCLUDING SUPPORTING BEAMS AND JOIST	2		
ROOF CONSTRUCTION			
INCLUDING SUPPORTING BEAMS AND JOIST	1c		

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  - EXHAUST. CFM AS SHOWN
  - EMERGENCY LIGHT
  - LOCATION OF EXIT SIGN & LIGHT DIRECTION

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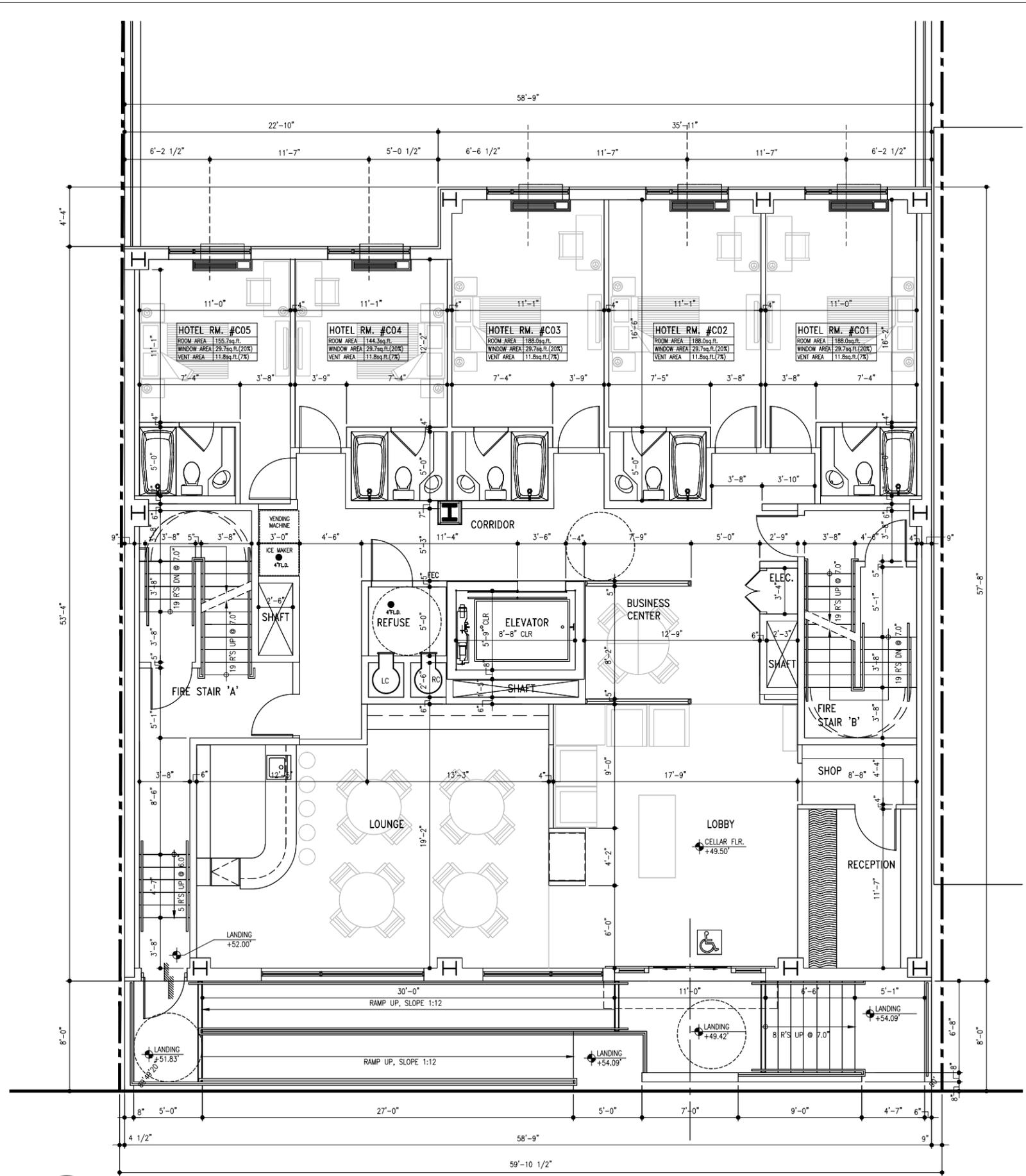
DOB STAMP & SIGNATURE:

PROJECT:  
PROPOSED 4-STORY  
TRANSIENT HOTEL

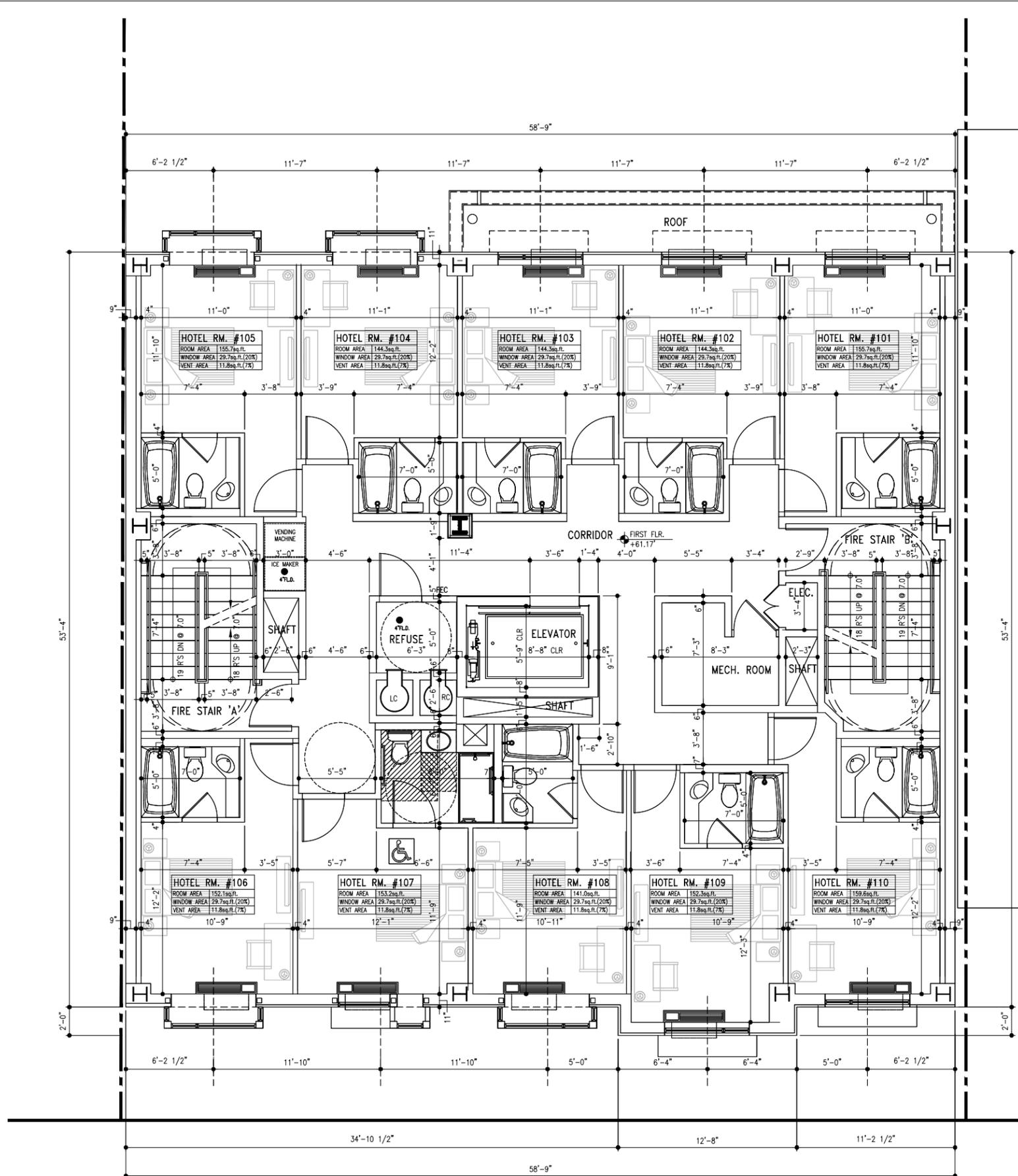
TITLE:  
CELLAR  
FLOOR PLAN

SEAL & SIGNATURE:

DATE: 6.06.13  
PROJECT NO.: MSS 561  
DRAWING BY: SG  
CHK. BY: MSS  
DWG NO:  
**A-101.00**  
CAD FILE NO: 06  
Z: 1-MSS:



P 1  
A101 CELLAR FLOOR PLAN  
SCALE: 1/4"=1'-0"



- NOTES:
- 1) FOR ALL STL. BEAMS PROVIDE 2-HR. F.R. MASTIC COATING AS PER UL N606. TYP.
  - 2) FOR ALL STL. COLUMNS PROVIDE 2-HR. F.R. GYB. BD. AS PER UL X536. TYP.
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  - 6) F. & I. SCALED SIGNS AT EACH STAIRWAY, ELEVATOR & STRATEGIC LOCATIONS SHOWING MEANS OF EGRESS AS PER MDL SEC. 64-1 TYPICAL FOR EACH FLOOR
  - 7) CLOSED CIRCUIT FIRE ALARM REQUIRED AS PER MDL SEC. 64 TO BE FILED AS A SEPARATE APPLICATION.
  - 8) PROVIDE 17"x44" OPENING @ FOUNDATION WALL FOR FTAC UNITS. VERIFY ROUGH OPENING SIZE W/ MANUFACTURER PRIOR TO ANY WORK.(MANUFACTURED BY McQUAY INCREMENTAL COMFORT CONDITIONERS-PDMS/PDNC)
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EXTERIOR	2		
INTERIOR	2b		
NONBEARING WALLS AND PARTITIONS			
EXTERIOR		SEE TABLE 602	
NONBEARING WALLS AND PARTITIONS			
INTERIOR		0	
FLOOR CONSTRUCTION			
INCLUDING SUPPORTING BEAMS AND JOIST		2	
ROOF CONSTRUCTION			
INCLUDING SUPPORTING BEAMS AND JOIST			1c

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HEIGHT LIMITATIONS SHOWN AS STORIES AND FEET ABOVE GRADE PLANE			
AREA LIMITATIONS AS DETERMINED BY THE DEFINITION OF "AREA, BUILDING," PER FLOOR			
GROUP	HT(Feet)	HT(S)	TYPE 1B (160+)
R-1	S	A	UL (UNLIMITED)

- LEGEND
- POURED CONCRETE WALL. SEE DWG. FOR THICKNESS
  - 8" CONC. BLK. EXT. WALL OR AS SHOWN ON PLAN W/ 2 1/2" MTL. FRAMING + BATT INSUL. INSIDE 1/2" STUCCO OUTSIDE. 3-HR F.R.
  - 3 1/2" MTL. STUD WALL W/ 1/2" GYP.BD. ON E.S. (N.R.)
  - 3 1/2" MTL. STUD WALL W/ 5/8" GYP.BD. ON E.S.(F.C. 60) 1-HR F.R. 50 TO 54 STC.
  - 3 1/2" MTL. STUD WALL W/ 2-5/8" GYP.BD. ON E.S. 2-HR F.R. 55 TO 59 STC.
  - 5 1/2" MTL. STUD WALL W/ 2-5/8" GYP.BD. FROM INSIDE AND 2-5/8" CEMENTITIOUS BACKER UNITS FINISH STUCCO FROM OUTSIDE. 2-HR F.R.
  - 2-HR F.R. SHAFT WALL (SEE DETAIL PROVIDED). 50 TO 54 STC.
  - 1-HR F.R. SHAFT WALL (SEE DETAIL PROVIDED). 50 TO 54 STC.
  - SD/CO
  - SMOKE DETECTOR SHALL COMPLY W/ SEC. 907.2.8.3 & 907.2.9 OF NYC BLDG. and C.O. W/ SEC. 908.7 OF NYC BLDG
  - EXHAUST. CFM AS SHOWN
  - EMERGENCY LIGHT
  - LOCATION OF EXIT SIGN & LIGHT DIRECTION

CONSULTANTS:

MEP:

STRUCTURAL:

SITE:

NO. DATE DESCRIPTION OF REVISION

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DOB STAMP & SIGNATURE:

PROJECT:  
PROPOSED 4-STORY  
TRANSIENT HOTEL

TITLE:  
1ST FLOOR PLAN

SEAL & SIGNATURE: DATE: 6.06.13  
PROJECT NO.: MSS 561  
DRAWING BY: SG  
CHK. BY: MSS  
DWG NO:  
**A-102.00**  
CAD FILE NO: 06  
Z: 1-MSS:



- NOTES:
- 1) FOR ALL STL. BEAMS PROVIDE 2-HR. F.R. MASTIC COATING AS PER UL N606. TYP.
  - 2) FOR ALL STL. COLUMNS PROVIDE 2-HR. F.R. GYB. BD. AS PER UL X536. TYP.
  - 3) G.C. TO INSTALL ACRYLIC CORNER GUARDS @ ALL CORNERS EQUAL OR LESS THAN 135° ANGLE.
  - 4) ALL FINISHES TO BE COORDINATED W/ OWNER.
  - 5) ENTIRE BUILDING TO BE SPRINKLERED (TO BE FILED AS A SEPARATE). APPLICATION
  - 6) F. & I. SCALED SIGNS AT EACH STAIRWAY, ELEVATOR & STRATEGIC LOCATIONS SHOWING MEANS OF EGRESS AS PER MDL SEC. 64- TYPICAL FOR EACH FLOOR.
  - 7) CLOSED CIRCUIT FIRE ALARM REQUIRED AS PER MDL SEC. 64 TO BE FILED AS A SEPARATE APPLICATION.
  - 8) PROVIDE 17"x44" OPENING @ FOUNDATION WALL FOR FTAC UNITS. VERIFY ROUGH OPENING SIZE W/ MANUFACTURER PRIOR TO ANY WORK.(MANUFACTURED BY McQUAY INCREMENTAL COMFORT CONDITIONERS-PDMS/PDNC)
  - 9) MECHANICAL VENTILATION, EXHAUST... TO BE FILED AS A SEPARATE APPLICATION UNDER MEP PLANS
  - 10) PIT FLOOR BENEATH CYLINDERS AND BUFFER TO BE FLAT AND LEVEL WITHIN 1/8" (3MM) FULL WIDTH OF HOISTWAY.
  - 11) A FIXED VERTICAL STEEL LADDER TO PIT EXTENDING 4'-0" ABOVE THE SILL OF THE BOTTOM ENTRANCE AS LOCATED IN THE PLAN. LADDER WIDTH & PROJECTION FROM WALL PER LOCAL CODE.
  - 12) PROVIDE PHOTOLUMINESCENT EXIT PATH MARKINGS IN COMPLIANCE W/ BC 1026.11
  - 13) EXIT SIGNS TO COMPLY W/ BC 1026
  - 14) PROVIDE FRESH AIR (VIA POWER VENTILATION) IN TRASH COMPACTOR ROOM.
  - 15) ALL WALLS, PARTITIONS AND FLOOR/CEILING ASSEMBLIES SHALL HAVE A SOUND TRANSMISSION CLASS (STC) OF NOT LESS THAN 50. AS PER BC 1207.2. SEE LEGEND BELOW.

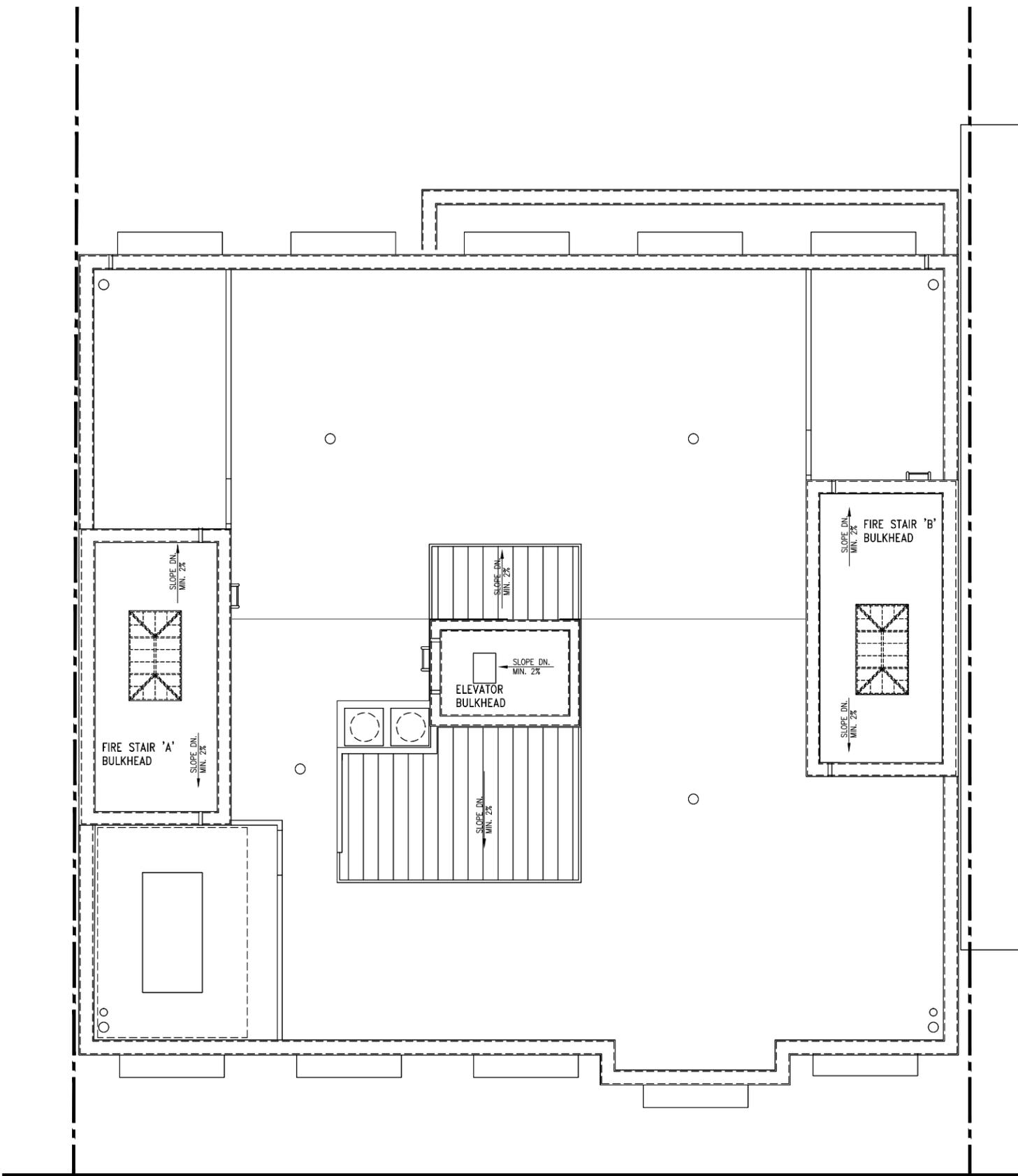


TABLE 601 BUILDING ELEMENTS			
FIRE-RESISTANCE RATING REQ. FOR BUILDING ELEMENTS (HRS.)			
CONSTRUCTION GROUP NON-COMBUSTIBLE			
BUILDING ELEMENT	TYPE I	TYPE II	TYPE III
STRUCTURAL FRAME #			
INCLUDING COLUMNS, GIRDERS, TRUSSES		2b	
BEARING WALLS			
EXTERIOR 1/2		2	
INTERIOR		2b	
NONBEARING WALLS AND PARTITIONS			
EXTERIOR		SEE TABLE 602	
NONBEARING WALLS AND PARTITIONS			
INTERIOR 2		0	
FLOOR CONSTRUCTION #			
INCLUDING SUPPORTING BEAMS AND JOIST		2	
ROOF CONSTRUCTION			
INCLUDING SUPPORTING BEAMS AND JOIST		1c	

TABLE 503 BUILDING HEIGHT			
HEIGHT LIMITATIONS SHOWN AS STORIES AND FEET ABOVE GRADE PLANE			
AREA LIMITATIONS AS DETERMINED BY THE DEFINITION OF "AREA, BUILDING," PER FLOOR			
GROUP	HT(Feet)	HT(S)	TYPE 1B (160e)
R-1	S	A	UL (UNLIMITED)

- LEGEND**
- POURED CONCRETE WALL. SEE DWG. FOR THICKNESS
  - 8" CONC. BLK. EXT. WALL OR AS SHOWN ON PLAN W/ 2 1/2" MTL. FRAMING + BATT INSUL. INSIDE 1/2" STUCCO OUTSIDE. 3-HR F.R.
  - 3 1/2" MTL. STUD WALL W/ 1/2" GYP.BD. ON E.S. (N.R.)
  - 3 1/2" MTL. STUD WALL W/ 5/8" GYP.BD. ON E.S.(F.C. 60) 1-HR F.R. 50 TO 54 STC.
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  - 2-HR F.R. SHAFT WALL (SEE DETAIL PROVIDED). 50 TO 54 STC.
  - 1-HR F.R. SHAFT WALL (SEE DETAIL PROVIDED). 50 TO 54 STC.
  - SMOKE DETECTOR SHALL COMPLY W/ SEC. 907.2.8.3 & 907.2.9 OF NYC BLDG. and C.O. W/ SEC. 908.7 OF NYC BLDG
  - EXHAUST. CFM AS SHOWN
  - EMERGENCY LIGHT
  - LOCATION OF EXIT SIGN & LIGHT DIRECTION

**CONSULTANTS:**

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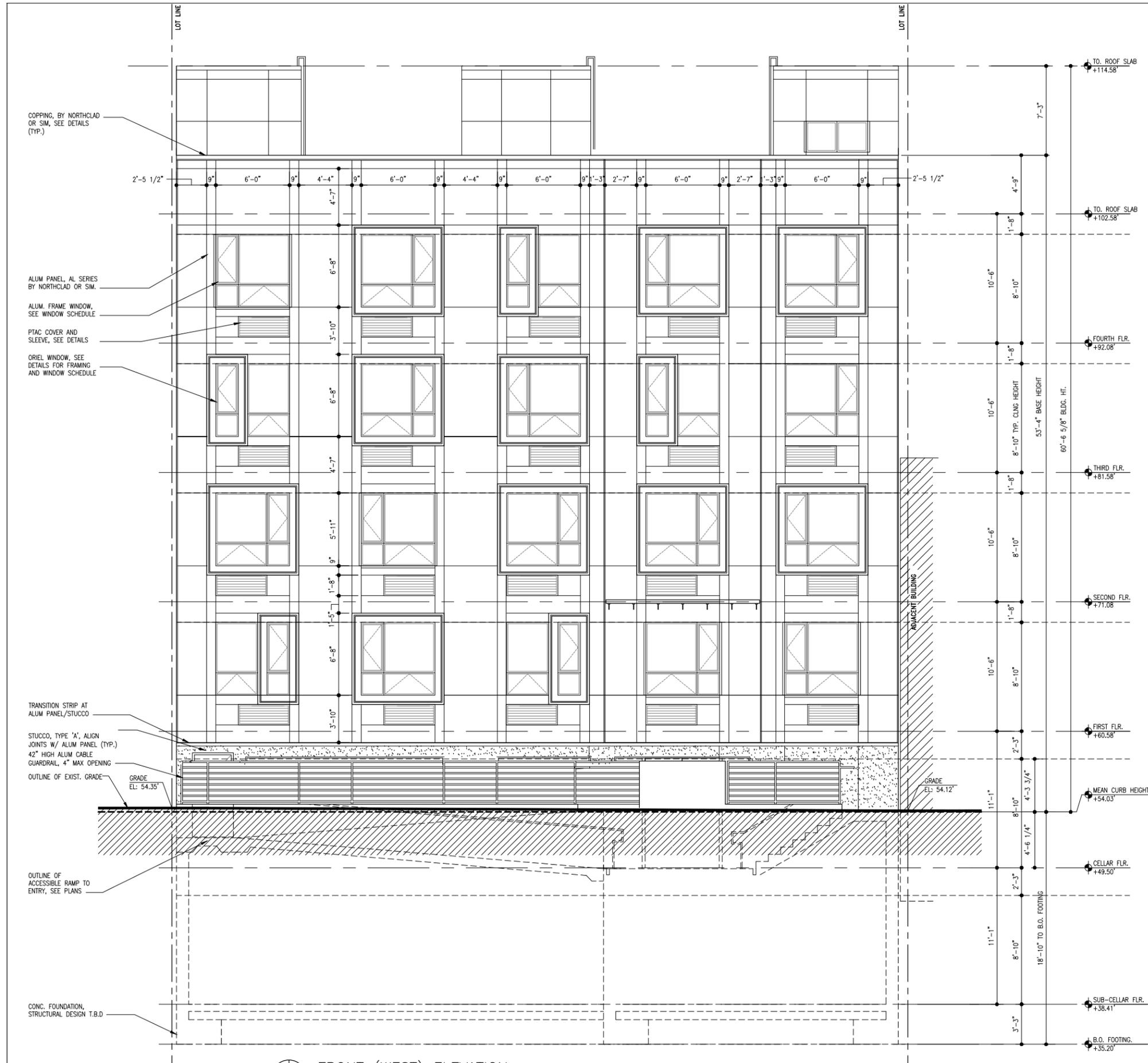
DOB STAMP & SIGNATURE:

PROJECT:  
**PROPOSED 4-STORY  
TRANSIENT HOTEL**

TITLE:  
**BULKHEAD PLAN**

SEAL & SIGNATURE: \_\_\_\_\_

DATE: 6.06.13  
PROJECT NO.: MSS 561  
DRAWING BY: SG  
CHK. BY: MSS  
DWG NO:  
**A-108.00**  
CAD FILE NO: 06  
Z: 1-MSS



**E 1**  
A200 FRONT (WEST) ELEVATION  
SCALE: 1/4"=1'-0"

**CONSULTANTS:**

MEP:

STRUCTURAL:

SITE:

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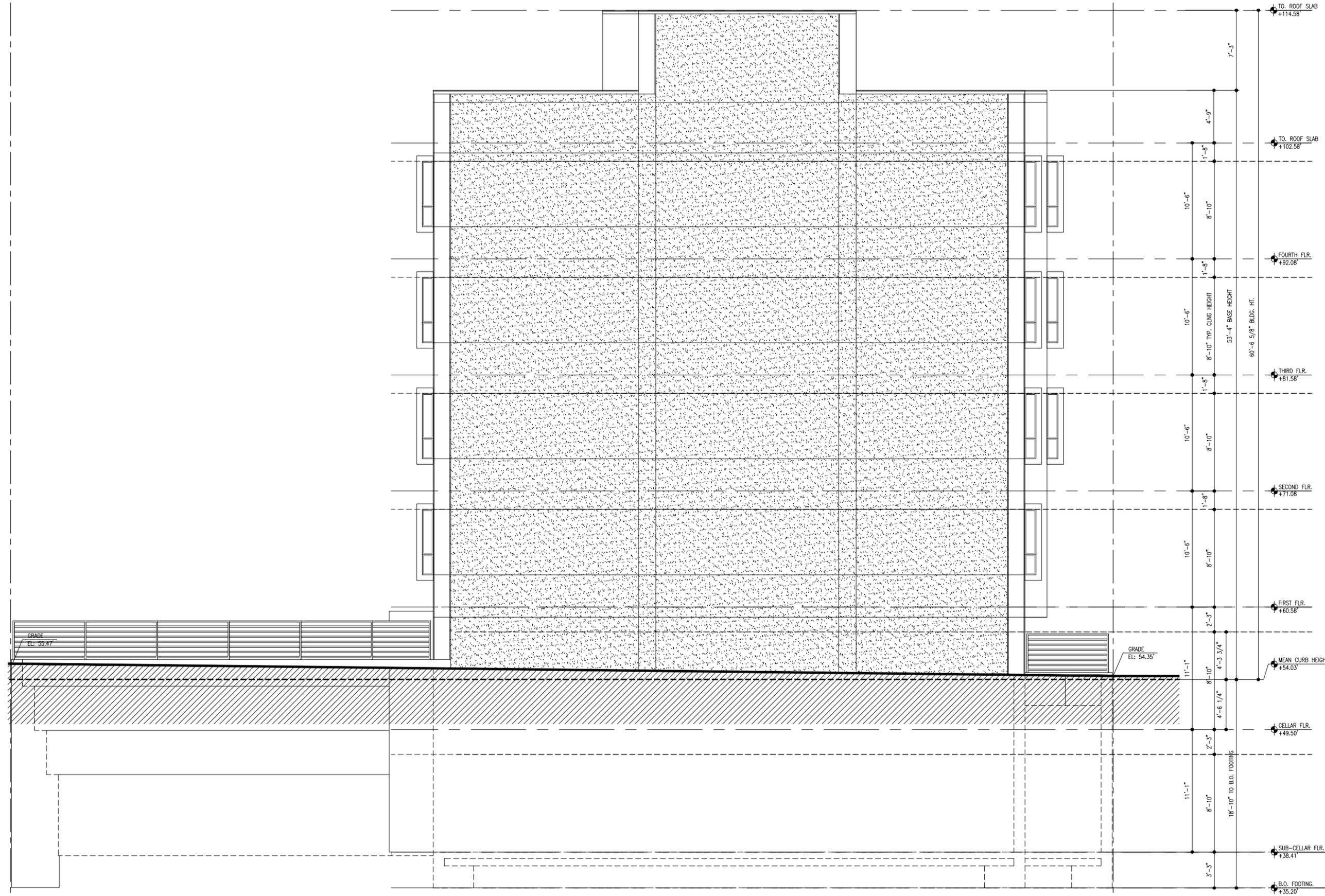
DOB STAMP & SIGNATURE:

PROJECT:  
**PROPOSED 4-STORY  
TRANSIENT HOTEL**

TITLE:  
**FRONT (WEST)  
ELEVATION**

SEAL & SIGNATURE:

DATE: 6.06.13  
PROJECT NO.: MSS 561  
DRAWING BY: SG  
CHK. BY: MSS  
DWG NO:  
**A-200.00**  
CAD FILE NO: 06  
Z: 1-MSS:



CONSULTANTS:

MEP:

STRUCTURAL:

SITE:

NO.	DATE	DESCRIPTION OF REVISION

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DOB STAMP & SIGNATURE:

PROJECT:  
**PROPOSED 4-STORY  
TRANSIENT HOTEL**

TITLE:  
**SIDE (NORTH)  
ELEVATION**

SEAL & SIGNATURE:

DATE: 6.06.13
PROJECT NO.: MSS 561
DRAWING BY: SG
CHK. BY: MSS
DWG NO:
<b>A-201.00</b>
CAD FILE NO: 06
Z: 1-MSS:

**E 1** SIDE (NORTH) ELEVATION  
SCALE: 1/4"=1'-0"





**ATTACHMENT B**  
**CITIZEN PARTICIPATION PLAN**

## **ATTACHMENT B**

### **CITIZEN PARTICIPATION PLAN**

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

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

**Repositories.** A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. USAC Towing will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Repository Name: Queens Central Library

Repository Address: 89-11 Merrick Boulevard, Jamaica, NY 11432

Repository Telephone Number: 718-990-0700

Repository Hours of Operation:

Mon	9:00 AM - 9:00 PM
Tue	1:00 PM - 9:00 PM
Wed	9:00 AM - 9:00 PM
Thu	9:00 AM - 9:00 PM
Fri	9:00 AM - 7:00 PM
Sat	9:00 AM - 7:00 PM
Sun	12:00 AM - 5:00 PM

**Digital Documentation.** NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

**Identify Issues of Public Concern.** The major issues of concern to the public will be potential impacts of nuisance odors and dust during the disturbance of historic fill soils at the Site. This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to

monitor the potential for exposure including a Construction Health and Safety Plan and a Community Air Monitoring Plan are required components of the remedial program. Implementation of these plans will be under the direct oversight of the New York City Department of Environmental Remediation (NYCOER).

These plans will specify the following worker and community health and safety activities during remedial activity at the Site:

- On-Site air monitoring for worker protection,
- Perimeter air monitoring for community protection.

The Health and Safety Plan and the Community Air Monitoring Plan prepared as part of the Remedial Action Work Plan will be available for public review at the document repository.

**Public Notice and Public Comment.** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by USAC Towing, reviewed and approved by OER prior to distribution and mailed by USAC Towing. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

**Citizen Participation Milestones.** Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial

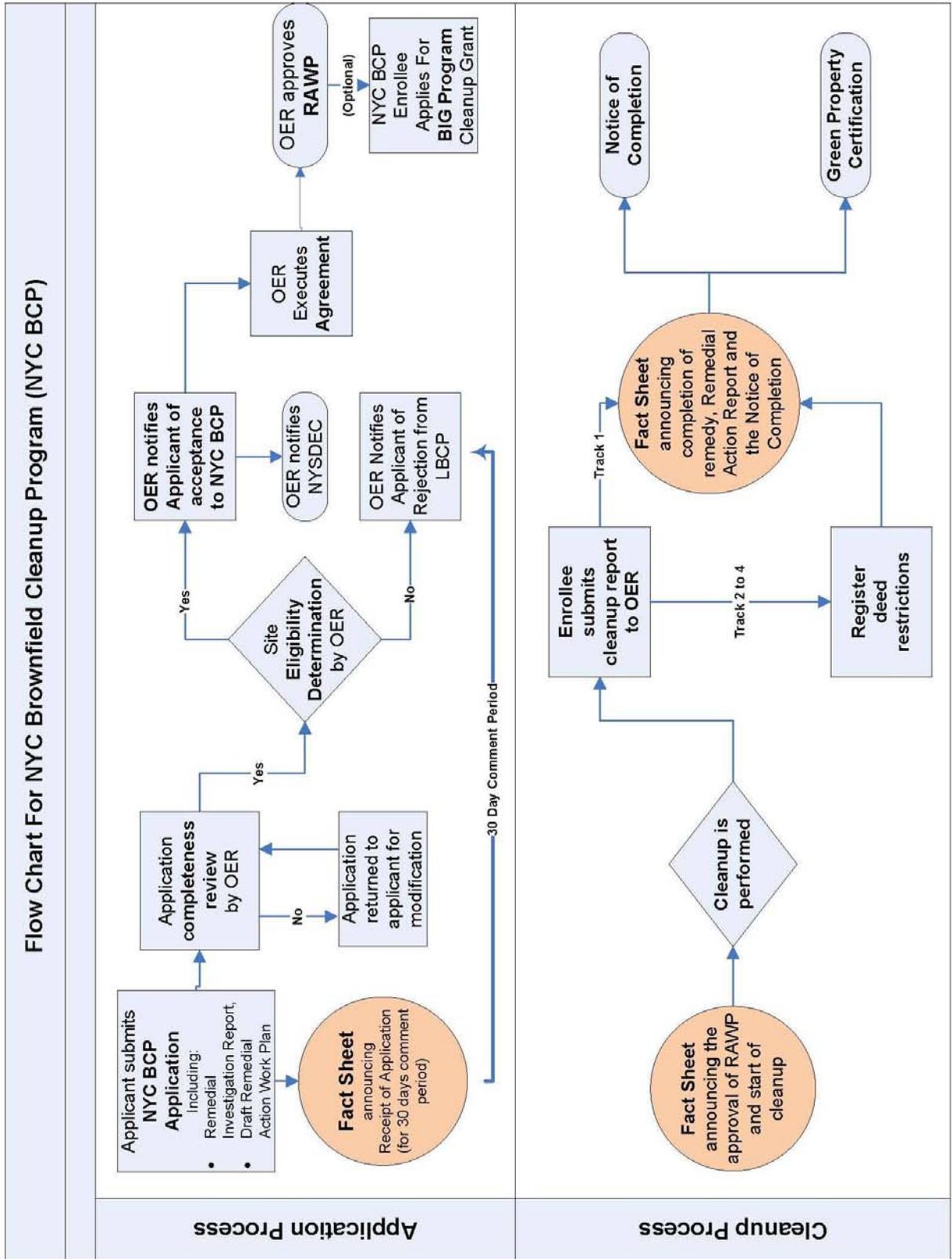
Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion



**ATTACHMENT C**  
**SUSTAINABILITY STATEMENT**

## ATTACHMENT C SUSTAINABILITY STATEMENT

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

**Reuse of Clean, Recyclable Materials.** Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

This project intends to use recycled concrete aggregate wherever possible in grading and backfilling the Site. An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

**Reduce Consumption of Virgin and Non-Renewable Resources.** Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

The project will reduce the consumption of virgin materials by substituting recycled concrete aggregate for mined gravel and/or sand backfill whenever possible. An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

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

Recycled concrete materials and other backfill materials will be locally sourced reducing the energy consumption associated with transporting these materials to the Site. Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.



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

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

**ATTACHMENT D**  
**SOIL/MATERIALS MANAGEMENT PLAN**

## **ATTACHMENT D**

### **SOIL/MATERIALS MANAGEMENT PLAN**

#### **1.1 SOIL SCREENING METHODS**

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

#### **1.2 STOCKPILE METHODS**

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

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

#### **1.3 CHARACTERIZATION OF EXCAVATED MATERIALS**

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

#### **1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE**

The PE/QEP overseeing the remedial action will:

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

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

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

#### **1.5 OFF-SITE MATERIALS TRANSPORT**

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

Outbound truck transport routes are the following:

- a) Continue North on Queens Boulevard to Hillside Avenue
- b) Turn Left on Hillside Avenue
- c) Follow the signs for I-678 (Van Wyck Expressway) North or South

This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

## **1.6 MATERIALS DISPOSAL OFF-SITE**

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

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

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be

disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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

## **1.7 MATERIALS REUSE ON-SITE**

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in Table 1. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

## **1.8 DEMARCATION**

After completion of hotspot removal and any other invasive remedial activities, and prior to

backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

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

## **1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES**

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in Table 1.

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

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

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;

- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

### **Source Screening and Testing**

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

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

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

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

### **1.10 FLUIDS MANAGEMENT**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported

and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

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

### **1.11 STORM-WATER POLLUTION PREVENTION**

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

### **1.12 CONTINGENCY PLAN**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's

Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

### **1.13 ODOR, DUST AND NUISANCE CONTROL**

#### **Odor Control**

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

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

#### **Dust Control**

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

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

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will

not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

**Other Nuisances**

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

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

**ATTACHMENT E**  
**SITE SPECIFIC CONSTRUCTION**  
**HEALTH AND SAFETY PLAN**

**140-15 & 140-19 QUEENS BOULEVARD**  
**QUEENS, NEW YORK**  
**Block 2960, Lots 60 and 61**

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**CONSTRUCTION**  
**HEALTH AND SAFETY PLAN**

JULY 2013

*Prepared By:*

***EBC***

***ENVIRONMENTAL BUSINESS***

1808 Middle Country Road  
Ridge, NY 11961

## HEALTH AND SAFETY PLAN

Site: **Redevelopment Project**

Location: **140-15 & 140-19 Queens Boulevard, Queens, NY 11435**

Prepared By: **ENVIRONMENTAL BUSINESS CONSULTANTS**

Date Prepared: **July- 2013**

Version: **1**

Revision: **0**

### Project Description:

Waste types: Solid

Characteristics: Pesticides and metals in historic fill (From grade to depths as great as 2 feet)

Overall Hazard: Low

ENVIRONMENTAL BUSINESS CONSULTANTS (EBC) AND EBC'S SUBCONTRACTORS DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION.

## CONSTRUCTION HEALTH AND SAFETY PLAN

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APPENDIX D                      HOSPITAL INFORMATION, MAP AND FIELD ACCIDENT REPORT

## STATEMENT OF COMMITMENT

This Construction Health and Safety Plan (CHASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Activities planned for 140-15 & 140-19 Queens Boulevard, Queens, New York.

This CHASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This CHASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. The General Contractor and their subcontractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees. The General contractor has the option of adopting this CHASP or providing its own for the planned scope of work under the Remedial Action Plan.



## 1.0 INTRODUCTION

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for implementation of a Remedial Action Plan at Redevelopment Project located at 140-15 & 140-19 Queens Boulevard, Queens, New York, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during the removal of underground storage tanks and the excavation and loading of contaminated soil. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to subsurface sample collection activities and is based on the best information available. The CHASP may be revised by EBC at the request of the Owner or the New York City Office of Environmental Remediation (NYCOER) upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's Project Manager, site safety officer and/or the EBC Health and Safety Consultant.

### 1.1 Scope

This CHASP addresses the potential hazards related to the site Remedial Action Plan (RAP). The RAP activities are as described below:

- 1) Site mobilization of General Contractor (GC) and Subcontractors to install the buildings' foundations.
  - a) Excavate soil/historic fill to a depth of approximately 18 feet for the first 65 ft of the lot for construction of a subcellar level.
  - b) Excavate soil/historic fill from the rear portion of the lot (35ft) to a depth of approximately 15 feet for construction of a rear paved yard.

### 1.2 Application

The CHASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- General Contractor
- EBC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

### 1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the CHASP. Amendments to the CHASP are acknowledged by completing forms included in **Appendix B**.

### 1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Construction Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Ms. Chawinie Miller	EBC Project Manager	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000 Cell (631) 827-5007
Mr. Kevin Waters	EBC Site Safety Officer	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this CHASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this CHASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.
2. Coordinating site safety decisions with the project manager.
3. Designating exclusion, decontamination and support zones on a daily basis.
4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.
5. Maintaining the work zone entry/exit log and site entry/exit log.
6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

## 2.0 SITE BACKGROUND AND SCOPE OF WORK

The Site is located at 140-15 & 140-19 Queens Boulevard in the Jamaica section of Queens, New York, and is identified as Block 9620 and Lots 60 and 61 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 5,900-square feet and is bounded by Block 9260 Lot 1 (a commercial gasoline station), to the north, Block 9620 Lot 59 (multi story commercial building) to the south, Block 9260 Lots 13, 14 and 15 (residential buildings) to the east, and Queens Boulevard, Block 9619 Lot 12 (a commercial building) to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is currently vacant land.

The development project consists of redeveloping the lot with a 4-story commercial hotel. The building will cover approximately 65% of the lot and includes a cellar and sub-cellar beneath the footprint of the building. The sub-cellar will be utilized for utility rooms, office space and four hotel units. The cellar level will contain five hotel units, the lobby/reception area, and a lounge. Both the cellar and sub-cellar will have elevator and stair access. The first floor will be comprised entirely of hotel units. The sub-cellar level and foundation will require excavation of 65% of the Site to a total depth of approximately 18 feet below grade. The remaining portions of the lot will be excavated to a depth of 15 feet below grade and developed with a rear yard. Layout of the proposed site development is presented in Figure 3. The current zoning designation is residential (R6A) and commercial (C24). The proposed use is consistent with existing zoning for the property.

### 2.1 Prior Investigations

#### 2.1.1 Remedial Investigation Report

EBC performed a subsurface investigation at the Site consisting of the following;

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed six soil borings across the entire project Site, and collected twelve soil samples and one duplicate soil sample for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three groundwater monitoring wells throughout the Site to establish groundwater flow and collected three groundwater samples and one duplicate groundwater sample for chemical analysis to evaluate groundwater quality; and
4. Installed four soil vapor probes around Site perimeter and collected four samples for chemical analysis.

#### Soil Sampling Results

Soil/fill samples collected during the RI showed no SVOCs or PCBs detected above Unrestricted Use SCOs. Only one VOC, acetone, was detected above UUSCOs in one of the six deep soil samples at a concentration of 71 µg/Kg. No other VOCs were detected in any of the other 11 soil samples. Three pesticides were detected in four of the six shallow samples above UUSCOs and include 4,4' -DDD (3.6, µg/Kg) 4,4' -DDE (maximum concentrations of 6 µg/Kg) and 4,4' -DDT (maximum concentration of 11 µg/Kg). Two metals, including lead (maximum of 232 µg/Kg) and Zinc (maximum of 352 µg/Kg) were detected above the UUSCOs in three of the six shallow samples. No VOCs, with the exception of acetone, SVOCs, pesticides, PCBs or metals

were detected in any of the 6 deep soil samples collected on-site. Overall, the findings were consistent with observations for historical fill sites in areas throughout NYC.

### Groundwater Sampling Results

Groundwater samples collected during the RI showed no VOCs or pesticides. One SVOC, benzo(a)anthracene (maximum concentration 0.02 µg/L), was detected in two wells above the New York State 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). One PCB, PCB-1248 (0.096 µg/L), was detected in the duplicate above the New York State 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). No PCBs were detected in the remaining groundwater samples. Four dissolved metals; iron (maximum concentration of 1.79 mg/L), magnesium (maximum concentration of 52 mg/L), manganese (maximum concentration of 8.51 mg/L) and sodium (maximum concentration of 169 mg/L) were detected in the three wells above the above the New York State 6NYCRR Part 703.5 Groundwater Quality Standards (GQS).

### Soil Vapor Sampling Results

Soil vapor samples collected during the RI showed total concentrations of petroleum-related VOCs (BTEX) ranged from 4.82 µg/m<sup>3</sup> to 108 µg/m<sup>3</sup>. MTBE was non detect in all soil vapor samples. Tetrachloroethene (PCE) was detected in all soil vapor samples at a maximum concentration of 258 µg/m<sup>3</sup>, carbon tetrachloride was also detected in all samples at a concentration of 1.07 µg/m<sup>3</sup>. Trichloroethene (TCE) was detected in all four soil vapor samples at a max concentration of 5.42 µg/m<sup>3</sup> and 1,1,1-Trichloroethane (TCA) was detected in one soil vapor sample at a max concentration of 1.14 µg/m<sup>3</sup>. The PCE and TCE concentrations were above the monitoring level ranges established within the State DOH soil vapor guidance matrix. TCA and carbon tetrachloride were below the monitoring level ranges established within the State DOH soil vapor guidance matrix.

## **2.2 Description of Remedial Action Plan**

Site activities included within the Remedial Action Plan that are included within the scope of this HASP include the following:

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs. 65% of the property will be excavated to a depth of approximately 18 feet below grade with the remainder of the Site excavated to approximately 15 feet below grade for development purposes.
6. Screening of excavated soil/fill during intrusive work for indications of contamination

- by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
  8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
  9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
  10. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
  11. As part of development, installation of a vapor barrier system below the concrete slab underneath the building, as well as behind foundation walls of the proposed building. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from polyethylene and EVOH resins.
  12. As part of development, construction and maintenance of an engineered composite cover consisting of 6" thick concrete slab across the footprint of the new building.
  13. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations. Since groundwater is at a depth of 10 feet below ground surface, dewatering permits will be obtained from NYCDEP.
  14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
  15. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.
  16. If Track 1 Unrestricted Use SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and

certification of Engineering and Institutional Controls and reporting at a specified frequency

17. If Track 1 Unrestricted Use SCOs are not achieved, the property will continue to be flagged with an E-Designation by the NYC Building Department. Establishment of Engineering Controls and Institutional Controls; a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farmings; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval. Preparation of a Community Protection Statement and Performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.

### **3.0 HAZARD ASSESSMENT**

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

#### **3.1 Physical Hazards**

##### *3.1.1 Tripping Hazards*

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

##### *3.1.2 Climbing Hazards*

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

##### *3.1.3 Cuts and Lacerations*

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

##### *3.1.4 Lifting Hazards*

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

##### *3.1.5 Utility Hazards*

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

##### *3.1.6 Traffic Hazards*

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

#### **3.2 Work in Extreme Temperatures**

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

### 3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

#### 1. Prevention

- a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
- b. Work in Pairs. Individuals should avoid undertaking any activity alone.
- c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
- d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

#### 2. Recognition and Treatment

##### a. Heat Rash (or prickly heat):

Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.

Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.

Treatment: Remove source or irritation and cool skin with water or wet cloths.

##### b. Heat Cramps (or heat prostration)

Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.

##### c. Heat Stroke

Cause: Same as heat exhaustion. This is also an extremely serious condition.

Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.

Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

### 3.2.2 Cold Exposure

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

### 3.3 Chemical Hazards

Soil collected from the site as part of several subsurface investigations performed at the site have revealed elevated levels of SVOCs, metals and pesticides in historic fill at the Site.

Metals reported to be present at elevated concentrations in historic fill materials at the Site include the following:

Lead	Zinc
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Pesticides reported to be present at elevated concentrations in historic fill materials at the Site include the following:

4,4'-DDD	4,4'-DDE	4,4'-DDT
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The primary routes of exposure to identified contaminants in soil to on-site construction workers are through inhalation, ingestion and absorption.

**Appendix C** includes information sheets for all detected chemicals that may be encountered at the site.

#### 3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 5,000 µg/m<sup>3</sup> over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

#### 3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over

5,000  $\mu\text{g}/\text{m}^3$  over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

### 3.3.3 *Organic Vapors*

Although no VOCs were detected within any of the soil samples collected at the Site, the site safety officer will periodically monitor organic vapors with a Photo-ionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

### 4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work clothes, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

### 4.2 Level C

Level C PPE shall be donned when sustained concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), by more than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

### 4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection, engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

**5.0 AIR MONITORING AND ACTION LEVELS**

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

**5.1 Air Monitoring Requirements**

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

**5.2 Work Stoppage Responses**

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

- 1 The SSO will be consulted immediately
- 2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
- 3 Monitoring will be continued until intrusive work resumes.

**5.3 Action Levels During Excavation Activities**

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	<ul style="list-style-type: none"> <li>• Continue excavating</li> <li>• Level D protection</li> <li>• Continue monitoring every 10 minutes</li> </ul>
1-5 ppm Above Background, Sustained Reading	1-10%	<ul style="list-style-type: none"> <li>• Continue excavating</li> <li>• Go to Level C protection or employ</li> </ul>

		<p>engineering controls</p> <ul style="list-style-type: none"> <li>• Continue monitoring every 10 minutes</li> </ul>
5-25 ppm Above Background, Sustained Reading	10-20%	<ul style="list-style-type: none"> <li>• Discontinue excavating, unless PID is only action level exceeded.</li> <li>• Level C protection or employ engineering controls</li> <li>• Continue monitoring for organic vapors 200 ft downwind</li> <li>• Continuous monitoring for LEL at excavation pit</li> </ul>
>25 ppm Above Background, Sustained Reading	>20%	<ul style="list-style-type: none"> <li>• Discontinue excavating</li> <li>• Withdraw from area, shut off all engine ignition sources.</li> <li>• Allow pit to vent</li> <li>• Continuous monitoring for organic vapors 200 ft downwind.</li> </ul>

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less than 5 ppm (see Community Air Monitoring Plan).

## 6.0 SITE CONTROL

### 6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book.

**Due to the dimensions of the Site and the work area, it is expected that an exclusion zone will include the entire fenced area with the exception of the construction entrance area, which will serve as the decontamination zone. A support zone if needed will be located outside of the fenced area.** All onsite workers engaged in the excavation of hazardous or contaminated materials must provide evidence of OSHA 24 or 40-hour Hazardous Waste Operations and Emergency Response Operations training to conduct work within the exclusion zone established by the site safety officer. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer, if provided.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

**7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN**

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

**7.1 Emergency Equipment On-site**

- Private telephones: Site personnel.
- Two-way radios: Site personnel where necessary.
- Emergency Alarms: On-site vehicle horns\*.
- First aid kits: On-site, in vehicles or office.
- Fire extinguisher: On-site, in office or on equipment.

\* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

**7.2 Emergency Telephone Numbers**

General Emergencies	911
Suffolk County Police	911
NYC Fire Department	911
Jamaica Hospital Medical Center	(718) 206-6000
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Project Manager	(718) 482-4010
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
Project Manager	1-631-504-6000
Site Safety Officer	1-631-504-6000

**7.3 Personnel Responsibilities During an Emergency**

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager’s on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;
- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;
- Determine the cause of incidents and make recommendations to prevent recurrence; and,
- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

- Project Manager Ms. Chawinie Miller (631) 504-6000
- Site Safety Officer Mr. Kevin Waters (631) 504-6000

#### 7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**) and information on the chemical(s) to which they may have been exposed (**Appendix C**).

#### 7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

#### 7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.

- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

### **7.7 Spill Control Procedures**

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

### **7.8 Vapor Release Plan**

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

***APPENDIX A***  
***SITE SAFETY ACKNOWLEDGEMENT FORM***

### DAILY BRIEFING SIGN-IN SHEET

Date: \_\_\_\_\_ Person Conducting Briefing: \_\_\_\_\_

Project Name and Location: \_\_\_\_\_

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc...):

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2. OTHER ISSUES (HASP changes, attendee comments, etc...):

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3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

***APPENDIX B***  
***SITE SAFETY PLAN AMENDMENTS***

**SITE SAFETY PLAN AMENDMENT FORM**

Site Safety Plan Amendment #: \_\_\_\_\_

Site Name: \_\_\_\_\_

Reason for Amendment: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Alternative Procedures: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Required Changes in PPE: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Project Superintendent (signature)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Health and Safety Consultant (signature)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Site Safety Officer (signature)

\_\_\_\_\_  
Date

# ***APPENDIX C***

## ***CHEMICAL HAZARDS***

### **CHEMICAL HAZARDS**

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

# International Chemical Safety Cards

VINYL CHLORIDE

ICSC: 0082



Chloroethene  
Chloroethylene  
VCM  
 $C_2H_3Cl / H_2C=CHCl$   
Molecular mass: 62.5  
(cylinder)



ICSC # 0082  
CAS # 75-01-4  
RTECS # [KU9625000](#)  
UN # 1086 (stabilized)  
EC # 602-023-00-7  
April 13, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
<b>EXPLOSION</b>	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	<b>IN ALL CASES CONSULT A DOCTOR!</b>
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	<b>ON CONTACT WITH LIQUID: FROSTBITE.</b>	Protective gloves. Cold-insulating gloves. Protective clothing.	<b>ON FROSTBITE:</b> rinse with plenty of water, do NOT remove clothes.
<b>•EYES</b>	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: complete protective clothing including self-contained breathing apparatus.	Fireproof. Separated from incompatible materials. ( See Chemical Dangers. ) Cool. Store only if stabilized.	Note: D F+ symbol T symbol R: 45-12 S: 53-45 UN Hazard Class: 2.1

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0082**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## VINYL CHLORIDE

ICSC: 0082

<p><b>I M P O R T A N T  D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.</p> <p><b>CHEMICAL DANGERS:</b> The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes ( hydrogen chloride , phosgene ). Attacks iron and steel in the presence of moisture.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 1 ppm as TWA; A1 (confirmed human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 1; (DFG 2004). OSHA PEL: 1910.1017 TWA 1 ppm C 5 ppm 15-minute NIOSH REL: Ca <a href="#">See Appendix A</a> NIOSH IDLH: Ca N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p> <p><b>INHALATION RISK:</b> A harmful concentration of this gas in the air will be reached very quickly on loss of containment.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes . The liquid may cause frostbite. The substance may cause effects on the central nervous system . Exposure could cause lowering of consciousness. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver, spleen, blood and peripheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: -13°C Melting point: -154°C Relative density (water = 1): 0.9 (liquid) Density: 8 (vapour) at 15°C g/l Solubility in water: none</p>	<p>Relative vapour density (air = 1): 2.2 Flash point: -78°C c.c. Auto-ignition temperature: 472°C Explosive limits, vol% in air: 3.6-33 Octanol/water partition coefficient as log Pow: 0.6</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>This substance may be hazardous to the environment; special attention should be given to ground water contamination.</p>	
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### NOTES

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-20S1086

NFPA Code: H 2; F 4; R 2;

### ADDITIONAL INFORMATION

ICSC: 0082

VINYL CHLORIDE

# International Chemical Safety Cards

## TRICHLOROETHYLENE

ICSC: 0081



1,1,2-Trichloroethylene  
Trichloroethene  
Ethylene trichloride  
Acetylene trichloride  
 $C_2HCl_3$  /  $CICH=CCl_2$   
Molecular mass: 131.4

ICSC # 0081  
CAS # 79-01-6  
RTECS # [KX4550000](#)  
UN # 1710  
EC # 602-027-00-9  
April 10, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.	Separated from metals ( see Chemical Dangers ), strong bases, food and feedstuffs . Dry. Keep in the dark. Ventilation along the floor. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the

ICSC: 0081

OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## TRICHLOROETHYLENE

ICSC: 0081

<p style="text-align: center;"><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes ( phosgene , hydrogen chloride ). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004). MAK: Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2007). OSHA PEL<sup>†</sup>: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours) NIOSH REL: Ca <a href="#">See Appendix A</a> <a href="#">See Appendix C</a> NIOSH IDLH: Ca 1000 ppm See: <a href="#">79016</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in respiratory failure . Exposure could cause lowering of consciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.</p>
<p style="text-align: center;"><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 87°C Melting point: -73°C Relative density (water = 1): 1.5 Solubility in water, g/100 ml at 20°C: 0.1 Vapour pressure, kPa at 20°C: 7.8 Relative vapour density (air = 1): 4.5</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3 Auto-ignition temperature: 410°C Explosive limits, vol% in air: 8-10.5 Octanol/water partition coefficient as log Pow: 2.42 Electrical conductivity: 800pS/m</p>
<p style="text-align: center;"><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p> 	
<p><b>NOTES</b></p>		
<p>Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61S1710</p> <p style="text-align: right;">NFPA Code: H2; F1; R0;</p> <p>Card has been partially updated in October 2004: see Occupational Exposure Limits, EU Classification, Emergency Response. Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Storage.</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		
Empty space for additional information		

# International Chemical Safety Cards

**TOLUENE**

ICSC: 0078



Methylbenzene  
Toluol  
Phenylmethane  
 $C_6H_5CH_3 / C_7H_8$   
Molecular mass: 92.1

ICSC # 0078  
CAS # 108-88-3  
RTECS # [XS5250000](#)  
UN # 1294  
EC # 601-021-00-3  
October 10, 2002 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0078**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**TOLUENE**

**ICSC: 0078**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 50 ppm 190 mg/m<sup>3</sup> H Peak limitation category: II(4) Pregnancy risk group: C (DFG 2004). OSHA PEL<sup>†</sup>: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak) NIOSH REL: TWA 100 ppm (375 mg/m<sup>3</sup>) ST 150 ppm (560 mg/m<sup>3</sup>) NIOSH IDLH: 500 ppm See: <a href="#">108883</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the respiratory tract The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmia and unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 111°C Melting point: -95°C Relative density (water = 1): 0.87 Solubility in water: none Vapour pressure, kPa at 25°C: 3.8 Relative vapour density (air = 1): 3.1</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 4°C c.c. Auto-ignition temperature: 480°C Explosive limits, vol% in air: 1.1-7.1 Octanol/water partition coefficient as log Pow: 2.69</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1294  
NFPA Code: H 2; F 3; R 0;

**ADDITIONAL INFORMATION**

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**ICSC: 0078** **TOLUENE**

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

## TETRACHLOROETHYLENE

ICSC: 0076



1,1,2,2-Tetrachloroethylene  
 Perchloroethylene  
 Tetrachloroethene  
 $C_2Cl_4 / Cl_2C=CCl_2$   
 Molecular mass: 165.8

ICSC # 0076  
 CAS # 127-18-4  
 RTECS # [KX3850000](#)  
 UN # 1897  
 EC # 602-028-00-4  
 April 13, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		STRICT HYGIENE! PREVENT GENERATION OF MISTS!	
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	Safety goggles , face shield .	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Separated from metals ,( see Chemical Dangers ), food and feedstuffs . Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0076**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## TETRACHLOROETHYLENE

ICSC: 0076

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air.</p> <p><b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004). MAK: skin absorption (H); Carcinogen category: 3B; (DFG 2004). OSHA PEL<sup>+</sup>: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours) NIOSH REL: Ca Minimize workplace exposure concentrations. <a href="#">See Appendix A</a> NIOSH IDLH: Ca 150 ppm See: <a href="#">127184</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 121°C Melting point: -22°C Relative density (water = 1): 1.6 Solubility in water, g/100 ml at 20°C: 0.015</p>	<p>Vapour pressure, kPa at 20°C: 1.9 Relative vapour density (air = 1): 5.8 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09 Octanol/water partition coefficient as log Pow: 2.9</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p>	
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### NOTES

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1897

NFPA Code: H2; F0; R0;

### ADDITIONAL INFORMATION

<p><b>ICSC: 0076</b></p>	<p><b>TETRACHLOROETHYLENE</b></p>
<p>(C) IPCS, CEC, 1994</p>	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only</p>
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**1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : *tert*-Butylbenzene

Product Number : B90602  
Brand : Aldrich

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # : (314) 776-6555

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : 2-Methyl-2-phenylpropane

Formula : C<sub>10</sub>H<sub>14</sub>  
Molecular Weight : 134.22 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>tert-Butylbenzene</b>			
98-06-6	202-632-4	-	-

**3. HAZARDS IDENTIFICATION****Emergency Overview****OSHA Hazards**

Flammable Liquid, Irritant

**HMIS Classification**

Health Hazard: 2  
Flammability: 3  
Physical hazards: 0

**NFPA Rating**

Health Hazard: 2  
Fire: 3  
Reactivity Hazard: 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.  
**Skin** May be harmful if absorbed through skin. Causes skin irritation.  
**Eyes** Causes eye irritation.  
**Ingestion** May be harmful if swallowed.

#### 4. FIRST AID MEASURES

##### General advice

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

##### If inhaled

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

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

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

##### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### 5. FIRE-FIGHTING MEASURES

##### Flammable properties

Flash point 34.0 °C (93.2 °F) - closed cup

Ignition temperature 450 °C (842 °F)

##### Suitable extinguishing media

For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

##### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

##### Further information

Use water spray to cool unopened containers.

#### 6. ACCIDENTAL RELEASE MEASURES

##### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

##### Environmental precautions

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

##### Methods for cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

#### 7. HANDLING AND STORAGE

##### Handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

##### Storage

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 in cool place.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### 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).

#### Hand protection

Handle with gloves.

#### Eye protection

Face shield and safety glasses

#### Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

#### Hygiene measures

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

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid, clear
Colour	colourless

### Safety data

pH	no data available
Melting point	-58 °C (-72 °F) - lit.
Boiling point	169 °C (336 °F) - lit.
Flash point	34.0 °C (93.2 °F) - closed cup
Ignition temperature	450 °C (842 °F)
Lower explosion limit	0.8 %(V)
Density	0.867 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 3.80

## 10. STABILITY AND REACTIVITY

### Storage stability

Stable under recommended storage conditions.

### Conditions to avoid

Heat, flames and sparks.

### Materials to avoid

Strong oxidizing agents

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

**Hazardous reactions**

Vapours may form explosive mixture with air.

**11. TOXICOLOGICAL INFORMATION****Acute toxicity**

LD50 Oral - rat - 3,045 mg/kg

Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands.

**Irritation and corrosion**

no data available

**Sensitisation**

no data available

**Chronic exposure**

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.

**Signs and Symptoms of Exposure**

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

**Potential Health Effects**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.

**Additional Information**

RTECS: CY9120000

**12. ECOLOGICAL INFORMATION****Elimination information (persistence and degradability)**

no data available

**Ecotoxicity effects**

Toxicity to fish	LC0 - Leuciscus idus (Golden orfe) - 44 mg/l - 48 h
	LC50 - Leuciscus idus (Golden orfe) - 65 mg/l - 48 h
Toxicity to daphnia and other aquatic	LC50 - Daphnia magna (Water flea) - 41 mg/l - 24 h

invertebrates.

#### Further information on ecology

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

### 13. DISPOSAL CONSIDERATIONS

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. 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: 2709 Class: 3 Packing group: III  
Proper shipping name: Butyl benzenes  
Marine pollutant: No  
Poison Inhalation Hazard: No

#### IMDG

UN-Number: 2709 Class: 3 Packing group: III EMS-No: F-E, S-D  
Proper shipping name: BUTYLBENZENES  
Marine pollutant: No

#### IATA

UN-Number: 2709 Class: 3 Packing group: III  
Proper shipping name: Butylbenzenes

### 15. REGULATORY INFORMATION

#### OSHA Hazards

Flammable Liquid, Irritant

#### DSL Status

All components of this product are on the Canadian DSL list.

#### SARA 302 Components

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

#### SARA 313 Components

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

#### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
tert-Butylbenzene	98-06-6	1993-04-24

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
tert-Butylbenzene	98-06-6	1993-04-24

**New Jersey Right To Know Components**

tert-Butylbenzene

CAS-No.  
98-06-6

Revision Date  
1993-04-24

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

**16. OTHER INFORMATION**

**Further information**

Copyright 2009 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# International Chemical Safety Cards

**o-XYLENE**

ICSC: 0084



ortho-Xylene  
1,2-Dimethylbenzene  
o-Xylol  
 $C_6H_4(CH_3)_2 / C_8H_{10}$   
Molecular mass: 106.2

ICSC # 0084  
CAS # 95-47-6  
RTECS # [ZE2450000](#)  
UN # 1307  
EC # 601-022-00-9  
August 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 32°C explosive vapour/air mixtures may be formed.	Above 32°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants strong acids	Note: C Xn symbol R: 10-20/21-38 S: 2-25 UN Hazard Class: 3 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0084**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**o-XYLENE**

**ICSC: 0084**

<p><b>I M P O R T A N T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m<sup>3</sup> Peak limitation category: II(2) skin absorption (H); Pregnancy risk group: D (DFG 2005). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL<sup>†</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 144°C Melting point: -25°C Relative density (water = 1): 0.88 Solubility in water: none Vapour pressure, kPa at 20°C: 0.7</p>	<p>Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 32°C c.c. Auto-ignition temperature: 463°C Explosive limits, vol% in air: 0.9-6.7 Octanol/water partition coefficient as log Pow: 3.12</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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**NOTES**

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0086 p-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III  
NFPA Code: H 2; F 3; R 0;

**ADDITIONAL INFORMATION**

<b>ICSC: 0084</b>	<b>o-XYLENE</b>
(C) IPCS, CEC, 1994	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# Material Safety Data Sheet

## Normal-Butylbenzene, 99+%

ACC# 55434

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Normal-Butylbenzene, 99+%

**Catalog Numbers:** AC107850000, AC107850050, AC107850250, AC107850500, AC107851000, AC107852500  
AC107852500

**Synonyms:** 1-Phenylbutane

**Company Identification:**

Acros Organics N.V.

One Reagent Lane

Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01

**For emergencies in the US, call CHEMTREC:** 800-424-9300

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
104-51-8	n-Butylbenzene	>99	203-209-7

### Section 3 - Hazards Identification

#### EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 59 deg C.

**Warning! Flammable liquid and vapor.** May cause eye and skin irritation. May cause respiratory and digestive tract irritation. The toxicological properties of this material have not been fully investigated.

**Target Organs:** Liver, nervous system.

#### Potential Health Effects

**Eye:** May cause eye irritation. The toxicological properties of this material have not been fully investigated.

**Skin:** May cause skin irritation. The toxicological properties of this material have not been fully investigated.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. The toxicological properties of this substance have not been fully investigated.

**Inhalation:** May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. Vapors may cause dizziness or suffocation.

**Chronic:** No information found.

### Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

**Ingestion:** Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable liquid and vapor. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Use agent most appropriate to extinguish fire. Do NOT use straight streams of water.

**Flash Point:** 59 deg C ( 138.20 deg F)

**Autoignition Temperature:** 412 deg C ( 773.60 deg F)

**Explosion Limits, Lower:** .80 vol %

**Upper:** 5.80 vol %

**NFPA Rating:** (estimated) Health: 1; Flammability: 2; Instability: 0

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use adequate ventilation to keep airborne concentrations low. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
n-Butylbenzene	none listed	none listed	none listed

**OSHA Vacated PELs:** n-Butylbenzene: No OSHA Vacated PELs are listed for this chemical.

### Personal Protective Equipment

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

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions. Follow the OSHA respirator regulations found in 29

CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** None reported.

**pH:** Not available.

**Vapor Pressure:** 1.33 hPa @ 23 C

**Vapor Density:** 4.6

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** 183 deg C @ 760.00mm Hg

**Freezing/Melting Point:** -88 deg C

**Decomposition Temperature:** > 183 deg C

**Solubility:** insoluble

**Specific Gravity/Density:** .8600g/cm<sup>3</sup>

**Molecular Formula:** C<sub>10</sub>H<sub>14</sub>

**Molecular Weight:** 134.22

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Incompatible materials, ignition sources, excess heat, strong oxidants.

**Incompatibilities with Other Materials:** Oxidizing agents.

**Hazardous Decomposition Products:** Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

**Hazardous Polymerization:** Has not been reported.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 104-51-8: CY9070000

**LD50/LC50:**

Not available.

**Carcinogenicity:**

**CAS#** 104-51-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information available.

**Teratogenicity:** No information available.

**Reproductive Effects:** No information available.

**Mutagenicity:** No information available.

**Neurotoxicity:** No information available.

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. No information available.

**Environmental:** Rapidly volatilizes into the atmosphere where it is photochemically degraded by hydroxyl radicals.

**Physical:** No information available.

**Other:** No information available.

## Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	BUTYL BENZENES	No information available.
<b>Hazard Class:</b>	3	
<b>UN Number:</b>	UN2709	
<b>Packing Group:</b>	III	

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 104-51-8 is listed on the TSCA inventory.

#### Health & Safety Reporting List

CAS# 104-51-8: Effective 6/1/87, Sunset 12/19/95

#### Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

#### Section 12b

None of the chemicals are listed under TSCA Section 12b.

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 104-51-8: immediate, fire.

**Section 313** No chemicals are reportable under Section 313.

#### Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

#### Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

#### OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

#### STATE

CAS# 104-51-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

#### California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

## European/International Regulations

### European Labeling in Accordance with EC Directives

#### Hazard Symbols:

Not available.

#### Risk Phrases:

R 10 Flammable.

#### Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.

S 24/25 Avoid contact with skin and eyes.

S 33 Take precautionary measures against static discharges.

S 37 Wear suitable gloves.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 9 Keep container in a well-ventilated place.

S 28A After contact with skin, wash immediately with plenty of water

#### WGK (Water Danger/Protection)

CAS# 104-51-8: 1

#### Canada - DSL/NDSL

CAS# 104-51-8 is listed on Canada's DSL List.

#### Canada - WHMIS

This product has a WHMIS classification of B3, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

#### Canadian Ingredient Disclosure List

## Section 16 - Additional Information

**MSDS Creation Date:** 4/15/1998

**Revision #4 Date:** 3/16/2007

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.*

# International Chemical Safety Cards

## NAPHTHALENE

ICSC: 0667



Naphthene  
C<sub>10</sub>H<sub>8</sub>

Molecular mass: 128.18

ICSC # 0667  
 CAS # 91-20-3  
 RTECS # [QJ0525000](#)  
 UN # 1334 (solid); 2304 (molten)  
 EC # 601-052-00-2  
 April 21, 2005 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
<b>•INHALATION</b>	Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! (Further see Inhalation).	Protective gloves.	Rinse skin with plenty of water or shower.
<b>•EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 22-40-50/53 S: 2-36/37-46-60-61 UN Hazard Class: 4.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0667**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## NAPHTHALENE

ICSC: 0667

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms irritating and toxic gases. Reacts with strong oxidants .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 10 ppm as TWA; 15 ppm as STEL; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004). OSHA PEL<sup>†</sup>: TWA 10 ppm (50 mg/m<sup>3</sup>) NIOSH REL: TWA 10 ppm (50 mg/m<sup>3</sup>) ST 15 ppm (75 mg/m<sup>3</sup>) NIOSH IDLH: 250 ppm See: <a href="#">91203</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the blood , resulting in lesions of blood cells (haemolysis) . See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the blood , resulting in chronic haemolytic anaemia. The substance may have effects on the eyes , resulting in the development of cataract. This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 218°C</p> <p>Sublimation slowly at room temperature</p> <p>Melting point: 80°C</p> <p>Density: 1.16 g/cm<sup>3</sup></p> <p>Solubility in water, g/100 ml at 25°C: none</p>	<p>Vapour pressure, Pa at 25°C: 11</p> <p>Relative vapour density (air = 1): 4.42</p> <p>Flash point: 80°C c.c.</p> <p>Auto-ignition temperature: 540°C</p> <p>Explosive limits, vol% in air: 0.9-5.9</p> <p>Octanol/water partition coefficient as log Pow: 3.3</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p>	
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**NOTES**

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)

NFPA Code: H2; F2; R0;

**ADDITIONAL INFORMATION**

<b>ICSC: 0667</b>	<b>NAPHTHALENE</b>
(C) IPCS, CEC, 1994	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

## METHYL TERT-BUTYL ETHER

ICSC: 1164



tert-Butyl methyl ether  
MTBE  
Methyl-1,1-dimethylethyl ether  
2-Methoxy-2-methyl propane  
 $(\text{CH}_3)_3\text{COCH}_3 / \text{C}_5\text{H}_{12}\text{O}$   
Molecular mass: 88.2

ICSC # 1164  
CAS # 1634-04-4  
RTECS # [KN525000](#)  
UN # 2398  
EC # 603-181-00-X  
November 04, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>			
<b>•INHALATION</b>	Drowsiness. Dizziness. Headache. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness.	Safety goggles or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants, strong acids.	F symbol Xi symbol R: 11-38 S: 2-9-16-24 UN Hazard Class: 3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1164**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## METHYL TERT-BUTYL ETHER

**ICSC: 1164**

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air and may travel along the ground; distant ignition possible.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with strong oxidants causing fire hazard. The substance decomposes on contact with acids.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA; A3; (ACGIH 2004). MAK: 50 ppm, 180 mg/m<sup>3</sup>; Peak limitation category: I(1.5); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the skin. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure far above the OEL could cause lowering of consciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 55°C Melting point: -109°C Relative density (water = 1): 0.7 Solubility in water, g/100 ml at 20°C: 4.2 Vapour pressure, kPa at 20°C: 27 Relative vapour density (air = 1): 3.0</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.5 Flash point: -28°C c.c. Auto-ignition temperature: 375°C Explosive limits, vol% in air: 1.6-15.1 Octanol/water partition coefficient as log Pow: 1.06</p>
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<b>ENVIRONMENTAL DATA</b>	<p>It is strongly advised not to let the chemical enter into the environment because it persists in the environment.</p>	
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### NOTES

Much less likely to form peroxides than other ethers. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-30GF1-I+II

### ADDITIONAL INFORMATION

**ICSC: 1164**

**METHYL TERT-BUTYL ETHER**

(C) IPCS, CEC, 1994

<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

**ETHYLBENZENE**

ICSC: 0268



Ethylbenzol  
Phenylethane  
EB

$C_8H_{10} / C_6H_5C_2H_5$

Molecular mass: 106.2

ICSC # 0268

CAS # 100-41-4

RTECS # [DA0700000](#)

UN # 1175

EC # 601-023-00-4

March 13, 1995 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
• <b>INHALATION</b>	Cough. Dizziness. Drowsiness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain. Blurred vision.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	(Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: A filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-20 S: 2-16-24/25-29 UN Hazard Class: 3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0268**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## ETHYLBENZENE

ICSC: 0268

<b>I M P O R T A N T A D V I S I O N</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH AROMATIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour mixes well with air, explosive mixtures are easily formed.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong oxidants. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 125 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 3A; (DFG 2004). OSHA PEL: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 125 ppm (545 mg/m<sup>3</sup>) NIOSH IDLH: 800 ppm 10%LEL See: <a href="#">100414</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system Exposure far above the OEL could cause lowering of consciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 136°C Melting point: -95°C Relative density (water = 1): 0.9 Solubility in water, g/100 ml at 20°C: 0.015 Vapour pressure, kPa at 20°C: 0.9 Relative vapour density (air = 1): 3.7</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 18°C c.c. Auto-ignition temperature: 432°C Explosive limits, vol% in air: 1.0-6.7 Octanol/water partition coefficient as log Pow: 3.2</p>
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is harmful to aquatic organisms.</p>	
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### NOTES

The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1175 or 30GF1-I+II  
NFPA Code: H2; F3; R0

### ADDITIONAL INFORMATION

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**ICSC: 0268** **ETHYLBENZENE**

(C) IPCS, CEC, 1994

<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# Material Safety Data Sheet

## cis-1,2-Dichloroethylene, 97%

ACC# 97773

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** cis-1,2-Dichloroethylene, 97%

**Catalog Numbers:** AC113380000, AC113380025, AC113380100

**Synonyms:** cis-Acetylene dichloride.

**Company Identification:**

Acros Organics N.V.

One Reagent Lane

Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01

**For emergencies in the US, call CHEMTREC:** 800-424-9300

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
156-59-2	cis-1,2-Dichloroethylene	97	205-859-7

### Section 3 - Hazards Identification

#### EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.

**Warning! Flammable liquid and vapor.** Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.

**Target Organs:** Central nervous system, respiratory system, eyes, skin.

#### Potential Health Effects

**Eye:** Causes moderate eye irritation.

**Skin:** Causes moderate skin irritation. May cause dermatitis.

**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.

**Inhalation:** May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.

**Chronic:** Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

### Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.

**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.

**Extinguishing Media:** Use water fog, dry chemical, carbon dioxide, or regular foam.

**Flash Point:** 6 deg C ( 42.80 deg F)

**Autoignition Temperature:** 440 deg C ( 824.00 deg F)

**Explosion Limits, Lower:** 9.70 vol %

**Upper:** 12.80 vol %

**NFPA Rating:** (estimated) Health: 2; Flammability: 3; Instability: 2

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.

**Storage:** Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
cis-1,2-Dichloroethylene	200 ppm TWA	none listed	none listed

**OSHA Vacated PELs:** cis-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.

### Personal Protective Equipment

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

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

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid  
**Appearance:** Clear  
**Odor:** Pleasant odor  
**pH:** Not available.  
**Vapor Pressure:** 201 mm Hg @ 25 deg C  
**Vapor Density:** 3.34 (air=1)  
**Evaporation Rate:**Not available.  
**Viscosity:** Not available.  
**Boiling Point:** 60 deg C @ 760 mm Hg  
**Freezing/Melting Point:**-80 deg C  
**Decomposition Temperature:**Not available.  
**Solubility:** Insoluble.  
**Specific Gravity/Density:**1.2800  
**Molecular Formula:**C2H2Cl2  
**Molecular Weight:**96.94

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.  
**Conditions to Avoid:** Light, ignition sources, exposure to air, excess heat.  
**Incompatibilities with Other Materials:** Strong oxidizing agents, strong bases, copper.  
**Hazardous Decomposition Products:** Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.  
**Hazardous Polymerization:** May occur.

## Section 11 - Toxicological Information

**RTECS#:**  
**CAS#** 156-59-2: KV9420000  
**LD50/LC50:**  
CAS# 156-59-2:  
Inhalation, rat: LC50 = 13700 ppm;  
**Carcinogenicity:**  
CAS# 156-59-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.  
**Epidemiology:** No data available.  
**Teratogenicity:** No data available.  
**Reproductive Effects:** No data available.  
**Mutagenicity:** No data available.  
**Neurotoxicity:** No data available.  
**Other Studies:**

## Section 12 - Ecological Information

No information available.

## Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:** None listed.

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	DOT regulated - small quantity provisions apply (see 49CFR173.4)	1,2-DICHLOROETHYLENE
<b>Hazard Class:</b>		3
<b>UN Number:</b>		UN1150
<b>Packing Group:</b>		II

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 156-59-2 is listed on the TSCA inventory.

#### Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

#### Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

#### Section 12b

None of the chemicals are listed under TSCA Section 12b.

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### Section 313

No chemicals are reportable under Section 313.

#### Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

#### Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

#### OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

#### STATE

CAS# 156-59-2 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

#### California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

### European/International Regulations

#### European Labeling in Accordance with EC Directives

#### Hazard Symbols:

XN F

#### Risk Phrases:

R 11 Highly flammable.  
R 20 Harmful by inhalation.  
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.  
S 29 Do not empty into drains.  
S 7 Keep container tightly closed.  
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**

CAS# 156-59-2: No information available.

**Canada - DSL/NDSL**

CAS# 156-59-2 is listed on Canada's NDSL List.

**Canada - WHMIS**

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

<b>Section 16 - Additional Information</b>
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**MSDS Creation Date:** 2/09/1998

**Revision #5 Date:** 3/16/2007

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.*

# International Chemical Safety Cards

**BENZENE**

ICSC: 0015



Cyclohexatriene  
Benzol  
C<sub>6</sub>H<sub>6</sub>  
Molecular mass: 78.1

ICSC # 0015  
CAS # 71-43-2  
RTECS # [CY1400000](#)  
UN # 1114  
EC # 601-020-00-8  
May 06, 2003 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive. Risk of fire and explosion: see Chemical Dangers.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! Dry skin. Redness. Pain. (Further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
<b>•EYES</b>	Redness. Pain.	Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. Sore throat. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Fireproof. Separated from food and feedstuffs oxidants halogens	Do not transport with food and feedstuffs. Note: E F symbol T symbol R: 45-46-11-36/38-48/23/24/25-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0015**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**BENZENE**

ICSC: 0015

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 ppm as TWA 2.5 ppm as STEL (skin) A1 BEI (ACGIH 2004). MAK: H Carcinogen category: 1 Germ cell mutagen group: 3A (DFG 2004). OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm <a href="#">See Appendix F</a> NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 ppm See: <a href="#">71432</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation through the skin and by ingestion</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in lowering of consciousness Exposure far above the occupational exposure limit value may result in unconsciousness death</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the bone marrow immune system , resulting in a decrease of blood cells. This substance is carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 80°C Melting point: 6°C Relative density (water = 1): 0.88 Solubility in water, g/100 ml at 25°C: 0.18 Vapour pressure, kPa at 20°C: 10 Relative vapour density (air = 1): 2.7</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: -11°C c.c. Auto-ignition temperature: 498°C Explosive limits, vol% in air: 1.2-8.0 Octanol/water partition coefficient as log Pow: 2.13</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms.</p>	
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**NOTES**

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II  
NFPA Code: H2; F3; R0

**ADDITIONAL INFORMATION**

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**ICSC: 0015** **BENZENE**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

1,3,5-TRIMETHYLBENZENE

ICSC: 1155



Mesitylene  
 $C_9H_{12}$   
 Molecular mass: 120.2

ICSC # 1155  
 CAS # 108-67-8  
 RTECS # [OX6825000](#)  
 UN # 2325  
 EC # 601-025-00-5  
 March 06, 2002 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
<b>EXPLOSION</b>	Above 50°C explosive vapour/air mixtures may be formed.	Above 50°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
<b>•INHALATION</b>	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Redness. Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>•EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	Marine pollutant. Xi symbol N symbol R: 10-37-51/53 S: 2-61 UN Hazard Class: 3 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 1155

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## 1,3,5-TRIMETHYLBENZENE

ICSC: 1155

<p><b>I M P O R T A N T A D V I S I O N</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic and irritating fumes. Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (as mixed isomers): 25 ppm; (ACGIH 2001). MAK (all isomers): 20 ppm; 100 mg/m<sup>3</sup>; class II 1 © (2001) OSHA PEL<sup>†</sup>: none NIOSH REL: TWA 25 ppm (125 mg/m<sup>3</sup>) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure, resulting in chronic bronchitis. The substance may have effects on the central nervous system blood See Notes.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 165°C Melting point: -45°C Relative density (water = 1): 0.86 Solubility in water: very poor Vapour pressure, kPa at 20°C: 0.25</p>	<p>Relative vapour density (air = 1): 4.1 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 50°C (c.c.) Auto-ignition temperature: 550°C Octanol/water partition coefficient as log Pow: 3.42</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is harmful to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</p>	
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**NOTES**

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. See ICSC 1433 1,2,4-Trimethylbenzene (Pseudocumene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethylbenzene (mixed isomers).

Transport Emergency Card: TEC (R)-30S2325  
NFPA Code: H0; F2; R0

**ADDITIONAL INFORMATION**

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<b>ICSC: 1155</b>		<b>1,3,5-TRIMETHYLBENZENE</b>
(C) IPCS, CEC, 1994		

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

1,2,4-TRIMETHYLBENZENE

ICSC: 1433



Pseudocumene  
 $C_9H_{12}$   
 Molecular mass: 120,2

ICSC # 1433  
 CAS # 95-63-6  
 RTECS # [DC3325000](#)  
 UN # 1993  
 EC # 601-043-00-3  
 March 06, 2002 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
<b>EXPLOSION</b>	Above 44°C explosive vapour/air mixtures may be formed.	Above 44°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
• <b>INHALATION</b>	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness. Dry skin.	Protective gloves.	Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	Xn symbol N symbol R: 10-20-36/37/38-51/53 S: 2-26-61 UN Hazard Class: 3 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 1433

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## 1,2,4-TRIMETHYLBENZENE

ICSC: 1433

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic and irritating fumes Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (as mixed isomers) 25 ppm as TWA (ACGIH 2004). MAK: (as mixed isomers) 20 ppm 100 mg/m<sup>3</sup> Peak limitation category: II(2) Pregnancy risk group: C (DFG 2004). OSHA PEL<sup>†</sup>: none NIOSH REL: TWA 25 ppm (125 mg/m<sup>3</sup>) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure , resulting in chronic bronchitis The substance may have effects on the central nervous system blood See Notes.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 169°C Melting point: -44°C Relative density (water = 1): 0.88 Solubility in water: very poor Relative vapour density (air = 1): 4.1</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 44°C c.c. Auto-ignition temperature: 500°C Explosive limits, vol% in air: 0.9-6.4 Octanol/water partition coefficient as log Pow: 3.8</p>
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</p>	
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### NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. See also ICSC 1155 1,3,5-Trimethylbenzene (Mesitylene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethylbenzene (mixed isomers). 1,3,5-Trimethylbenzene (Mesitylene) is classified as a marine pollutant.

Transport Emergency Card: TEC (R)-30GF1-III  
NFPA Code: H0; F2; R0;

### ADDITIONAL INFORMATION

<b>ICSC: 1433</b>	<b>1,2,4-TRIMETHYLBENZENE</b>
<small>(C) IPCS, CEC, 1994</small>	

<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

## 1,1,1,2-TETRACHLOROETHANE

ICSC: 1486



$C_2H_2Cl_4 / Cl_3CCH_2Cl$   
Molecular mass: 167.8

ICSC # 1486  
CAS # 630-20-6  
RTECS # [K18450000](#)  
UN # 1702  
April 23, 2004 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.	NO contact with hot surfaces. NO open flames.	In case of fire in the surroundings: powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>			In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>			
• <b>INHALATION</b>	Headache. Nausea. Shortness of breath. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest.
• <b>SKIN</b>	Redness. Burning sensation. Pain.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Burning sensation. Headache. Nausea.	Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Refer for medical attention. Give plenty of water to drink.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking liquid in covered containers. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment.	Separated from strong oxidants, strong bases. Well closed.	Do not transport with food and feedstuffs. UN Hazard Class: 6.1 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1486**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## 1,1,1,2-TETRACHLOROETHANE

ICSC: 1486

I

<p><b>M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> YELLOW TO RED LIQUID .</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating producing toxic and corrosive gases including hydrogen chloride . Reacts with strong bases and strong oxidants .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK not established. OSHA PEL: none NIOSH REL: Handle with caution in the workplace. <a href="#">See Appendix C</a> (Chloroethanes) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion and by inhalation.</p> <p><b>INHALATION RISK:</b> No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin . The substance may cause effects on the central nervous system .</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 130.5°C Melting point: -70.2°C Relative density (water = 1): 1.54	Solubility in water, g/100 ml at 25°C: 0.11 Vapour pressure, kPa at 25°C: 1.9 Octanol/water partition coefficient as log Pow: 2.66
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<b>ENVIRONMENTAL DATA</b>	The substance is harmful to aquatic organisms.	
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**NOTES**

See ICSC 0332 1,1,2,2,-Tetrachloroethane. Transport Emergency Card: TEC (R)-61GT1-II

**ADDITIONAL INFORMATION**

<b>ICSC: 1486</b>	<b>1,1,1,2-TETRACHLOROETHANE</b>
(C) IPCS, CEC, 1994	

<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
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# International Chemical Safety Cards

**PYRENE**

ICSC: 1474



Benzo (d,e,f) phenanthrene  
beta-Pyrene  
 $C_{16}H_{10}$   
Molecular mass: 202.26

ICSC # 1474  
CAS # 129-00-0  
RTECS # [UR2450000](#)  
November 27, 2003 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Water spray, carbon dioxide, dry powder, alcohol-resistant foam, foam.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>			
• <b>INHALATION</b>		Avoid inhalation of dust	Fresh air, rest.
• <b>SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles.)	Separated from strong oxidants. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. R: S:

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 1474

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**PYRENE**

ICSC: 1474

I  M	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW COLOURLESS SOLID IN VARIOUS FORMS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation through the skin and by ingestion
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**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**

The substance decomposes on heating producing irritating fumes

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.  
MAK not established.

**INHALATION RISK:**

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**

Exposure to sun may provoke an irritating effect of pyrene on skin and lead to chronic skin discoloration.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

**PHYSICAL PROPERTIES**

Boiling point: 404°C  
Melting point: 151°C  
Density: 1.27 g/cm<sup>3</sup>

Solubility in water: 0.135 mg/l at 25°C  
Vapour pressure, Pa at °C: 0.08  
Octanol/water partition coefficient as log Pow: 4.88

**ENVIRONMENTAL DATA**

Bioaccumulation of this chemical may occur in crustacea, in fish, in milk, in algae and in molluscs. It is strongly advised that this substance does not enter the environment.



**NOTES**

Pyrene is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, pyrene may be encountered as a laboratory chemical in its pure form. Health effects of exposure to the substance have not been investigated adequately. See ICSC 1415 Coal-tar pitch.

**ADDITIONAL INFORMATION**

**ICSC: 1474**

**PYRENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Phenanthrene

Product Number : 695114  
Brand : Aldrich

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # : (314) 776-6555

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Harmful by ingestion., Irritant

##### Other hazards which do not result in classification

Photosensitizer.

##### GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

#### HMIS Classification

Health hazard:	2
Flammability:	0
Physical hazards:	0

#### NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	0

#### Potential Health Effects

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.

**Eyes**  
**Ingestion**

Causes eye irritation.  
Harmful if swallowed.

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### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>14</sub>H<sub>10</sub>  
Molecular Weight : 178.23 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Phenanthrene</b>			
85-01-8	201-581-5	-	-

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### 4. 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.

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### 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**

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

**Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

---

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**

Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

**Environmental precautions**

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

**Methods and materials for containment and cleaning up**

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

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### 7. HANDLING AND STORAGE

**Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**

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

Handle and store under inert gas.

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### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

Components	CAS-No.	Value	Control	Update	Basis
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**Acute toxicity**

LD50 Oral - mouse - 700.0 mg/kg

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

**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.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Phenanthrene)

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

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

Inhalation - May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Ingestion</b>	Harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.

**Signs and Symptoms of Exposure**

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

**Additional Information**

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**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 3.2 mg/l - 96.0 h LC100 - other fish - 1.5 mg/l - 1.0 h
Toxicity to daphnia	EC50 - Daphnia magna (Water flea) - 0.86 mg/l - 24 h

and other aquatic invertebrates.

EC50 - Daphnia magna (Water flea) - 0.38 mg/l - 48 h

Toxicity to algae EC50 - Chlorella vulgaris (Fresh water algae) - 1.20 mg/l - 3 h

**Persistence and degradability**

Biodegradability Result: 55 - 95 % - Partially biodegradable.

**Bioaccumulative potential**

Bioaccumulation Pimephales promelas (fathead minnow) - 28 d  
Bioconcentration factor (BCF): 5,100

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms.

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**13. DISPOSAL CONSIDERATIONS**

**Product**

Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

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**14. TRANSPORT INFORMATION**

**DOT (US)**

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Phenanthrene)  
Reportable Quantity (RQ): 5000 lbs  
Marine pollutant: 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. (Phenanthrene)  
Marine pollutant: No

**IATA**

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Phenanthrene)

**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**

**OSHA Hazards**

Harmful by ingestion., Irritant

**DSL Status**

All components of this product are on the Canadian DSL list.

**SARA 302 Components**

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

**SARA 313 Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**SARA 311/312 Hazards**

Acute Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	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. Phenanthrene	85-01-8	1990-01-01

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**16. OTHER INFORMATION****Further information**

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# International Chemical Safety Cards

**INDENO(1,2,3-cd)PYRENE**

ICSC: 0730



o-Phenylenepyrene  
2,3-Phenylenepyrene  
 $C_{22}H_{12}$   
Molecular mass: 276.3

ICSC # 0730  
CAS # 193-39-5  
RTECS # [NK9300000](#)  
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**INDENO(1,2,3-cd)PYRENE**

ICSC: 0730

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b>
<b>P</b>		

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A

**CHEMICAL DANGERS:**  
Upon heating, toxic fumes are formed.

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**OCCUPATIONAL EXPOSURE LIMITS:**  
TLV not established.  
MAK:  
Carcinogen category: 2;  
(DFG 2004).

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 536°C  
Melting point: 164°C  
Solubility in water:  
none

Octanol/water partition coefficient as log Pow: 6.58

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish.



**NOTES**

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0730**

**INDENO(1,2,3-cd)PYRENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Fluorene	
Product Number	:	46880	
Brand	:	Aldrich	
Product Use	:	For laboratory research purposes.	
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA	Manufacturer : Sigma-Aldrich Corporation 3050 Spruce St. St. Louis, Missouri 63103 USA
Telephone	:	+1 800-325-5832	
Fax	:	+1 800-325-5052	
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555	
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956	

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

No known OSHA hazards

##### GHS Classification

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 1)

##### 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.

P501

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

##### HMIS Classification

Health hazard: 1

Flammability: 1

Physical hazards: 0

##### NFPA Rating

Health hazard: 1

Fire: 1

Reactivity Hazard: 0

##### Potential Health Effects

##### Inhalation

May be harmful if inhaled. May cause respiratory tract irritation.

##### Skin

May be harmful if absorbed through skin. May cause skin irritation.

**Eyes**  
**Ingestion**

May cause eye irritation.  
May be harmful if swallowed.

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### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>13</sub>H<sub>10</sub>  
Molecular Weight : 166.22 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Fluorene</b>			
86-73-7	201-695-5	-	-

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### 4. 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.

---

### 5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**

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

**Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

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### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**

Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

**Environmental precautions**

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

**Methods 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.

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### 7. HANDLING AND STORAGE

**Precautions for safe handling**

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**

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

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### 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).

#### Hand 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.

#### Eye protection

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

#### Skin and 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.

#### Hygiene measures

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	crystalline
Colour	white

### Safety data

pH	no data available
Melting/freezing point	Melting point/range: 113 - 115 °C (235 - 239 °F) Melting point/range: 111 - 114 °C (232 - 237 °F) - lit.
Boiling point	298 °C (568 °F) - lit.
Flash point	151.0 °C (303.8 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available

Odour Threshold no data available

Evaporation rate no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

#### Inhalation LC50

no data available

#### Dermal LD50

no data available

#### Other information on acute toxicity

LD50 Intraperitoneal - mouse - > 2.0 mg/kg

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluorene)

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

### Teratogenicity

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

**Signs and Symptoms of Exposure**

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

**Synergistic effects**

no data available

**Additional Information**

RTECS: LL5670000

---

**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish	LC50 - Fish - 0.82 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	Remarks: no data available
Toxicity to algae	EC50 - Algae - 3.4 mg/l - 96 h

**Persistence and degradability****Bioaccumulative potential**

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 24 h Bioconcentration factor (BCF): 512
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**Mobility in soil**

Adsorbs on soil.

**PBT and vPvB assessment**

no data available

**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****Product**

Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

Not dangerous goods

**IMDG**

UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F  
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Fluorene)  
Marine pollutant: Marine pollutant

**IATA**

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluorene)

**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****OSHA Hazards**

No known OSHA hazards

**DSL Status**

All components of this product are on the Canadian DSL list.

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

No SARA Hazards

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Fluorene	86-73-7	2007-03-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Fluorene	86-73-7	2007-03-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Fluorene	86-73-7	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.

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**16. OTHER INFORMATION****Further information**

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

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Fluoranthene

Product Number : 423947  
Brand : Aldrich

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Harmful by ingestion., Carcinogen

##### GHS Classification

Acute toxicity, Oral (Category 4)  
Acute toxicity, Dermal (Category 5)  
Acute aquatic toxicity (Category 1)  
Chronic aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)

H302 : Harmful if swallowed.  
H313 : May be harmful in contact with skin.  
H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273 : Avoid release to the environment.  
P501 : Dispose of contents/ container to an approved waste disposal plant.

##### HMIS Classification

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

##### NFPA Rating

Health hazard: 1  
Fire: 1  
Reactivity Hazard: 0

## Potential Health Effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Skin</b>	Harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.
<b>Ingestion</b>	Harmful if swallowed.

---

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Benzo[j,k]fluorene

Formula : C<sub>16</sub>H<sub>10</sub>

Molecular Weight : 202.25 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Fluoranthene</b>			
206-44-0	205-912-4	-	-

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## 4. 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.

---

## 5. FIRE-FIGHTING MEASURES

### Suitable extinguishing media

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

### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

---

## 6. ACCIDENTAL RELEASE MEASURES

### Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Avoid breathing dust.

### Environmental precautions

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

### Methods 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.

---

## 7. HANDLING AND STORAGE

### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

### Conditions for safe storage

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection

For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand 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.

#### Eye 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 and 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.

#### Hygiene measures

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

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	solid
Colour	no data available

### Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 105 - 110 °C (221 - 230 °F) - lit.
Boiling point	384 °C (723 °F) - lit.
Flash point	198.0 °C (388.4 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available

Odour Threshold no data available

Evaporation rate no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 2,000 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

LD50 Dermal - rabbit - 3,180 mg/kg

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

Laboratory experiments have shown mutagenic effects.

### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluoranthene)

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

NTP: Reasonably anticipated to be human carcinogens. (Fluoranthene)

Reasonably anticipated to be a human carcinogen (Fluoranthene)

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

## Teratogenicity

no data available

## Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

## Specific target organ toxicity - repeated exposure (Globally Harmonized System)

no data available

## Aspiration hazard

no data available

## Potential health effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Harmful if swallowed.
<b>Skin</b>	Harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

## Signs and Symptoms of Exposure

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

## Synergistic effects

no data available

## Additional Information

RTECS: LL4025000

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## 12. ECOLOGICAL INFORMATION

### Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.0077 mg/l - 96 h NOEC - Cyprinodon variegatus (sheepshead minnow) - 560 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	Immobilization EC50 - Daphnia magna (Water flea) - > 0.005 - < 0.01 mg/l - 3 d Immobilization EC50 - Daphnia magna (Water flea) - 0.78 mg/l - 20 h NOEC - Daphnia magna (Water flea) - 0.085 mg/l - 48 h

### Persistence and degradability

no data available

### Bioaccumulative potential

no data available

### Mobility in soil

no data available

### PBT and vPvB assessment

no data available

### 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

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### 13. DISPOSAL CONSIDERATIONS

#### Product

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

#### Contaminated packaging

Dispose of as unused product.

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### 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Fluoranthene)  
Reportable Quantity (RQ): 100 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

#### IMDG

Not dangerous goods

#### IATA

Not dangerous goods

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### 15. REGULATORY INFORMATION

#### OSHA Hazards

Harmful by ingestion., Carcinogen

#### SARA 302 Components

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

#### SARA 313 Components

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

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Fluoranthene	206-44-0	1990-01-01

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### 16. OTHER INFORMATION

#### Further information

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

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# International Chemical Safety Cards

## DIBENZO(a,h)ANTHRACENE

ICSC: 0431



1,25,6-Dibenzanthracene



Molecular mass: 278.4

ICSC # 0431  
 CAS # 53-70-3  
 RTECS # [HN2625000](#)  
 EC # 601-041-00-2  
 October 23, 1995 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0431**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## DIBENZO(a,h)ANTHRACENE

ICSC: 0431

<p><b>I</b></p> <p><b>M</b></p> <p><b>P</b></p> <p><b>O</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALLINE POWDER.</p> <p><b>PHYSICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration</p>
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R  
T  
A  
N  
T  
D  
A  
T  
A

**CHEMICAL DANGERS:**

of airborne particles can, however, be reached quickly.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

The substance may have effects on the skin, resulting in photosensitization. This substance is probably carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 524°C  
Melting point: 267°C  
Relative density (water = 1): 1.28

Solubility in water:  
none  
Octanol/water partition coefficient as log Pow: 6.5

**ENVIRONMENTAL DATA**

Bioaccumulation of this chemical may occur in seafood.



**NOTES**

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

**ADDITIONAL INFORMATION**

**ICSC: 0431**

**DIBENZO(a,h)ANTHRACENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**CHRYSENE**

ICSC: 1672



Benzoaphenanthrene  
 1,2-Benzophenanthrene  
 1,2,5,6-Dibenzonaphthalene  
 $C_{18}H_{12}$   
 Molecular mass: 228.3

ICSC # 1672  
 CAS # 218-01-9  
 RTECS # [GC0700000](#)  
 UN # 3077  
 EC # 601-048-00-0  
 October 12, 2006 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III Signal: Warning Aqua-Cancer Suspected of causing cancer Very toxic to aquatic life with long lasting effects Very toxic to aquatic life

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## CHRYSENE

ICSC: 1672

<p><b>I M P O R T A N T  D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO BEIGE CRYSTALS OR POWDER</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm<sup>3</sup></p>	<p>Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.</p>	
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**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III

**ADDITIONAL INFORMATION**

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ICSC: 1672

CHRYSENE

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

**BENZO(k)FLUORANTHENE**

ICSC: 0721



Dibenzo(b,jk)fluorene  
8,9-Benzofluoranthene  
11,12-Benzofluoranthene  
 $C_{20}H_{12}$   
Molecular mass: 252.3

ICSC # 0721  
CAS # 207-08-9  
RTECS # [DF6350000](#)  
EC # 601-036-00-5  
March 25, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0721**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**BENZO(k)FLUORANTHENE**

ICSC: 0721

I	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
M		

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**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**

Upon heating, toxic fumes are formed.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

MAK:

Carcinogen category: 2;  
(DFG 2004).

**INHALATION RISK:**

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 480°C  
Melting point: 217°C  
Solubility in water:  
none

Octanol/water partition coefficient as log Pow: 6.84

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish.



**NOTES**

Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0721**

**BENZO(k)FLUORANTHENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**BENZO(g,h,i)FLUORANTHENE**

ICSC: 0527



2,13-Benzofluoranthene  
Benzo(mno)fluoranthene  
 $C_{18}H_{10}$   
Molecular mass: 226.3

ICSC # 0527  
CAS # 203-12-3  
RTECS # [DF6140000](#)  
March 25, 1998 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	
• <b>SKIN</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• <b>EYES</b>		Safety goggles, face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Well closed.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0527**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**BENZO(g,h,i)FLUORANTHENE**

ICSC: 0527

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	
<b>P</b>		

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**INHALATION RISK:**

**CHEMICAL DANGERS:**

The substance decomposes on heating producing toxic fumes.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

See Notes.

**PHYSICAL PROPERTIES**

Melting point: 149°C  
Solubility in water: none  
Vapour pressure, Pa at 20°C: <10

Relative vapour density (air = 1): 7.8  
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.0  
Octanol/water partition coefficient as log Pow: 7.23

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.



**NOTES**

Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Also consult ICSC #0720 and 0721.

**ADDITIONAL INFORMATION**

**ICSC: 0527**

**BENZO(g,h,i)FLUORANTHENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**BENZO(b)FLUORANTHENE**

ICSC: 0720



Benz(e)acephenanthrylene  
2,3-Benzofluoranthene  
Benzo(e)fluoranthene  
3,4-Benzofluoranthene  
 $C_{20}H_{12}$   
Molecular mass: 252.3

ICSC # 0720  
CAS # 205-99-2  
RTECS # [CU1400000](#)  
EC # 601-034-00-4  
March 25, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0720**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**BENZO(b)FLUORANTHENE**

ICSC: 0720

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation
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A

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**

Upon heating, toxic fumes are formed.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV: A2 (suspected human carcinogen); (ACGIH 2004).

MAK:

Carcinogen category: 2;  
(DFG 2004).

of its aerosol and through the skin.

**INHALATION RISK:**

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

This substance is possibly carcinogenic to humans. May cause genetic damage in humans.

**PHYSICAL PROPERTIES**

Boiling point: 481°C  
Melting point: 168°C  
Solubility in water:  
none

Octanol/water partition coefficient as log Pow: 6.12

**ENVIRONMENTAL DATA**

This substance may be hazardous to the environment; special attention should be given to air quality and water quality.



**NOTES**

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

**ADDITIONAL INFORMATION**

**ICSC: 0720**

**BENZO(b)FLUORANTHENE**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**BENZO(a)PYRENE**

ICSC: 0104



Benz(a)pyrene  
3,4-Benzopyrene  
Benzo(d,e,f)chrysene  
 $C_{20}H_{12}$   
Molecular mass: 252.3

ICSC # 0104  
CAS # 50-32-8  
RTECS # [DJ3675000](#)  
EC # 601-032-00-3  
October 17, 2005 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0104**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

# BENZO(a)PYRENE

ICSC: 0104

<p>I M P O R T A N T A D V I S I O N</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> PALE-YELLOW CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005). MAK: Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm<sup>3</sup></p>	<p>Solubility in water: none (&lt;0.1 g/100 ml) Vapour pressure : negligible Octanol/water partition coefficient as log Pow: 6.04</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.</p>	
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**NOTES**

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

**ADDITIONAL INFORMATION**

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<b>ICSC: 0104</b>	(C) IPCS, CEC, 1994	<b>BENZO(a)PYRENE</b>
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# International Chemical Safety Cards

## BENZ(a)ANTHRACENE

ICSC: 0385



1,2-Benzoanthracene  
Benzo(a)anthracene  
2,3-Benzphenanthrene  
Naphthanthracene  
 $C_{18}H_{12}$   
Molecular mass: 228.3

ICSC # 0385  
CAS # 56-55-3  
RTECS # [CV9275000](#)  
EC # 601-033-00-9  
October 23, 1995 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0385

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

ICSC: 0385

# BENZ(a)ANTHRACENE

<b>I M P O R T A N T D A T A</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	<b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	<b>CHEMICAL DANGERS:</b>	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b>
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2 (as pyrolysis product of organic materials) (DFG 2005).	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is probably carcinogenic to humans.

<b>PHYSICAL PROPERTIES</b>	Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274 Solubility in water: none	Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61
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<b>ENVIRONMENTAL DATA</b>	Bioaccumulation of this chemical may occur in seafood.	
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## NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

## ADDITIONAL INFORMATION

<b>ICSC: 0385</b>	<b>BENZ(a)ANTHRACENE</b>
(C) IPCS, CEC, 1994	

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# International Chemical Safety Cards

**ANTHRACENE**

ICSC: 0825



Anthracin  
Paranaphthalene  
 $C_{14}H_{10} / (C_6H_4CH)_2$   
Molecular mass: 178.2

ICSC # 0825  
CAS # 120-12-7  
RTECS # [CA9350000](#)  
March 24, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST!</b>	
<b>•INHALATION</b>	Cough. Sore throat.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	Safety spectacles, face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain.	Do not eat, drink, or smoke during work.	Rinse mouth. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from strong oxidants. Well closed.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0825**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**ANTHRACENE**

ICSC: 0825

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> WHITE CRYSTALS OR FLAKES.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by
<b>M</b>		

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N  
T  
D  
A  
T  
A

**PHYSICAL DANGERS:**

Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**

The substance decomposes on heating, under influence of strong oxidants producing acrid, toxic fume, causing fire and explosion hazard.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

inhalation.

**INHALATION RISK:**

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

**EFFECTS OF SHORT-TERM EXPOSURE:**

The substance slightly irritates the skin and the respiratory tract.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

Repeated or prolonged contact with skin may cause dermatitis under the influence of UV light.

**PHYSICAL PROPERTIES**

Boiling point: 342°C  
Melting point: 218°C  
Density: 1.25-1.28 g/cm<sup>3</sup>  
Solubility in water, g/100 ml at 20 °C: 0.00013  
Vapour pressure, Pa at 25°C: 0.08

Relative vapour density (air = 1): 6.15  
Flash point: 121°C  
Auto-ignition temperature: 538°C  
Explosive limits, vol% in air: 0.6-?  
Octanol/water partition coefficient as log Pow: 4.5 (calculated)

**ENVIRONMENTAL DATA**

The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.



**NOTES**

Green oil, Tetra-olive N2G are trade names.

NFPA Code: H0; F1; R;

**ADDITIONAL INFORMATION**

**ICSC: 0825**

**ANTHRACENE**

(C) IPCS, CEC, 1994

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Acenaphthylene

Product Number : 416703  
Brand : Aldrich

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # : (314) 776-6555

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

#### OSHA Hazards

Carcinogen

#### GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)

H302 Harmful if swallowed.  
H315 Causes skin irritation.  
H319 Causes serious eye irritation.  
H335 May cause respiratory irritation.

Precautionary statement(s)

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

#### HMIS Classification

Health hazard: 2  
Chronic Health Hazard: \*  
Flammability: 1  
Physical hazards: 0

#### NFPA Rating

Health hazard: 2  
Fire: 1  
Reactivity Hazard: 0

#### Potential Health Effects

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>12</sub>H<sub>8</sub>  
Molecular Weight : 152.19 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Acenaphthylene</b>			
208-96-8	205-917-1	-	-

---

#### 4. 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.

---

#### 5. FIRE-FIGHTING MEASURES

##### **Suitable extinguishing media**

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

##### **Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

---

#### 6. ACCIDENTAL RELEASE MEASURES

##### **Personal precautions**

Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

##### **Environmental precautions**

Do not let product enter drains.

##### **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.

---

#### 7. HANDLING AND STORAGE

##### **Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

##### **Conditions for safe storage**

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

---

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

##### **Personal protective equipment**

###### **Respiratory protection**

For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand 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.

**Eye 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 and 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.

**Hygiene measures**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form                      solid

**Safety data**

pH                              no data available  
Melting point              78 - 82 °C (172 - 180 °F) - lit.  
Boiling point                280 °C (536 °F) - lit.  
Flash point                  122.0 °C (251.6 °F) - closed cup  
Ignition temperature      no data available  
Lower explosion limit      no data available  
Upper explosion limit      no data available  
Density                        0.899 g/mL at 25 °C (77 °F)  
Water solubility              no data available

---

**10. STABILITY AND REACTIVITY****Chemical stability**

Stable under recommended storage conditions.

**Conditions to avoid**

no data available

**Materials to avoid**

Oxidizing agents

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

---

**11. TOXICOLOGICAL INFORMATION****Acute toxicity**

LD50 Oral - mouse - 1,760 mg/kg

Remarks: Autonomic Nervous System:Other (direct) parasympathomimetic. Respiratory disorder Blood: Hemorrhage.

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

Inhalation - May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

**Signs and Symptoms of Exposure**

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

**Additional Information**

RTECS: AB1254000

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**12. ECOLOGICAL INFORMATION****Toxicity**

no data available

**Persistence and degradability**

no data available

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

no data available

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**13. DISPOSAL CONSIDERATIONS****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. (Acenaphthylene)  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

Not dangerous goods

**IATA**

Not dangerous goods

---

**15. REGULATORY INFORMATION**

**OSHA Hazards**

Carcinogen

**DSL Status**

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Acenaphthylene	CAS-No. 208-96-8
----------------	---------------------

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Chronic Health Hazard

**Massachusetts Right To Know Components**

No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know Components**

Acenaphthylene	CAS-No. 208-96-8	Revision Date
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**New Jersey Right To Know Components**

Acenaphthylene	CAS-No. 208-96-8	Revision Date
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**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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**16. OTHER INFORMATION**

**Further information**

Copyright 2010 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# International Chemical Safety Cards

## ACENAPHTHENE

ICSC: 1674



1,2-Dihydroacenaphthylene  
 1,8-Ethylenenaphthalene  
 $C_{12}H_{10}$   
 Molecular mass: 154.2

ICSC # 1674  
 CAS # 83-32-9  
 RTECS # [AB1000000](#)  
 UN # 3077  
 October 12, 2006 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See NOTES.	PREVENT DISPERSION OF DUST!	
<b>•INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>•SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P2 filter respirator for harmful particles. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants . Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	UN Hazard Class: 9 UN Packing Group: III Signal: Warning Enviro Very toxic to aquatic life with long lasting effects

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1674**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**ACENAPHTHENE**

**ICSC: 1674**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE TO BEIGE CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms toxic gases including carbon monoxide. Reacts with strong oxidants .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed .</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> See Notes.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 279°C Melting point: 95°C Density: 1.2 g/cm<sup>3</sup> Solubility in water, g/100 ml at 25°C: 0.0004</p>	<p>Vapour pressure, Pa at 25°C: 0.3 Relative vapour density (air = 1): 5.3 Flash point: 135°C o.c. Auto-ignition temperature: &gt;450 °C Octanol/water partition coefficient as log Pow: 3.9 - 4.5</p>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.</p>	
<p><b>NOTES</b></p>		
<p>Acenaphthene occurs as a pure substance and also as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-90GM7-III</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		
<p> </p>		
<p><b>ICSC: 1674</b></p>		<p><b>ACENAPHTHENE</b></p>



### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : GAMMA-CHLORDANE

Product Number : 442599  
Brand : Supelco

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # : (314) 776-6555

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Harmful by ingestion., Carcinogen

##### GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H302 Harmful if swallowed.  
H351 Suspected of causing cancer.  
H400 Very toxic to aquatic life.

Precautionary statement(s)

P273 Avoid release to the environment.  
P281 Use personal protective equipment as required.

#### HMIS Classification

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

#### NFPA Rating

Health hazard: 1  
Fire: 0  
Reactivity Hazard: 0

#### Potential Health Effects

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C10H6Cl8

Molecular Weight : 409.76 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>trans-Chlordane</b>			
5103-74-2	225-826-0	-	-

---

#### 4. 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.

---

#### 5. FIRE-FIGHTING MEASURES

##### Suitable extinguishing media

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

##### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

---

#### 6. ACCIDENTAL RELEASE MEASURES

##### Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

##### Environmental precautions

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

##### Methods 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.

---

#### 7. HANDLING AND STORAGE

##### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

##### Conditions for safe storage

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

---

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

##### Personal protective equipment

###### 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).

**Hand 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.

**Eye 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 and 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.

**Hygiene measures**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	crystalline
Colour	white
Odour	odourless

**Safety data**

pH	no data available
Melting point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Density	1.590 g/cm <sup>3</sup>
Water solubility	insoluble

---

**10. STABILITY AND REACTIVITY****Chemical stability**

Stable under recommended storage conditions.

**Conditions to avoid**

no data available

**Materials to avoid**

Strong oxidizing agents

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

---

**11. TOXICOLOGICAL INFORMATION****Acute toxicity**

LD50 Oral - rat - 1,100 mg/kg

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

**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.

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

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Harmful if swallowed.
<b>Skin</b>	Harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

**Additional Information**

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**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish LC50 - *Lepomis macrochirus* - 0.05 mg/l - 96 h

**Persistence and degradability**

no data available

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**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**

**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.  
 Marine pollutant: Marine pollutant

**IATA**

UN-Number: 3077 Class: 9 Packing group: III  
 Proper shipping name: Environmentally hazardous substance, solid, n.o.s.

**Further information**

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

**15. REGULATORY INFORMATION****OSHA Hazards**

Harmful by ingestion., Carcinogen

**DSL Status**

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

trans-Chlordane	CAS-No. 5103-74-2
-----------------	----------------------

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know Components**

trans-Chlordane	CAS-No. 5103-74-2	Revision Date
-----------------	----------------------	---------------

**New Jersey Right To Know Components**

trans-Chlordane	CAS-No. 5103-74-2	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.

**16. OTHER INFORMATION****Further information**

Copyright 2010 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name :  $\alpha$ -Endosulfan

Product Number : 45468  
Brand : Fluka

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # : (314) 776-6555

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

#### OSHA Hazards

Toxic by ingestion

#### GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H301 : Toxic if swallowed.  
H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273 : Avoid release to the environment.  
P301 + P310 : IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.  
P501 : Dispose of contents/ container to an approved waste disposal plant.

#### HMIS Classification

Health hazard: 2  
Flammability: 0  
Physical hazards: 0

#### NFPA Rating

Health hazard: 2  
Fire: 0  
Reactivity Hazard: 0

#### Potential Health Effects

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula :  $C_9H_6Cl_6O_3S$   
Molecular Weight : 406.93 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Endosulfan (<math>\alpha</math> isomer)</b>			
959-98-8	-	-	-

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#### 4. 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.

---

#### 5. FIRE-FIGHTING MEASURES

##### Suitable extinguishing media

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

##### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

---

#### 6. ACCIDENTAL RELEASE MEASURES

##### Personal precautions

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

##### Environmental precautions

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

##### Methods 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.

---

#### 7. HANDLING AND STORAGE

##### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

##### Conditions for safe storage

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

---

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

##### Personal protective equipment

###### Respiratory protection

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

**Hand 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.

**Eye 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 and 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.

**Hygiene measures**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	crystalline
Colour	white

**Safety data**

pH	no data available
Melting point	108.0 - 110.0 °C (226.4 - 230.0 °F)
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Water solubility	insoluble

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**10. STABILITY AND REACTIVITY****Chemical stability**

Stable under recommended storage conditions.

**Conditions to avoid**

no data available

**Materials to avoid**

Strong oxidizing agents

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Hydrogen chloride gas

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**11. TOXICOLOGICAL INFORMATION****Acute toxicity**

LD50 Oral - rat - 76.0 mg/kg

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

### **Carcinogenicity**

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### **Reproductive toxicity**

no data available

### **Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

### **Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

### **Aspiration hazard**

no data available

### **Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Toxic if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

### **Additional Information**

RTECS: RB9275100

---

## **12. ECOLOGICAL INFORMATION**

### **Toxicity**

### **Persistence and degradability**

### **Bioaccumulative potential**

Bioaccumulation	other fish - 21 d
	Bioconcentration factor (BCF): 10,994

### **Mobility in soil**

no data available

### **PBT and vPvB assessment**

no data available

### **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**

### **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.  
 Reportable Quantity (RQ): 1 lbs  
 Marine pollutant: No  
 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.  
 Marine pollutant: No

**IATA**

UN-Number: 2811 Class: 6.1 Packing group: III  
 Proper shipping name: Toxic solid, organic, n.o.s.

**15. REGULATORY INFORMATION****OSHA Hazards**

Toxic by ingestion

**DSL Status**

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Endosulfan ( $\alpha$ isomer)	CAS-No. 959-98-8
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**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Acute Health Hazard

**Massachusetts Right To Know Components**

Endosulfan ( $\alpha$ isomer)	CAS-No. 959-98-8	Revision Date 1993-04-24
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**Pennsylvania Right To Know Components**

Endosulfan ( $\alpha$ isomer)	CAS-No. 959-98-8	Revision Date 1993-04-24
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**New Jersey Right To Know Components**

Endosulfan ( $\alpha$ isomer)	CAS-No. 959-98-8	Revision Date 1993-04-24
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**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

**16. OTHER INFORMATION****Further information**

Copyright 2010 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	: δ-BHC		
Product Number	: 48495		
Brand	: Supelco		
Product Use	: For laboratory research purposes.		
Supplier	: Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA	Manufacturer	: Sigma-Aldrich Corporation 3050 Spruce St. St. Louis, Missouri 63103 USA
Telephone	: +1 800-325-5832		
Fax	: +1 800-325-5052		
Emergency Phone # (For both supplier and manufacturer)	: (314) 776-6555		
Preparation Information	: Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956		

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Carcinogen, Toxic by ingestion, Harmful by skin absorption.

##### Target Organs

Central nervous system Central nervous system

##### GHS Classification

Acute toxicity, Oral (Category 3)  
Acute toxicity, Dermal (Category 4)  
Carcinogenicity (Category 2)  
Acute aquatic toxicity (Category 1)  
Chronic aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P501	Dispose of contents/ container to an approved waste disposal plant.

#### HMIS Classification

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

**NFPA Rating**

Health hazard: 2  
Fire: 0  
Reactivity Hazard: 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.  
**Skin** May cause skin irritation.  
**Eyes** May cause eye irritation.  
**Ingestion** Toxic if swallowed.

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : δ-1,2,3,4,5,6-Hexachlorocyclohexane  
Formula : C<sub>6</sub>H<sub>6</sub>Cl<sub>6</sub>  
Molecular Weight : 290.8 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane</b>			
319-86-8	206-272-9	602-042-00-0	-

---

**4. 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.

---

**5. FIRE-FIGHTING MEASURES**

**Suitable extinguishing media**

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

**Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas  
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas  
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

---

**6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions**

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

**Environmental precautions**

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

**Methods 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.

---

**7. HANDLING AND STORAGE****Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**

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

---

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

Contains no substances with occupational exposure limit values.

**Personal protective equipment****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).

**Hand 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.

**Eye 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 and 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.

**Hygiene measures**

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

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	solid
Colour	no data available

**Safety data**

pH	no data available
Melting/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available

Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - no data available

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## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 1,000 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

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 (1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane)

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

#### **Teratogenicity**

no data available

#### **Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

#### **Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

#### **Aspiration hazard**

no data available

#### **Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Toxic if swallowed.
<b>Skin</b>	May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

#### **Signs and Symptoms of Exposure**

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

#### **Synergistic effects**

no data available

#### **Additional Information**

RTECS: GV4550000

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## **12. ECOLOGICAL INFORMATION**

### **Toxicity**

Toxicity to fish LC50 - other fish - 2.83 mg/l - 96.0 h

### **Persistence and degradability**

no data available

**Bioaccumulative potential**

Bioaccumulation other fish - 33 d  
Bioconcentration factor (BCF): 326

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**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****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. (1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane)  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant: 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. (1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane)  
Marine pollutant: No

**IATA**

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane)

**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****OSHA Hazards**

Carcinogen, Toxic by ingestion, Harmful by skin absorption.

**DSL Status**

This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane

CAS-No.  
319-86-8

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane	319-86-8	2007-03-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane	319-86-8	2007-03-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane	319-86-8	2007-03-01

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer.	319-86-8	1989-10-01

1 $\alpha$ ,2 $\alpha$ ,3 $\alpha$ ,4 $\beta$ ,5 $\alpha$ ,6 $\beta$ )-1,2,3,4,5,6-Hexachlorocyclohexane

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**16. OTHER INFORMATION****Further information**

Copyright 2011 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	α-Chlordane	
Product Number	:	442449	
Brand	:	Supelco	
Product Use	:	For laboratory research purposes.	
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA	Manufacturer : Sigma-Aldrich Corporation 3050 Spruce St. St. Louis, Missouri 63103 USA
Telephone	:	+1 800-325-5832	
Fax	:	+1 800-325-5052	
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555	
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956	

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

##### GHS Classification

Acute toxicity, Inhalation (Category 4)  
Acute toxicity, Oral (Category 4)  
Acute toxicity, Dermal (Category 3)  
Skin irritation (Category 2)  
Eye irritation (Category 2A)  
Specific target organ toxicity - single exposure (Category 3)  
Acute aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H302 + H332	Harmful if swallowed or if inhaled.
H311	Toxic in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P312

Call a POISON CENTER or doctor/ physician if you feel unwell.

**HMIS Classification**

**Health hazard:** 2  
**Flammability:** 0  
**Physical hazards:** 0

**NFPA Rating**

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

**Potential Health Effects**

**Inhalation** Toxic if inhaled. Causes respiratory tract irritation.  
**Skin** Toxic if absorbed through skin. Causes skin irritation.  
**Eyes** Causes eye irritation.  
**Ingestion** Toxic if swallowed.

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Molecular Weight : 208.29 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Chlordane</b>			
5103-71-9	225-825-5	-	-

---

**4. FIRST AID MEASURES**

**General advice**

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

**If inhaled**

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

**In case of skin contact**

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

**In case of eye contact**

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

**If swallowed**

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

---

**5. FIRE-FIGHTING MEASURES**

**Suitable extinguishing media**

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

**Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

---

**6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions**

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

**Environmental precautions**

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

### Methods 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.

---

## 7. HANDLING AND STORAGE

### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

### Conditions for safe storage

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

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection

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

#### Hand 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.

#### Eye 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 and 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.

#### Hygiene measures

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form crystalline

Colour colourless

### Safety data

pH no data available

Melting/freezing point 93.0 - 94.0 °C (199.4 - 201.2 °F)

Boiling point no data available

Flash point no data available

Ignition temperature no data available

Autoignition temperature no data available

Lower explosion limit no data available

Upper explosion limit no data available

Vapour pressure no data available

Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas  
Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 500.0 mg/kg

#### Inhalation LC50

#### Dermal LD50

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	Toxic if inhaled. Causes respiratory tract irritation.
<b>Ingestion</b>	Toxic if swallowed.
<b>Skin</b>	Toxic if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.

**Synergistic effects**

no data available

**Additional Information**

RTECS: Not available

---

**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish LC50 - Lepomis macrochirus (Bluegill) - 0.0074 mg/l - 96 h

**Persistence and degradability**

no data available

**Bioaccumulative potential**

Bioaccumulation Lepomis macrochirus (Bluegill) - 24 h  
Bioconcentration factor (BCF): 322

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

no data available

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

---

**13. DISPOSAL CONSIDERATIONS****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. (Chlordane)  
Marine pollutant:  
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. (Chlordane)  
Marine pollutant: Marine pollutant

### IATA

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chlordane)

### 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

### OSHA Hazards

Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption, Irritant

### DSL Status

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Chlordane	CAS-No. 5103-71-9
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### SARA 302 Components

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

### SARA 313 Components

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

### SARA 311/312 Hazards

Acute Health Hazard

### Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

### Pennsylvania Right To Know Components

Chlordane	CAS-No. 5103-71-9	Revision Date
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### New Jersey Right To Know Components

Chlordane	CAS-No. 5103-71-9	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.

---

## 16. OTHER INFORMATION

### Further information

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

---

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 4,4'-DDD PESTANAL,250 MG (2,2-BIS(4-CHL&

Product Number : 35486  
Brand : Fluka

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # : (314) 776-6555

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

#### OSHA Hazards

Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

#### GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301 Toxic if swallowed.  
H312 Harmful in contact with skin.  
H351 Suspected of causing cancer.  
H400 Very toxic to aquatic life.  
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273 Avoid release to the environment.  
P280 Wear protective gloves/protective clothing.  
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

#### HMIS Classification

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

#### NFPA Rating

Health hazard: 2  
Fire: 0  
Reactivity Hazard: 0

#### Potential Health Effects

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

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane  
4,4'-DDD  
TDE

Formula : C<sub>14</sub>H<sub>10</sub>Cl<sub>4</sub>  
Molecular Weight : 320.04 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane</b>			
72-54-8	200-783-0	-	-

---

### 4. 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.

---

### 5. FIRE-FIGHTING MEASURES

#### Suitable extinguishing media

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

#### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

---

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

#### Environmental precautions

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

#### Methods and materials for containment and cleaning up

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

---

### 7. HANDLING AND STORAGE

#### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

#### Conditions for safe storage

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

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### 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).

#### Hand protection

Handle with gloves.

#### Eye protection

Face shield and safety glasses

#### Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

#### Hygiene measures

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form                      solid

### Safety data

pH	no data available
Melting point	94.0 - 96.0 °C (201.2 - 204.8 °F)
Boiling point	193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
Density	1.38 g/cm <sup>3</sup>
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.02

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

---

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

LD50 Oral - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg

Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg

Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg

Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg

Remarks: Behavioral:Altered sleep time (including change in righting reflex).

LD50 Dermal - rabbit - 1,200 mg/kg

Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

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

Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

**Reproductive toxicity**

no data available

**Specific target organ toxicity - single exposure (GHS)**

no data available

**Specific target organ toxicity - repeated exposure (GHS)**

no data available

**Aspiration hazard**

no data available

**Potential health effects****Inhalation**

May be harmful if inhaled. May cause respiratory tract irritation.

**Ingestion**

Toxic if swallowed.

**Skin**

Harmful if absorbed through skin. May cause skin irritation.

**Eyes** May cause eye irritation.

**Signs and Symptoms of Exposure**

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

**Additional Information**

RTECS: KI0700000

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**

Toxicity to fish LC50 - other fish - 1.18 - 9 mg/l - 96.0 h  
LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h  
LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h  
LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates. EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

**Persistence and degradability**

no data available

**Bioaccumulative potential**

Indication of bioaccumulation.

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

---

**13. DISPOSAL CONSIDERATIONS**

**Product**

Observe all federal, state, and local environmental regulations. 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. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant: No  
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. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)  
Marine pollutant: No

**IATA**

UN-Number: 2811 Class: 6.1 Packing group: III  
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)

---

## 15. REGULATORY INFORMATION

### OSHA Hazards

Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

### DSL Status

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8
---	--------------------

### SARA 302 Components

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

### SARA 313 Components

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

### SARA 311/312 Hazards

Acute Health Hazard

### Massachusetts Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
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### Pennsylvania Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

### New Jersey Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
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## 16. OTHER INFORMATION

### Further information

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

# International Chemical Safety Cards

## CAMPHECHLOR

ICSC: 0843



Toxaphene  
 Chlorinated camphene (60%)  
 Polychlorocamphene  
 $C_{10}H_{10}Cl_8$  (approx•)  
 Molecular mass: 413.8 (average)

ICSC # 0843  
 CAS # 8001-35-2  
 RTECS # [XW5250000](#)  
 UN # 2761  
 EC # 602-044-00-1  
 November 04, 1997 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		Foam, powder, carbon dioxide. NO water.
<b>EXPLOSION</b>	The explosion hazard will depend on the solvent used in the formulation.		In case of fire: keep drums, etc., cool by spraying with water but NO direct contact with water.
<b>EXPOSURE</b>		STRICT HYGIENE!	IN ALL CASES CONSULT A DOCTOR!
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness.	Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Convulsions. Dizziness. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Give a slurry of activated charcoal in water to drink. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Keep in the dark.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 21-25-37/38-40-50/53 S: 1/2-36/37-45-60-61 UN Hazard Class: 6.1

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0843**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**CAMPHECHLOR**

**ICSC: 0843**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> YELLOW TO AMBER WAXY SOLID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating, on burning and/or under influence of alkali, strong sunlight, and catalysts like iron producing toxic fumes. Attacks iron. Incompatible with strongly alkaline pesticides.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA; 1 mg/m<sup>3</sup> as STEL; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2008). MAK: skin absorption (H); Carcinogen category: 2 (DFG 2008). OSHA PEL<sup>†</sup>: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL: Ca skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 200 mg/m<sup>3</sup> See: <a href="#">8001352</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body through the skin, by ingestion.</p> <p><b>INHALATION RISK:</b></p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance irritates mildly the skin. The substance may cause effects on the central nervous system , resulting in tremors and convulsions. Exposure at high level may result in death.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
---	--	---

<p><b>PHYSICAL PROPERTIES</b></p>	<p>Melting point: 65-90°C Relative density (water = 1): 1.65 Solubility in water: None</p>	<p>Vapour pressure, Pa at 25°C: 53 Relative vapour density (air = 1): 14.3 Octanol/water partition coefficient as log Pow: 3.3</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>This substance may be hazardous to the environment; special attention should be given to water organisms, some terrestrial species, and birds. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic species.</p>	
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**NOTES**

Decomposes near boiling point. Camphechlor is a reaction mixture of chlorinated camphenes containing 67-69% chlorine. Use of this organochlorine pesticide should be discouraged, except where there is no adequate alternative. Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Alltox, Chem-Phene, M 5055, Clor Chem T-590, Crestoxo, Estonox, Fasco-Terpene, Geniphene, Gy-phene, Hercules 3956, Melipex, Penphene, Phenacide, Phenatox, Strobane-T, Toxakil, Toxyphene, Toxon 63 are trade names.

Transport Emergency Card: TEC (R)-61G53b

Card has been partially updated in November 2008: see Occupational Exposure Limits, EU Classification, Packaging & labelling.

**ADDITIONAL INFORMATION**

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**ICSC: 0843**

**CAMPHECHLOR**

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH</p>
---------------------------------------	--

values.



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Search

72-55-9 msds



MSDS 250,000+

MSDS : 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%

CAS : 72-55-9

SYNONYMS : p,p'-DDE ; ethylene,1,1-dichloro-2,2-bis-(p-chlorophenyl)- ; DDT dehydrochloride ; DDE; 1-1'-(Dichloroethenylidene)bis(4-chlorobenzene)

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Catalog of Chemical Suppliers, Buyers, Custom Synthesis Companies And Equipment Manufacturers  
[ 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% 72-55-9 ]

Suppliers:

Not Available

Buyers:

Not Available

[Sprayon® LU711 Lubricant](#) Because your environment demands a TRUE Industrial Lubricant [Sprayon.com](http://Sprayon.com)

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\*\*\*\* SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS \*\*\*\*

```

+-----+-----+-----+-----+
| CAS# | Chemical Name | % | EINECS# |
+-----+-----+-----+-----+
| 72-55-9 | 2,2-Bis-(4-chlorophenyl)-1,1-dichloro | 99 | 200-784-6 |
| ethylene | | |
+-----+-----+-----+-----+

```

Hazard Symbols: XN

Risk Phrases: 22 33

\*\*\*\* SECTION 3 - HAZARDS IDENTIFICATION \*\*\*\*

## EMERGENCY OVERVIEW

Harmful if swallowed. Danger of cumulative effects.Cancer suspect agent.Possible risks of irreversible effects.

## Potential Health Effects

## Eye:

May cause eye irritation.

## Skin:

May cause skin irritation.

## Ingestion:

May cause irritation of the digestive tract. May be harmful if swallowed. Ingestion of large amounts may cause liver and/or kidney damage.

## Inhalation:

May cause respiratory tract irritation.

## Chronic:

May cause cancer according to animal studies. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects.

\*\*\*\* SECTION 4 - FIRST AID MEASURES \*\*\*\*

## Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

## Skin:

Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

## Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water.

Never give anything by mouth to an unconscious person. Get medical aid immediately.

## Inhalation:

Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

## Notes to Physician:

Treat symptomatically and supportively.

\*\*\*\* SECTION 5 - FIRE FIGHTING MEASURES \*\*\*\*

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.

**Extinguishing Media:**

For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

\*\*\*\* SECTION 6 - ACCIDENTAL RELEASE MEASURES \*\*\*\*

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:**

Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

\*\*\*\* SECTION 7 - HANDLING and STORAGE \*\*\*\*

**Handling:**

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Do not ingest or inhale. Use with adequate ventilation.

**Storage:**

Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

\*\*\*\* SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION \*\*\*\*

**Engineering Controls:**

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

CAS# 72-55-9:

**Personal Protective Equipment**

**Eyes:**

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

**Skin:**

Wear appropriate protective gloves to prevent skin exposure.

**Clothing:**

Wear appropriate protective clothing to prevent skin exposure.

**Respirators:**

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

\*\*\*\* SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES \*\*\*\*

**Physical State:** Crystals

**Color:** white

**Odor:** None reported.

**pH:** Not available.

**Vapor Pressure:** 6.5106 mm Hg @ 20 C

**Viscosity:** Not available.

**Boiling Point:** 336 deg C

**Freezing/Melting Point:** 88.00 - 90.00 deg C

**Autoignition Temperature:** Not available.

**Flash Point:** Not available.

**Explosion Limits, lower:** Not available.

**Explosion Limits, upper:** Not available.

**Decomposition Temperature:**

**Solubility in water:** 0.010 ppm

**Specific Gravity/Density:**

**Molecular Formula:** C14H8Cl4

**Molecular Weight:** 318.02

\*\*\*\* SECTION 10 - STABILITY AND REACTIVITY \*\*\*\*

**Chemical Stability:**

Stable under normal temperatures and pressures.

**Conditions to Avoid:**

Incompatible materials, dust generation, strong oxidants.

**Incompatibilities with Other Materials:**

Strong oxidizing agents - strong bases.

**Hazardous Decomposition Products:**

Hydrogen chloride, carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Has not been reported.

\*\*\*\* SECTION 11 - TOXICOLOGICAL INFORMATION \*\*\*\*

**RTECS#:**

CAS# 72-55-9: KV9450000

**LD50/LC50:**

CAS# 72-55-9: Oral, mouse: LD50 = 700 mg/kg; Oral, rat: LD50 = 880 mg/kg.

**Carcinogenicity:**

2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene -

California: carcinogen, initial date 1/1/89

## Other:

See actual entry in RTECS for complete information.

## \*\*\*\* SECTION 12 - ECOLOGICAL INFORMATION \*\*\*\*

## Ecotoxicity:

Estimated BCF value = 8,300 based on water solubility. Estimated Koc value = 8,300. There was no movement of DDE reported in soil column mobility experiments.

## \*\*\*\* SECTION 13 - DISPOSAL CONSIDERATIONS \*\*\*\*

Dispose of in a manner consistent with federal, state, and local regulations.

## \*\*\*\* SECTION 14 - TRANSPORT INFORMATION \*\*\*\*

## IATA

Not regulated as a hazardous material.

## IMO

Not regulated as a hazardous material.

## RID/ADR

Not regulated as a hazardous material.

USA RQ: CAS# 72-55-9: 1 lb final RQ; 0.454 kg final RQ

## \*\*\*\* SECTION 15 - REGULATORY INFORMATION \*\*\*\*

## European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN

## Risk Phrases:

R 22 Harmful if swallowed.

R 33 Danger of cumulative effects.

## Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 72-55-9: 3

## Canada

None of the chemicals in this product are listed on the DSL/NDSL list.

CAS# 72-55-9 is listed on Canada's Ingredient Disclosure List.

## US FEDERAL

## TSCA

CAS# 72-55-9 is not listed on the TSCA inventory.

It is for research and development use only.

## \*\*\*\* SECTION 16 - ADDITIONAL INFORMATION \*\*\*\*

MSDS Creation Date: 9/28/1998 Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

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72-55-9 msds

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## ALL MSDS PAGES IN THIS GROUP

NAME	CAS
<a href="#">M-Benzoyloxybenzyl Alcohol, 97%</a>	1700-30-7
<a href="#">Octaphenylcyclotetrasiloxane, 98%</a>	546-56-5
<a href="#">Cetylpyridinium chloride</a>	123-03-5
<a href="#">3,4-Difluorophenol, 99%</a>	2713-33-9
<a href="#">1-Benzyl-4-Hydroxypiperidine, 97%</a>	4727-72-4
<a href="#">4-tert-Butylbenzoyl chloride</a>	1710-98-1
<a href="#">Borane-morpholine complex, 97%</a>	4856-95-5
<a href="#">Benzyl Ether, 99%</a>	103-50-4
<a href="#">5-Amino-1-Naphthol (Pract)</a>	83-55-6
<a href="#">Pyridinium-P-Toluenesulfonate 98%</a>	24057-28-1
<a href="#">Pyrogallol Red, 98% (Titr.)</a>	32638-88-3
<a href="#">Amberlite ira 416</a>	9002-26-0
<a href="#">3-Methoxybenzotrile, 98%</a>	1527-89-5
<a href="#">1-Adamantanemethanol, 99%</a>	770-71-8
<a href="#">Inosine, 99%</a>	58-63-9
<a href="#">Pentafluoropropionic Acid</a>	422-64-0
<a href="#">Pyruvic Acid</a>	127-17-3
<a href="#">Potassium hydrogen fluoride, 99+%</a>	7789-29-9
<a href="#">Aluminum Nitride, 98% Particle Size &lt;10 Micron</a>	24304-00-5
<a href="#">Nickel(II) hydroxide, c.p., 60-61% Ni</a>	12054-48-7
<a href="#">1-Adamantanamine sulfate, 99%</a>	31377-23-8
<a href="#">S-(Thiobenzoyl)-Thioglycolic Acid, 97%</a>	942-91-6
<a href="#">N,N-Dimethyl-P-Nitroaniline</a>	100-23-2
<a href="#">Benzofuroxan</a>	480-96-6
<a href="#">cis-2-Aminomethyl-1-cyclohexanol hydrochloride, 99%</a>	24947-68-0
<a href="#">Silver Phosphate, 98% (Titr.)</a>	7784-09-0

<a href="#">4-Cyano-4-Phenylpiperidine Hydrochloride, 99% (TLC)</a>	51304-58-6
<a href="#">Methanesulfonamide</a>	3144-09-0
<a href="#">gamma-Octanoic lactone, 98%</a>	104-50-7
<a href="#">Cis,cis,cis-1,2,3,4-cyclopentane- tetracarboxylic dianhydride,</a>	4802-47-5
<a href="#">Tetrachloroethylene Carbonate, 98+%</a>	22432-68-4
<a href="#">Oxamic Acid, 98%</a>	471-47-6
<a href="#">10,11-Dihydro-5H-Dibenzo(A,D)-Cycloheptene, 98%</a>	833-48-7
<a href="#">Thallium (I) Sulfate, 99.9+%</a>	7446-18-6
<a href="#">N-(2,6-Dimethylphenylcarbonyl-Methyl)-Iminodiacetic Acid, 99%</a>	59160-29-1
<a href="#">P-(Dimethylamino)cinnamic Acid, 99%</a>	1552-96-1
<a href="#">Biebrich Scarlet, 99% (UV-VIS)</a>	4196-99-0
<a href="#">4-Chlorobenzenediazonium hexafluoro- phosphate</a>	1582-27-0
<a href="#">Ammonium hexachloroiridate(IV), 99.99%</a>	16940-92-4
<a href="#">Methylamine-d2 deuteriochloride, 98+ atom % D</a>	593-51-1
<a href="#">2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%</a>	72-55-9
<a href="#">Nitro red</a>	56431-61-9
<a href="#">Methyl 2,3-dichlorobenzoate, 98+%</a>	2905-54-6
<a href="#">Isopropyl Bromoacetate, 98% (GC)</a>	29921-57-1
<a href="#">1-Iodo-4-Nitrobenzene, 99%</a>	636-98-6
<a href="#">4-Ethylcyclohexanol, 99% cis/trans mixture</a>	4534-74-1
<a href="#">Fluorescamine</a>	38183-12-9
<a href="#">Tris(2,2,6,6-Tetramethyl-3,5-Heptanedionato)Dysprosium(III), 99+%</a>	15522-69-7
<a href="#">3-Amino-2,2,5,5-Tetramethyl-1-Pyrrolidinyloxy, 99% (Titr.)</a>	34272-83-8
<a href="#">3,4-Dihydroxyphenylacetic Acid,98%</a>	102-32-9

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# International Chemical Safety Cards

## HEPTACHLOR

ICSC: 0743



1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene  
 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene  
 3,4,5,6,8,8a-Heptachlorodicyclopentadiene  
 $C_{10}H_5Cl_7$   
 Molecular mass: 373.3

ICSC # 0743  
 CAS # 76-44-8  
 RTECS # [PC0700000](#)  
 UN # 2761  
 EC # 602-046-00-2  
 July 05, 2003 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
• <b>INHALATION</b>	Convulsions. Tremor.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! (See Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• <b>EYES</b>		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: Chemical protection suit including self-contained breathing apparatus. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Separated from strong oxidants, metals, food and feedstuffs. Well closed. Keep in a well-ventilated room. Dry. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 24/25-33-40-50/53 S: 1/2-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the

ICSC: 0743

OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## HEPTACHLOR

ICSC: 0743

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE CRYSTALS OR TAN WAXY SOLID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating above 160°C producing toxic fumes including hydrogen chloride . Reacts with strong oxidants . Attacks metal.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.05 mg/m<sup>3</sup> as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). MAK: 0.05 mg/m<sup>3</sup> (Inhalable fraction); Peak limitation category: II(8); skin absorption (H); Carcinogen category: 4; Pregnancy risk group: D (DFG 20089). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 35 mg/m<sup>3</sup> See: <a href="#">76448</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of dusts from powder concentrates, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system .</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver . This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Decomposes below boiling point at 160°C Melting point: 95-96°C Density: 1.6 g/cm<sup>3</sup></p>	<p>Solubility in water: none Vapour pressure, Pa at 25°C: 0.053 Octanol/water partition coefficient as log Pow: 5.27-5.44</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur along the food chain, for example in fish and in milk. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</p>	
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### NOTES

Other melting points: 46-74°C for the technical product. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Depending on the degree of exposure, periodic medical examination is suggested.

Transport Emergency Card: TEC (R)-61GT7-II

Card has been partially updated in October 2005: see Occupational Exposure Limits, Emergency Response.  
Card has been partially updated in April 2010: see Occupational Exposure Limits, Storage.

### ADDITIONAL INFORMATION

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ICSC: 0743

HEPTACHLOR

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH</p>
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# International Chemical Safety Cards

**DIELDRIN**

ICSC: 0787



1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-1,4-exo- 5,8-dimethanonaphthalene  
3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2alpha,3beta,6beta,6aalpha,7beta,7aalpha)-2,7,3,6-  
dimethanonaphth(2,3-b)oxirene

HEOD



Molecular mass: 380.9

ICSC # 0787

CAS # 60-57-1

RTECS # [IO1750000](#)

UN # 2761

EC # 602-049-00-9

March 26, 1998 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
<b>•INHALATION</b>	(See Ingestion).	Ventilation (not if powder).	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! See Ingestion.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 25-27-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

DIELDRIN

ICSC: 0787

I M P O R T A N T D A T A	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating producing toxic fumes including hydrogen chloride. Reacts with oxidants and acids. Attacks metal due to the slow formation of hydrogen chloride in storage.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (as TWA): 0.25 mg/m<sup>3</sup>, A4 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m<sup>3</sup> ; Peak limitation category: II(8) skin absorption (H); (DFG 2007). OSHA PEL: TWA 0.25 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.25 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 50 mg/m<sup>3</sup> See: <a href="#">60571</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system, resulting in convulsions. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.</p>
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<b>PHYSICAL PROPERTIES</b>	Melting point: 175-176°C Density: 1.7 g/cm <sup>3</sup> Solubility in water: none	Vapour pressure, Pa at 20°C: 0.0004 Octanol/water partition coefficient as log Pow: 6.2
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees, birds. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.</p>	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Alvit, Dieldrex, Dieldrite, Illoxol, Octalox, Panoram, and Quintox are trade names. Also consult ICSC #0774, Aldrin.

Transport Emergency Card: TEC (R)-61G41b.

Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

## ADDITIONAL INFORMATION

ICSC: 0787

DIELDRIN

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# International Chemical Safety Cards

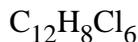
**ALDRIN**

ICSC: 0774



1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-exo-1,4-endo-5,8-dimethanonaphthalene  
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-,  
(1alpha,4alpha,4aβ,5alpha,8alpha,8aβ)

HHDN



Molecular mass: 364.9

ICSC # 0774

CAS # 309-00-2

RTECS # [IO2100000](#)

UN # 2761

EC # 602-048-00-3

March 26, 1998 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
<b>•INHALATION</b>	(See Ingestion).	Ventilation (not if powder).	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! See Ingestion.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 24/25-40-48/24/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

ALDRIN

ICSC: 0774

<b>I M P O R T A N T A D D I T I O N</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating producing toxic and corrosive fumes including hydrogen chloride. Reacts with acids and oxidants. Attacks many metals in presence of water.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.25 mg/m<sup>3</sup> (as TWA), A3 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m<sup>3</sup>; skin absorption (H); Peak limitation category: II(8) (DFG 2006). OSHA PEL: TWA 0.25 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.25 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 25 mg/m<sup>3</sup> See: <a href="#">309002</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system, resulting in convulsions. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.</p>
<b>PHYSICAL PROPERTIES</b>	Boiling point at 0.27kPa: 145°C Melting point: 104-105°C Density: 1.6 g/cm <sup>3</sup>	Solubility in water: none Vapour pressure, Pa at 20°C: 0.009 Octanol/water partition coefficient as log Pow: 7.4
<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds, honey bees. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.	
<b>NOTES</b>		
<p>Other melting points: 49-60°C (technical grade). Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. The recommendations on this Card also apply to ICSC 0787 (dieldrin). Aldrec, Aldrex, Aldrite, Aldron, Aldrosol, Algran, Alttox, Drinox, Octalene, Seedrin, and Toxadrin are trade names.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61G41b.</p> <p style="text-align: right;">NFPA Code: H2; F0; R0;</p> <p style="text-align: center;">Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.</p>		
<b>ADDITIONAL INFORMATION</b>		
<b>ICSC: 0774</b>	(C) IPCS, CEC, 1994	<b>ALDRIN</b>

**IMPORTANT LEGAL**

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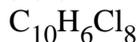
# International Chemical Safety Cards

## CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740



1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene  
1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene



Molecular mass: 409.8

ICSC # 0740  
CAS # 57-74-9  
RTECS #  
UN # 2996  
EC # 602-047-00-8  
March 26, 1998 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	(See Ingestion).	Breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Confusion. Convulsions. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs bases and incompatible materials See Chemical Dangers. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. Xn symbol N symbol R: 21/22-40-50/53 S: 2-36/37-60-61 UN Hazard Class: 6.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0740**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene hydrogen chloride Attacks iron, zinc, plastic, rubber and coatings.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). MAK: (Inhalable fraction) 0.5 mg/m<sup>3</sup> Peak limitation category: II(8); skin absorption (H); Carcinogen category: 3B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 100 mg/m<sup>3</sup> See: <a href="#">57749</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver immune system, resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point at 0.27kPa: 175°C Relative density (water = 1): 1.59-1.63 Solubility in water: none</p>	<p>Vapour pressure, Pa at 25°C: 0.0013 Octanol/water partition coefficient as log Pow: 2.78</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to soil organisms, honey bees. It is strongly advised that this substance does not enter the environment. The substance may cause long-term effects in the aquatic environment.</p>	
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### NOTES

If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. Belt, Chlor Kil, Chlortox, Corodan, Gold Crest, Intox, Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclör, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

### ADDITIONAL INFORMATION

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ICSC: 0740

CHLORDANE (TECHNICAL PRODUCT)

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

DDT

ICSC: 0034



Dichlorodiphenyltrichloroethane  
 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane  
 2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane  
 1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)  
 p,p'-DDT  
 $C_{14}H_9Cl_5$   
 Molecular mass: 354.5



ICSC # 0034  
 CAS # 50-29-3  
 RTECS # [KJ3325000](#)  
 UN # 2761  
 EC # 602-045-00-7  
 April 20, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
<b>•SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness.	Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0034

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

ICSC: 0034

DDT

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS WHITE POWDER. TECHNICAL PRODUCT IS WAXY SOLID.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with aluminium and iron.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 1 mg/m<sup>3</sup> as TWA A3 (ACGIH 2004). MAK: 1 mg/m<sup>3</sup> H Peak limitation category: II(8) (DFG 2003). OSHA PEL: TWA 1 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 mg/m<sup>3</sup> See: <a href="#">50293</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> May cause mechanical irritation. The substance may cause effects on the central nervous system, resulting in convulsions and respiratory depression. Exposure at high levels may result in death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 260°C Melting point: 109°C Density: 1.6 g/cm<sup>3</sup></p>	<p>Solubility in water: poor Octanol/water partition coefficient as log Pow: 6.36</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</p>	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

Transport Emergency Card: TEC (R)-61GT7-III

## ADDITIONAL INFORMATION

<p><b>ICSC: 0034</b></p>	<p><b>DDT</b></p>
<p>(C) IPCS, CEC, 1994</p>	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1262

Product Number : 442463  
Brand : Supelco

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Carcinogen

##### GHS Classification

Carcinogenicity (Category 1B)  
Specific target organ toxicity - repeated exposure (Category 2)  
Acute aquatic toxicity (Category 3)  
Chronic aquatic toxicity (Category 3)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H350 : May cause cancer.  
H373 : May cause damage to organs through prolonged or repeated exposure.  
H412 : Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P201 : Obtain special instructions before use.  
P273 : Avoid release to the environment.  
P308 + P313 : IF exposed or concerned: Get medical advice/ attention.

##### HMIS Classification

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

##### NFPA Rating

Health hazard: 0  
Fire: 0

Reactivity Hazard: 0

#### Potential Health Effects

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

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
<b>PCB - Aroclor 1262</b>			
37324-23-5	-	602-039-00-4	-

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### 4. FIRST AID MEASURES

#### General advice

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

#### If inhaled

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

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

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

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### 5. FIRE-FIGHTING MEASURES

#### Conditions of flammability

Not flammable or combustible.

#### Suitable extinguishing media

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

#### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

#### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

---

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

#### Environmental precautions

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

#### Methods 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.

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### 7. HANDLING AND STORAGE

#### Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

### Conditions for safe storage

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.

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### 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).

#### Hand 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.

#### Eye 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 and 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.

#### Hygiene measures

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

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid
Colour	no data available

### Safety data

pH	no data available
Melting point/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available

Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.  
Other decomposition products - no data available

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## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 11,300 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

Carcinogen

Possible human carcinogen

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

### Teratogenicity

no data available

### Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

### Specific target organ toxicity - repeated exposure (Globally Harmonized System)

May cause damage to organs through prolonged or repeated exposure.

no data available

### Aspiration hazard

no data available

### Potential health effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

### Signs and Symptoms of Exposure

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

### Synergistic effects

no data available

### Additional Information

RTECS: TQ1364000

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## 12. ECOLOGICAL INFORMATION

### Toxicity

Toxicity to fish LC50 - *Oncorhynchus clarki* - 50 mg/l - 96 h

### Persistence and degradability

Biodegradability Result: - According to the results of tests of biodegradability this product is not readily biodegradable.  
Remarks: no data available

### Bioaccumulative potential

no data available

### Mobility in soil

no data available

### PBT and vPvB assessment

no data available

### 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

**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: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid  
Reportable Quantity (RQ):  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN number: 2315 Class: 9 Packing group: II EMS-No: F-A, S-A  
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID  
Marine pollutant: No

**IATA**

UN number: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid

---

### 15. REGULATORY INFORMATION

**OSHA Hazards**

Carcinogen

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Chronic Health Hazard

**Massachusetts Right To Know Components**

No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
PCB - Aroclor 1262	37324-23-5	1989-08-11

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
PCB - Aroclor 1262	37324-23-5	1989-08-11

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. PCB - Aroclor 1262	37324-23-5	2008-08-01

**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. PCB - Aroclor 1262	37324-23-5	2008-08-01

## 16. OTHER INFORMATION

### Further information

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

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1248

Product Number : 48589  
Brand : Supelco  
Product Use : For laboratory research purposes.

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

Manufacturer : Sigma-Aldrich Corporation  
3050 Spruce St.  
St. Louis, Missouri 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Target Organ Effect

##### Target Organs

LiverLiver

##### GHS Classification

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 1)

##### 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.

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

##### HMIS Classification

Health hazard: 0

Flammability: 0

Physical hazards: 0

##### NFPA Rating

Health hazard: 0

Fire: 0

Reactivity Hazard: 0

## Potential Health Effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.

---

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
<b>Aroclor 1248</b>			
12672-29-6	-	-	-

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## 4. FIRST AID MEASURES

### General advice

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

### If inhaled

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

### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

### In case of eye contact

Flush eyes with water as a precaution.

### If swallowed

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

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## 5. FIRE-FIGHTING MEASURES

### Suitable extinguishing media

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

### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

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## 6. ACCIDENTAL RELEASE MEASURES

### Personal precautions

Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

### Environmental precautions

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

### Methods and materials for containment and cleaning up

Keep in suitable, closed containers for disposal.

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## 7. HANDLING AND STORAGE

### Precautions for safe handling

Normal measures for preventive fire protection.

### Conditions for safe storage

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.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection

Respiratory protection not required. For nuisance exposures use type OV/AG (US) or type ABEK (EU EN 14387) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand 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.

#### Eye protection

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

#### Skin and 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.

#### Hygiene measures

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

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid
Colour	no data available

### Safety data

pH	no data available
Melting/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.  
Other decomposition products - no data available

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## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 11,000 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

### Reproductive toxicity

Reproductive toxicity - Monkey - Oral

Maternal Effects: Menstrual cycle changes or disorders.

Reproductive toxicity - Monkey - Oral

Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Reproductive toxicity - Monkey - Oral

Effects on Fertility: Abortion.

Reproductive toxicity - Monkey - Oral

Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Behavioral. Effects on Newborn: Other postnatal measures or effects.

no data available

#### **Teratogenicity**

Developmental Toxicity - rabbit - Oral

Specific Developmental Abnormalities: Immune and reticuloendothelial system.

no data available

#### **Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

#### **Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

#### **Aspiration hazard**

no data available

#### **Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

#### **Signs and Symptoms of Exposure**

Nausea, Dizziness, Headache, muscle pain, muscle weakness, neck stiffness, trunk stiffness, stiffness of extremities, thick feeling in the tongue, Thirst

#### **Synergistic effects**

no data available

#### **Additional Information**

RTECS: Not available

---

## **12. ECOLOGICAL INFORMATION**

### **Toxicity**

Toxicity to fish	LC50 - <i>Lepomis macrochirus</i> - 0.278 mg/l - 96.0 h
Toxicity to algae	Growth inhibition EC50 - <i>Thalassiosira rotula</i> - 0.02 mg/l - 44 h

### **Persistence and degradability**

no data available

### **Bioaccumulative potential**

Bioaccumulation	<i>Pimephales promelas</i> (fathead minnow) - 250 d Bioconcentration factor (BCF): 120,000
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### **Mobility in soil**

no data available

### **PBT and vPvB assessment**

no data available

### **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**

**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: 2315 Class: 9 Packing group: II  
 Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1248)  
 Reportable Quantity (RQ): 1 lbs  
 Marine pollutant: No  
 Poison Inhalation Hazard: No

**IMDG**

UN-Number: 2315 Class: 9 Packing group: II EMS-No: F-A, S-A  
 Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID (Aroclor 1248)  
 Marine pollutant: Marine pollutant

**IATA**

UN-Number: 2315 Class: 9 Packing group: II  
 Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1248)

**15. REGULATORY INFORMATION****OSHA Hazards**

Target Organ Effect

**DSL Status**

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

Aroclor 1248	CAS-No. 12672-29-6
--------------	-----------------------

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Chronic Health Hazard

**Massachusetts Right To Know Components**

Aroclor 1248	CAS-No. 12672-29-6	Revision Date 1993-04-24
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**Pennsylvania Right To Know Components**

Aroclor 1248	CAS-No. 12672-29-6	Revision Date 1993-04-24
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**New Jersey Right To Know Components**

Aroclor 1248	CAS-No. 12672-29-6	Revision Date 1993-04-24
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**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer. Aroclor 1248	CAS-No. 12672-29-6	Revision Date 2008-08-01
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**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Aroclor 1248	CAS-No. 12672-29-6	Revision Date 2008-08-01
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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1242

Product Number : 48585  
Brand : Supelco

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

No known OSHA hazards

##### GHS Classification

Acute toxicity, Oral (Category 5)  
Specific target organ toxicity - repeated exposure (Category 1)  
Acute aquatic toxicity (Category 1)  
Chronic aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H303 May be harmful if swallowed.  
H372 Causes damage to organs through prolonged or repeated exposure.  
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273 Avoid release to the environment.  
P314 Get medical advice/ attention if you feel unwell.  
P501 Dispose of contents/ container to an approved waste disposal plant.

##### HMIS Classification

Health hazard: 1  
Flammability: 0  
Physical hazards: 0

##### NFPA Rating

Health hazard: 0  
Fire: 0  
Reactivity Hazard: 0

## Potential Health Effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.

---

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
<b>Aroclor 1242</b>			
53469-21-9	-	602-039-00-4	-

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## 4. 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. 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.

---

## 5. FIRE-FIGHTING MEASURES

### Conditions of flammability

Not flammable or combustible.

### Suitable extinguishing media

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

### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

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## 6. ACCIDENTAL RELEASE MEASURES

### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

### Environmental precautions

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

### Methods 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.

---

## 7. HANDLING AND STORAGE

### Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

### Conditions for safe storage

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.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Aroclor 1242	53469-21-9	TWA	1 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye irritation Liver damage Chloracne Danger of cutaneous absorption			
		TWA	1 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Skin designation			
		TWA	1 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		TWA	0.001 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
	Potential Occupational Carcinogen See Appendix A			

### Personal protective equipment

#### 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).

#### Hand 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.

#### Eye 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 and 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.

#### Hygiene measures

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

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form liquid  
Colour no data available

### Safety data

pH no data available  
Melting point/freezing point no data available  
Boiling point no data available

Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 4,250 mg/kg

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Chromodacryorrhea. Diarrhoea  
Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

#### Inhalation LC50

no data available

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

### Germ cell mutagenicity

no data available

### Carcinogenicity

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### Reproductive toxicity

no data available

### Teratogenicity

no data available

### Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

### Specific target organ toxicity - repeated exposure (Globally Harmonized System)

Causes damage to organs through prolonged or repeated exposure.

no data available

### Aspiration hazard

no data available

### Potential health effects

- |                   |   |
|-------------------|---|
| <b>Inhalation</b> | May be harmful if inhaled. May cause respiratory tract irritation.  |
| <b>Ingestion</b>  | May be harmful if swallowed.  |
| <b>Skin</b>       | May be harmful if absorbed through skin. May cause skin irritation. |
| <b>Eyes</b>       | May cause eye irritation.   |

### Signs and Symptoms of Exposure

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

### Synergistic effects

no data available

### Additional Information

RTECS: Not available

---

## 12. ECOLOGICAL INFORMATION

### Toxicity

- |  |   |
|--|---|
| Toxicity to fish                                     | LC50 - Pimephales promelas (fathead minnow) - 0.015 mg/l - 96 h |
| Toxicity to daphnia and other aquatic invertebrates. | LC50 - Daphnia magna (Water flea) - 0.23 mg/l - 48 h            |
| Toxicity to algae                                    | LC50 - Algae - 0.006 mg/l - 28 h                                |

### Persistence and degradability

- |                  |  |
|------------------|--|
| Biodegradability | Result: - According to the results of tests of biodegradability this product is not readily biodegradable.<br>Remarks: no data available |
|------------------|--|

### Bioaccumulative potential

Bioaccumulation Pimephales promelas (fathead minnow) - 8.5 Months  
Bioconcentration factor (BCF): 274,000

**Mobility in soil**  
no data available

**PBT and vPvB assessment**  
no data available

**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**

**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: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1242)  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN number: 2315 Class: 9 Packing group: II EMS-No: F-A, S-A  
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID (Aroclor 1242)  
Marine pollutant: No

**IATA**

UN number: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid (Aroclor 1242)

---

**15. REGULATORY INFORMATION**

**OSHA Hazards**

No known OSHA hazards

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

No SARA Hazards

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Aroclor 1242	53469-21-9	1993-04-24

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Aroclor 1242	53469-21-9	1993-04-24

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Aroclor 1242	53469-21-9	1993-04-24

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.  
Aroclor 1242

CAS-No.  
53469-21-9

Revision Date  
2008-08-01

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.  
Aroclor 1242

CAS-No.  
53469-21-9

Revision Date  
2008-08-01

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**16. OTHER INFORMATION****Further information**

Copyright 2011 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

---

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1232

Product Number : 48588  
Brand : Supelco

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

No known OSHA hazards

##### GHS Classification

Acute toxicity, Oral (Category 5)  
Acute aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)

H303 : May be harmful if swallowed.  
H400 : Very toxic to aquatic life.

Precautionary statement(s)

P273 : Avoid release to the environment.

##### HMIS Classification

Health hazard: 1  
Flammability: 0  
Physical hazards: 0

##### NFPA Rating

Health hazard: 0  
Fire: 0  
Reactivity Hazard: 0

##### Potential Health Effects

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

Ingestion

May be harmful if swallowed.

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
<b>Aroclor 1232</b>			
11141-16-5	-	602-039-00-4	-

---

### 4. 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.

---

### 5. FIRE-FIGHTING MEASURES

#### Suitable extinguishing media

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

#### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

#### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

---

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

#### Environmental precautions

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

#### Methods 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.

---

### 7. HANDLING AND STORAGE

#### Precautions for safe handling

Normal measures for preventive fire protection.

#### Conditions for safe storage

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.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### 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).

#### Hand 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.

#### Eye protection

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

#### Skin and 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.

#### Hygiene measures

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid
Colour	no data available

### Safety data

pH	no data available
Melting point/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available

Evaporation rate no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - no data available

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## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 4,470 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

### Reproductive toxicity

no data available

### Teratogenicity

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

Ingestion - May cause damage to organs through prolonged or repeated exposure. - Skin

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

**Signs and Symptoms of Exposure**

chloracne, hair loss, hyperpigmentation, Liver injury may occur., May cause endocrine disruption.

**Synergistic effects**

no data available

**Additional Information**

RTECS: Not available

---

**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish	LC50 - Onchorhynchus clarki - 1.72 mg/l - 96.0 h
Toxicity to algae	Growth inhibition EC50 - Thalassiosira rotula - 0.071 mg/l - 44 h

**Persistence and degradability**

Biodegradability	Biotic/Aerobic Result: 100 % - Readily biodegradable.
------------------	--

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**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****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: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN number: 2315 Class: 9 Packing group: II EMS-No: F-A, S-A  
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID  
Marine pollutant: No

**IATA**

UN number: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid

---

**15. REGULATORY INFORMATION****OSHA Hazards**

No known OSHA hazards

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

No SARA Hazards

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Aroclor 1232	11141-16-5	1993-04-24

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Aroclor 1232	11141-16-5	1993-04-24

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Aroclor 1232	11141-16-5	1993-04-24

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

---

**16. OTHER INFORMATION****Further information**

Copyright 2011 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1221

Product Number : 48587  
Brand : Supelco

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Target Organ Effect

##### Target Organs

Nerves.Nerves.

##### GHS Classification

Specific target organ toxicity - repeated exposure (Category 2)

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H373

May cause damage to organs through prolonged or repeated exposure.

H410

Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273

Avoid release to the environment.

P501

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

#### HMIS Classification

Health hazard: 0

Chronic Health Hazard: \*

Flammability: 0

Physical hazards: 0

#### NFPA Rating

Health hazard: 0

Fire: 0

**Reactivity Hazard:** 0

**Potential Health Effects**

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

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

CAS-No.	EC-No.	Index-No.	Concentration
<b>PCB - Aroclor 1221</b>			
11104-28-2	-	602-039-00-4	-

---

**4. 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.

---

**5. FIRE-FIGHTING MEASURES**

**Conditions of flammability**

Not flammable or combustible.

**Suitable extinguishing media**

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

**Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

---

**6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions**

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

**Environmental precautions**

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

**Methods 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.

---

**7. HANDLING AND STORAGE**

**Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

### Conditions for safe storage

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.

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### 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).

#### Hand 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.

#### Eye 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 and 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.

#### Hygiene measures

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid
Colour	no data available

### Safety data

pH	no data available
Melting point/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available

Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.  
Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 3,980 mg/kg

#### Inhalation LC50

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

### Serious eye damage/eye irritation

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

### Reproductive toxicity

Reproductive toxicity - rabbit - Oral

Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - rat - Subcutaneous

Maternal Effects: Uterus, cervix, vagina.

Reproductive toxicity - rat - Subcutaneous

Effects on Fertility: Other measures of fertility

no data available

### **Teratogenicity**

no data available

### **Specific target organ toxicity - single exposure (Globally Harmonized System)**

### **Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

May cause damage to organs through prolonged or repeated exposure.

no data available

### **Aspiration hazard**

no data available

### **Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

### **Signs and Symptoms of Exposure**

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

### **Synergistic effects**

no data available

### **Additional Information**

RTECS: Not available

---

## **12. ECOLOGICAL INFORMATION**

### **Toxicity**

Toxicity to fish LC50 - *Oncorhynchus clarki* - 1.17 mg/l - 96.0 h

### **Persistence and degradability**

Biodegradability Biotic/Aerobic Biochemical oxygen demand  
Result: 100 % - Readily biodegradable.

### **Bioaccumulative potential**

no data available

### **Mobility in soil**

no data available

### **PBT and vPvB assessment**

no data available

### **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**

### **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: 2315 Class: 9 Packing group: II  
 Proper shipping name: Polychlorinated biphenyls, liquid  
 Reportable Quantity (RQ): 1 lbs  
 Marine pollutant: No  
 Poison Inhalation Hazard: No

**IMDG**

UN number: 2315 Class: 9 Packing group: II EMS-No: F-A, S-A  
 Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID  
 Marine pollutant: No

**IATA**

UN number: 2315 Class: 9 Packing group: II  
 Proper shipping name: Polychlorinated biphenyls, liquid

**15. REGULATORY INFORMATION****OSHA Hazards**

Target Organ Effect

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
PCB - Aroclor 1221	11104-28-2	1993-04-24

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
PCB - Aroclor 1221	11104-28-2	1993-04-24

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
PCB - Aroclor 1221	11104-28-2	1993-04-24

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. PCB - Aroclor 1221	11104-28-2	2008-08-01

**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. PCB - Aroclor 1221	11104-28-2	2008-08-01

**16. OTHER INFORMATION****Further information**

Copyright 2011 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Aroclor 1016

Product Number : 48591  
Brand : Supelco

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

No known OSHA hazards

##### GHS Classification

Acute toxicity, Oral (Category 5)  
Specific target organ toxicity - repeated exposure (Category 2)  
Acute aquatic toxicity (Category 1)  
Chronic aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)

H303 : May be harmful if swallowed.  
H373 : May cause damage to organs through prolonged or repeated exposure.  
H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273 : Avoid release to the environment.  
P501 : Dispose of contents/ container to an approved waste disposal plant.

##### HMIS Classification

Health hazard: 1  
Flammability: 0  
Physical hazards: 0

##### NFPA Rating

Health hazard: 0  
Fire: 0  
Reactivity Hazard: 0

## Potential Health Effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.

---

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
<b>Aroclor 1016</b>			
12674-11-2	-	602-039-00-4	-

---

## 4. 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.

---

## 5. FIRE-FIGHTING MEASURES

### Conditions of flammability

Not flammable or combustible.

### Suitable extinguishing media

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

### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

---

## 6. ACCIDENTAL RELEASE MEASURES

### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

### Environmental precautions

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

### Methods 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.

---

## 7. HANDLING AND STORAGE

### Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

### Conditions for safe storage

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.

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### 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).

#### Hand 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.

#### Eye 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 and 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.

#### Hygiene measures

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid
Colour	no data available

### Safety data

pH	no data available
Melting point/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available

Evaporation rate      no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.  
Other decomposition products - no data available

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## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 2,300 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

IARC:            No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP:            No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

### Reproductive toxicity

Reproductive toxicity - rat - Oral

Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Monkey - Oral

Effects on Newborn: Behavioral.

Reproductive toxicity - Mammal - Oral

Effects on Fertility: Other measures of fertility Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

no data available

### Teratogenicity

Developmental Toxicity - rat - Oral

Specific Developmental Abnormalities: Central nervous system.

no data available

### Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

### Specific target organ toxicity - repeated exposure (Globally Harmonized System)

May cause damage to organs through prolonged or repeated exposure.

### Aspiration hazard

no data available

### Potential health effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

### Synergistic effects

no data available

### Additional Information

RTECS: Not available

---

## 12. ECOLOGICAL INFORMATION

### Toxicity

Toxicity to fish LC50 - *Oncorhynchus mykiss* (rainbow trout) - 0.0010 mg/l - 96.0 h

### Persistence and degradability

Biodegradability Biotic/Aerobic Biochemical oxygen demand

### Bioaccumulative potential

Bioaccumulation *Pimephales promelas* (fathead minnow) -  
Bioconcentration factor (BCF): 42,500

### Mobility in soil

no data available

### PBT and vPvB assessment

no data available

### 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

### 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: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

### IMDG

UN number: 2315 Class: 9 Packing group: II EMS-No: F-A, S-A  
Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID  
Marine pollutant: No

### IATA

UN number: 2315 Class: 9 Packing group: II  
Proper shipping name: Polychlorinated biphenyls, liquid

---

## 15. REGULATORY INFORMATION

### OSHA Hazards

No known OSHA hazards

### SARA 302 Components

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

### SARA 313 Components

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

### SARA 311/312 Hazards

No SARA Hazards

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Aroclor 1016	12674-11-2	1993-04-24

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Aroclor 1016	12674-11-2	1993-04-24

### New Jersey Right To Know Components

	CAS-No.	Revision Date
Aroclor 1016	12674-11-2	1993-04-24

### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Aroclor 1016	12674-11-2	2008-08-01

### 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. Aroclor 1016	12674-11-2	2008-08-01

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## 16. OTHER INFORMATION

### Further information

Copyright 2011 Sigma-Aldrich Co. 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 Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# International Chemical Safety Cards

## POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939



Chlorobiphenyl (54% chlorine)  
Chlorodiphenyl (54% chlorine)  
PCB  
Molecular mass: 327 (average)

ICSC # 0939  
CAS # 11097-69-1  
RTECS # [TQ1360000](#)  
UN # 2315  
EC # 602-039-00-4  
October 20, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
<b>•INHALATION</b>		Ventilation.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>		Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Headache. Numbness.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.		Separated from food and feedstuffs . Cool. Dry. Keep in a well-ventilated room.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Severe marine pollutant. Note: C Xn symbol N symbol R: 33-50/53 S: 2-35-60-61 UN Hazard Class: 9 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0939

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> LIGHT YELLOW VISCOUS LIQUID.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes in a fire producing irritating and toxic gases .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA; (skin); A3; (ACGIH 2004). MAK: 0.05 ppm, 0.70 mg/m<sup>3</sup>; H; Peak limitation category: II(8); Carcinogen category: 3B; Pregnancy risk group: B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL*: Ca TWA 0.001 mg/m<sup>3</sup> <a href="#">See Appendix A</a> *Note: The REL also applies to other PCBs. NIOSH IDLH: Ca 5 mg/m<sup>3</sup> See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20° C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. Chloracne is the most visible effect. The substance may have effects on the liver . Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Relative density (water = 1): 1.5 Solubility in water: none</p>	<p>Vapour pressure, Pa at 25°C: 0.01 Octanol/water partition coefficient as log Pow: 6.30 (estimated)</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment.</p>	
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**NOTES**

Changes into a resinous state (pour point) at 10°C. Distillation range: 365°-390°C. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.  
Transport Emergency Card: TEC (R)-90GM2-II-L

**ADDITIONAL INFORMATION**

<p><b>ICSC: 0939</b></p>	<p><b>POLYCHLORINATED BIPHENYL (AROCLOR 1254)</b> (C) IPCS, CEC, 1994</p>
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<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

**ZINC POWDER**

ICSC: 1205



Blue powder  
Merrillite  
Zn  
Atomic mass: 65.4  
(powder)

ICSC # 1205  
CAS # 7440-66-6  
RTECS # [ZG8600000](#)  
UN # 1436 (zinc powder or dust)  
EC # 030-001-00-1  
October 24, 1994 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
<b>EXPLOSION</b>	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</b>	
• <b>INHALATION</b>	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	Fireproof. Separated from acids, bases oxidants Dry.	Airtight. F symbol N symbol R: 15-17-50/53 S: 2-7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1205**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## ZINC POWDER

ICSC: 1205

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS GREY TO BLUE POWDER.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.</p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Inhalation of fumes may cause metal fume fever. The effects may be delayed.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 907°C Melting point: 419°C Relative density (water = 1): 7.14</p>	<p>Solubility in water: reaction Vapour pressure, kPa at 487°C: 0.1 Auto-ignition temperature: 460°C</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	
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### NOTES

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III  
NFPA Code: H0; F1; R1;

### ADDITIONAL INFORMATION

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<b>ICSC: 1205</b>	(C) IPCS, CEC, 1994	<b>ZINC POWDER</b>
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<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

NICKEL

ICSC: 0062



Ni  
Atomic mass: 58.7  
(powder)

ICSC # 0062  
CAS # 7440-02-0  
RTECS # [QR5950000](#)  
EC # 028-002-00-7  
October 17, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</b>	
• <b>INHALATION</b>	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Separated from strong acids.	Xn symbol R: 40-43 S: 2-22-36

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0062**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

NICKEL

ICSC: 0062

<b>I</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> SILVERY METALLIC SOLID IN VARIOUS FORMS.</p> <p><b>PHYSICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of the dust.</p>
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Dust explosion possible if in powder or granular form, mixed with air.

**CHEMICAL DANGERS:**

Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV:  
(Inhalable fraction)  
1.5 mg/m<sup>3</sup> as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004).  
MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah);  
Carcinogen category: 1;  
(DFG 2004).  
OSHA PEL\*†: TWA 1 mg/m<sup>3</sup> \*Note: The PEL does not apply to Nickel carbonyl.  
NIOSH REL\*: Ca TWA 0.015 mg/m<sup>3</sup> [See Appendix A](#)  
\*Note: The REL does not apply to Nickel carbonyl.  
NIOSH IDLH: Ca 10 mg/m<sup>3</sup> (as Ni) See: [7440020](#)

**INHALATION RISK:**

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

**EFFECTS OF SHORT-TERM EXPOSURE:**

May cause mechanical irritation. Inhalation of fumes may cause pneumonitis.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.

**PHYSICAL PROPERTIES**

Boiling point: 2730°C  
Melting point: 1455°C  
Density: 8.9 g/cm<sup>3</sup>

Solubility in water:  
none

**ENVIRONMENTAL DATA**

**NOTES**

At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

**ADDITIONAL INFORMATION**

**ICSC: 0062**

**NICKEL**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**MERCURY**

ICSC: 0056



Quicksilver  
Liquid silver  
Hg  
Atomic mass: 200.6

ICSC # 0056  
CAS # 7439-97-6  
RTECS # [OV4550000](#)  
UN # 2809  
EC # 080-001-00-0  
April 22, 2004 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0056**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## MERCURY

ICSC: 0056

<p><b>I</b> <b>M</b> <b>P</b> <b>O</b> <b>R</b> <b>T</b> <b>A</b> <b>N</b> <b>T</b> <b>D</b> <b>A</b> <b>T</b> <b>A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.025 mg/m<sup>3</sup> as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 0.1 mg/m<sup>3</sup> Sh Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003). OSHA PEL<sub>f</sub>: C 0.1 mg/m<sup>3</sup> NIOSH REL: Hg Vapor: TWA 0.05 mg/m<sup>3</sup> skin Other: C 0.1 mg/m<sup>3</sup> skin NIOSH IDLH: 10 mg/m<sup>3</sup> (as Hg) See: <a href="#">7439976</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none</p>	<p>Vapour pressure, Pa at 20°C: 0.26 Relative vapour density (air = 1): 6.93 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.</p>	
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**NOTES**

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

**ADDITIONAL INFORMATION**

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<b>ICSC: 0056</b>	(C) IPCS, CEC, 1994	<b>MERCURY</b>
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# International Chemical Safety Cards

**LEAD**

ICSC: 0052



Lead metal  
Plumbum  
Pb  
Atomic mass: 207.2  
(powder)

ICSC # 0052  
CAS # 7439-92-1  
RTECS # [OF7525000](#)  
October 08, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>	<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>	
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:	
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 0052</b>	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

# International Chemical Safety Cards

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.05 mg/m<sup>3</sup> A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004). MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004). EU OEL: as TWA 0.15 mg/m<sup>3</sup> (EU 2002). OSHA PEL*: 1910.1025 TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The PEL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH REL*: TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The REL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH IDLH: 100 mg/m<sup>3</sup> (as Pb) See: <a href="#">7439921</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.</p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 1740°C Melting point: 327.5°C	Density: 11.34 g/cm <sup>3</sup> Solubility in water: none
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<b>ENVIRONMENTAL DATA</b>	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.	
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**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.  
 Transport Emergency Card: TEC (R)-51S1872

**ADDITIONAL INFORMATION**

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<b>ICSC: 0052</b>	<b>LEAD</b>
(C) IPCS, CEC, 1994	

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# International Chemical Safety Cards

**COPPER**

ICSC: 0240



Cu  
(powder)

ICSC # 0240

CAS # 7440-50-8

RTECS # [GL5325000](#)

September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0240**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**COPPER**

ICSC: 0240

<p><b>I</b></p> <p><b>M</b></p> <p><b>P</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p>
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Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.

**EFFECTS OF SHORT-TERM EXPOSURE:**  
Inhalation of fumes may cause metal fume fever. See Notes.

**OCCUPATIONAL EXPOSURE LIMITS:**  
TLV: 0.2 mg/m<sup>3</sup> fume (ACGIH 1992-1993).  
TLV (as Cu, dusts & mists): 1 mg/m<sup>3</sup> (ACGIH 1992-1993).  
Intended change 0.1 mg/m<sup>3</sup>  
Inhal.,  
A4 (not classifiable as a human carcinogen);  
MAK: 0.1 mg/m<sup>3</sup> (Inhalable fraction)  
Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005).  
OSHA PEL\*: TWA 1 mg/m<sup>3</sup> \*Note: The PEL also applies to other copper compounds (as Cu) except copper fume.  
NIOSH REL\*: TWA 1 mg/m<sup>3</sup> \*Note: The REL also applies to other copper compounds (as Cu) except Copper fume.  
NIOSH IDLH: 100 mg/m<sup>3</sup> (as Cu) See: [7440508](https://www.cdc.gov/niosh/docs/2005-109/)

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**  
Repeated or prolonged contact may cause skin sensitization.

<b>PHYSICAL PROPERTIES</b>	Boiling point: 2595°C Melting point: 1083°C Relative density (water = 1): 8.9	Solubility in water: none
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<b>ENVIRONMENTAL DATA</b>	
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**NOTES**

The symptoms of metal fume fever do not become manifest until several hours.

**ADDITIONAL INFORMATION**

<b>ICSC: 0240</b>	(C) IPCS, CEC, 1994	<b>COPPER</b>
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# International Chemical Safety Cards

**CHROMIUM**

ICSC: 0029



Chrome  
Cr  
Atomic mass: 52.0  
(powder)

ICSC # 0029  
CAS # 7440-47-3  
RTECS # [GB4200000](#)  
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST!</b>	
• <b>INHALATION</b>	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0029**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**CHROMIUM**

ICSC: 0029

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> GREY POWDER	<b>ROUTES OF EXPOSURE:</b>
<b>M</b>	<b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.	<b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed.
<b>P</b>		

O  
R  
T  
A  
N  
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A

**CHEMICAL DANGERS:**

Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard.

**EFFECTS OF SHORT-TERM EXPOSURE:**

May cause mechanical irritation to the eyes and the respiratory tract.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m<sup>3</sup> as TWA A4 (ACGIH 2004).  
MAK not established.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

OSHA PEL\*: TWA 1 mg/m<sup>3</sup> [See Appendix C](#) \*Note: The PEL also applies to insoluble chromium salts.

NIOSH REL: TWA 0.5 mg/m<sup>3</sup> [See Appendix C](#)

NIOSH IDLH: 250 mg/m<sup>3</sup> (as Cr) See: [7440473](#)

**PHYSICAL PROPERTIES**

Boiling point: 2642°C  
Melting point: 1900°C  
Density: 7.15 g/cm<sup>3</sup>

Solubility in water:  
none

**ENVIRONMENTAL DATA**

**NOTES**

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

**ADDITIONAL INFORMATION**

**ICSC: 0029**

**CHROMIUM**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

CADMIUM

ICSC: 0020



Cd  
Atomic mass: 112.4

ICSC # 0020  
CAS # 7440-43-9  
RTECS # [EU980000](#)  
UN # 2570  
EC # 048-002-00-0  
April 22, 2005 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!</b>	<b>IN ALL CASES CONSULT A DOCTOR!</b>
• <b>INHALATION</b>	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.	Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants acids, food and feedstuffs	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T+ symbol N symbol R: 45-26-48/23/25-62-63-68-50/53 S: 53-45-60-61 UN Hazard Class: 6.1

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0020**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## CADMIUM

ICSC: 0020

<p><b>I M P O R T A N T A D V I S I O N</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001.) Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium, causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (Total dust) 0.01 mg/m<sup>3</sup> (Respirable fraction) 0.002 mg/m<sup>3</sup> as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL*: 1910.1027 TWA 0.005 mg/m<sup>3</sup> *Note: The PEL applies to all Cadmium compounds (as Cd). NIOSH REL*: Ca <a href="#">See Appendix A</a> *Note: The REL applies to all Cadmium compounds (as Cd). NIOSH IDLH: Ca 9 mg/m<sup>3</sup> (as Cd) See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The fume is irritating to the respiratory tract Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys, resulting in kidney impairment This substance is carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 765°C Melting point: 321°C Density: 8.6 g/cm<sup>3</sup></p>	<p>Solubility in water: none Auto-ignition temperature: (cadmium metal dust) 250°C</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	
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### NOTES

Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

### ADDITIONAL INFORMATION

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<p><b>ICSC: 0020</b></p>	<p><b>CADMIUM</b></p>
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(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

**BARIUM SULFATE**

ICSC: 0827



Barium sulphate  
Blanc fixe  
Artificial barite  
BaSO<sub>4</sub>  
Molecular mass: 233.43

ICSC # 0827

CAS # 7727-43-7

RTECS # [CR0600000](#)

October 20, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Rinse mouth.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P1 filter respirator for inert particles.			R: S:
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 0827</b>		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

# International Chemical Safety Cards

## BARIUM SULFATE

ICSC: 0827

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with aluminium powder.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 10 mg/m<sup>3</sup> as TWA; (ACGIH 2004). MAK: (Inhalable fraction) 4 mg/m<sup>3</sup>; (Respirable fraction) 1.5 mg/m<sup>3</sup>; (DFG 2004). OSHA PEL<sup>†</sup>: TWA 15 mg/m<sup>3</sup> (total) TWA 5 mg/m<sup>3</sup> (resp) NIOSH REL: TWA 10 mg/m<sup>3</sup> (total) TWA 5 mg/m<sup>3</sup> (resp) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Lungs may be affected by repeated or prolonged exposure to dust particles, resulting in baritosis (a form of benign pneumoconiosis).</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Melting point (decomposes): 1600°C Density: 4.5 g/cm<sup>3</sup></p>	Solubility in water: none
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<b>ENVIRONMENTAL DATA</b>	
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### NOTES

Occurs in nature as the mineral barite; also as barytes, heavy spar. Card has been partly updated in October 2005. See section Occupational Exposure Limits.

### ADDITIONAL INFORMATION

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<b>ICSC: 0827</b>	<b>BARIUM SULFATE</b>
(C) IPCS, CEC, 1994	

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

**ARSENIC**

ICSC: 0013



Grey arsenic  
As  
Atomic mass: 74.9

ICSC # 0013  
CAS # 7440-38-2  
RTECS # [CG0525000](#)  
UN # 1558  
EC # 033-001-00-X

October 18, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>•SKIN</b>	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>•EYES</b>	Redness.	Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 23/25-50/53 S: 1/2-20/21-28-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0013**

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**ARSENIC**

**ICSC: 0013**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.01 mg/m<sup>3</sup> as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004). MAK: Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL: 1910.1018 TWA 0.010 mg/m<sup>3</sup> NIOSH REL: Ca C 0.002 mg/m<sup>3</sup> 15-minute <a href="#">See Appendix A</a> NIOSH IDLH: Ca 5 mg/m<sup>3</sup> (as As) See: <a href="#">7440382</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow , resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Sublimation point: 613°C Density: 5.7 g/cm<sup>3</sup></p>	<p>Solubility in water: none</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.</p>	
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**NOTES**

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222).

Transport Emergency Card: TEC (R)-61GT5-II

**ADDITIONAL INFORMATION**

**ICSC: 0013** **ARSENIC**

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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***APPENDIX D***  
***HOSPITAL INFORMATION AND MAP***  
***FIELD ACCIDENT REPORT***

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME \_\_\_\_\_ PROJECT. NO. \_\_\_\_\_

Date of Accident \_\_\_\_\_ Time \_\_\_\_\_ Report By \_\_\_\_\_

Type of Accident (Check One):

Vehicular       Personal       Property

Name of Injured \_\_\_\_\_ DOB or Age \_\_\_\_\_

How Long Employed \_\_\_\_\_

Names of Witnesses \_\_\_\_\_  
\_\_\_\_\_

Description of Accident \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action Taken \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Did the Injured Lose Any Time? \_\_\_\_\_ How Much (Days/Hrs.)? \_\_\_\_\_

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? \_\_\_\_\_  
\_\_\_\_\_

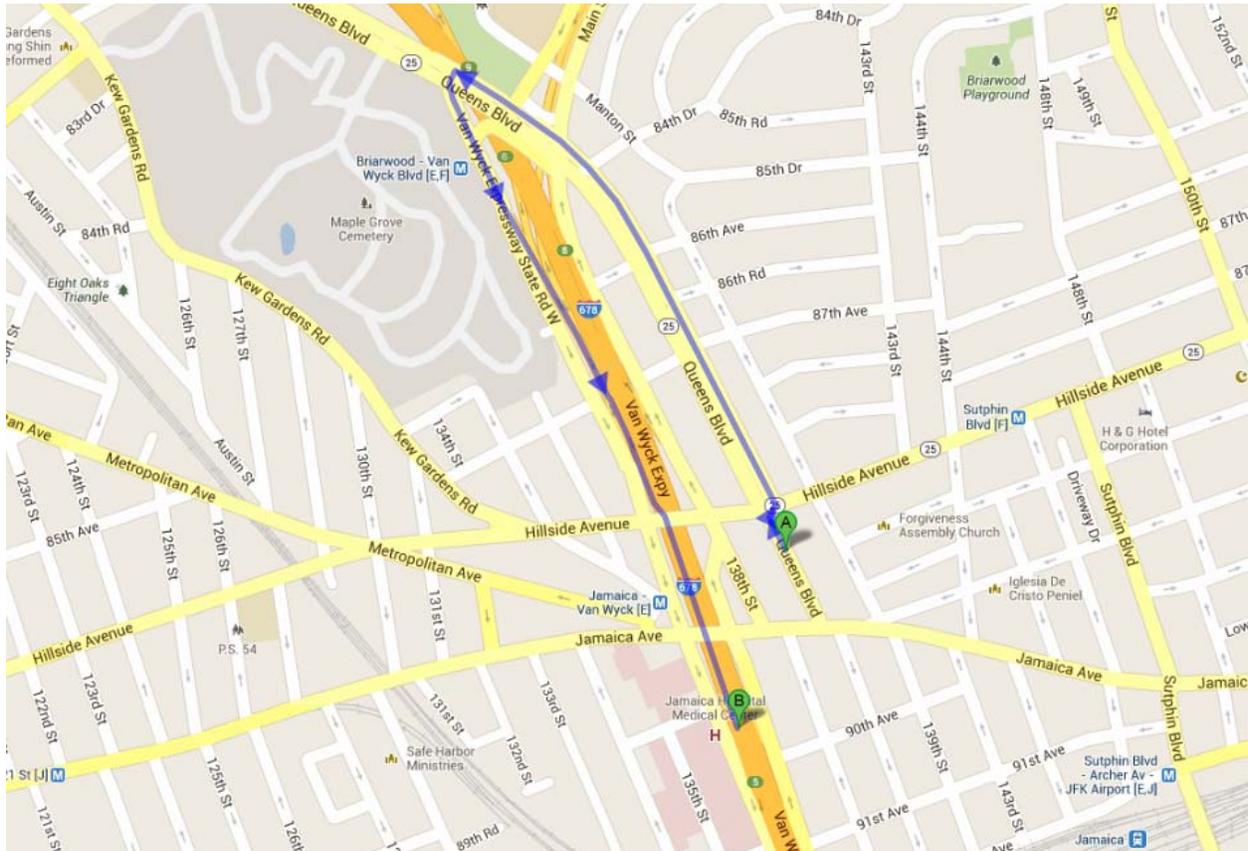
(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

## HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

**JAMAICA HOSPITAL MEDICAL CENTER**  
 8900 Van Wyck Expy, New York, NY 11418  
 718-206-6000  
 1.3 Miles – About 4 Minutes



**A** 140-15 Queens Blvd, Queens, NY 11435

- |    |   |                           |
|----|---|---------------------------|
| 1. | Head northwest on Queens Blvd   | go 180 ft<br>total 180 ft |
| 2. | Take the 1st right to stay on Queens Blvd   | go 69 ft<br>total 249 ft  |
| 3. | Turn left to stay on Queens Blvd<br>About 2 mins  | go 0.5 mi<br>total 0.6 mi |
| 4. | Turn left onto Van Wyck Expressway State Rd W<br>About 1 min  | go 0.1 mi<br>total 0.7 mi |
| 5. | Take the ramp on the left to I-678 S  | go 0.2 mi<br>total 0.9 mi |
| 6. | Keep left at the fork, follow signs for Interstate 678 S/Van Wyck Expressway/Kennedy Airport and merge onto I-678 S<br>Destination will be on the right | go 0.3 mi<br>total 1.3 mi |

**B** Jamaica Hospital Medical Center  
 8900 Van Wyck Expy, New York, NY 11418

**ATTACHMENT F**  
**VAPOR BARRIER SPECIFICATIONS**

# VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier



## Product Description

VaporBlock® Plus™ 20 is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock® Plus™ 20 is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab. VaporBlock® Plus™ 20 is more than 100 times less permeable than typical high-performance polyethylene vapor retarders against Methane, Radon and other harmful VOCs.

VaporBlock® Plus™ 20 is one of the most effective underslab gas barriers in the building industry today far exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Available in a 20 (Class A) mil thicknesses designed to meet the most stringent requirements. VaporBlock® Plus™ 20 is produced within the strict guidelines of our ISO 9001:2008 Certified Management System.

## Product Use

VaporBlock® Plus™ 20 resists gas and moisture migration into the building envelop when properly installed to provide protection from toxic/harmful chemicals. It can be installed as part of a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive system it is recommended to also include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock® Plus™ 20 works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.

## Size & Packaging

VaporBlock® Plus™ 20 is available in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements. Installation instructions and ASTM E-1745 classifications accompany each roll.



Under-Slab Vapor/Gas Retarder

## Product

## Part #

VaporBlock Plus 20 ..... VBP 20

## APPLICATIONS

- Radon Barrier Under-Slab Vapor Retarder
- Methane Barrier Foundation Wall Vapor Retarder
- VOC Barrier



# VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

		VAPORBLOCK PLUS 20	
PROPERTIES	TEST METHOD	IMPERIAL	METRIC
APPEARANCE		White/Gold	
THICKNESS, NOMINAL		20 mil	0.51 mm
WEIGHT		102 lbs/MSF	498 g/m <sup>2</sup>
CLASSIFICATION	ASTM E 1745	CLASS A, B & C	
TENSILE STRENGTH LBF/IN (N/CM) AVERAGE MD & TD (NEW MATERIAL)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
IMPACT RESISTANCE	ASTM D 1709	2600 g	
MAXIMUM USE TEMPERATURE		180° F	82° C
MINIMUM USE TEMPERATURE		-70° F	-57° C
PERMEANCE (NEW MATERIAL)	ASTM E 154 Section 7  ASTM E 96 Procedure B	0.0051 Perms grains/(ft <sup>2</sup> ·hr·in·Hg)	0.0034 Perms g/(24hr·m <sup>2</sup> ·mm Hg)
RADON DIFFUSION COEFFICIENT	K124/02/95	< 1.1 x 10 <sup>-13</sup> m <sup>2</sup> /s	
METHANE PERMEANCE	ASTM D 1434	< 1.7 x 10 <sup>-10</sup> m <sup>2</sup> /d·atm 0.32 GTR (Gas Transmission Rate) ml/m <sup>2</sup> ·D·ATM	

## VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.

Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.

ASTM E-1643 also provides general installation information for vapor retarders.

**VaporBlock® Plus™**  
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VaporBlock® Plus™ is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. RAVEN INDUSTRIES MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage.

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