

**WEST 28<sup>TH</sup> STREET SITE**  
**MANHATTAN, NEW YORK**

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**Remedial Action Work Plan**

**NYC BCP Number: 15CVCP116M**

**West 28<sup>th</sup> Street Rentals Site**

**215-219 West 28<sup>th</sup> Street**

**New York, New York**

**Block 778, Lots 29, 30 and 31**

**E-Designation # E-276**

**CEQR # 10DCP004M**

**West 28<sup>th</sup> Street Rezoning Action**

**Prepared or:**

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c/o HAP Investment Developers  
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**APRIL 2015**

# REMEDIAL ACTION WORK PLAN

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## LIST OF ACRONYMS

<b>Acronym</b>	<b>Definition</b>
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC BCP	New York City Brownfield 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	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
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, Mathew Carroll, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the West 28<sup>th</sup> Site NYC VCP# 15CVCP116M.

I, Mohamed Ahmed am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the West 28<sup>th</sup> Street Site NYC VCP# 15CVCP116M.

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

Mathew Carroll

NYS PE License Number

091629  
Signature

\_\_\_\_\_  
Date



Mohamed Ahmed

QEP Name

\_\_\_\_\_  
QEP Signature

\_\_\_\_\_  
Date

## **EXECUTIVE SUMMARY**

215-219 West 28<sup>th</sup> Street Mazal Owner LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to remediate a 7,360-square foot site located at 215-219 West 28<sup>th</sup> Street in Manhattan, 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 in the Chelsea section of Manhattan, New York and is identified as Block 778 and Lots 29, 30, and 31 on the New York City Tax Map. Figure 1 is a Site location map. The Site is located on the north side of West 28th Street between 7<sup>th</sup> and 8<sup>th</sup> Avenues. The Site is 7,360 square feet and is bounded by a 17-story residential and commercial building to the north, West 28th Street/Fashion Institute of Technology to the south, a 6-story mixed use building to the east, and a 6-story residential and commercial building to the west. Currently, Lots 29 and 30 are vacant and Lot 31 is occupied by a 4-story building with a basement that houses a boiler room and other utilities. Site Plan is shown on Figure 2.

### **Summary of Environmental Findings**

1. Elevation of the property above mean sea level ranges from 29 to 32 feet.
2. Depth to groundwater ranges from 17 to 18 ft-bg at the Site.
3. Groundwater flow is generally from east to west or southwest beneath the Site.
4. Depth to bedrock is approximately 70 feet at the Site.
5. Based upon geotechnical investigation and recent Phase II subsurface investigation boring logs, the stratigraphy of the Site, from the surface down, consists of approximately five (5) to ten (10) feet of fill material with brick, gravel and cinders in a coarse-sand matrix. Deeper soils were classified as silts and sands.

6. Soil/fill samples results were compared to New York State Department of Environmental Conservation (NYSDEC) Part 375 Table 375-6.8 Unrestricted Use and Restricted Residential Use Soil Cleanup Objectives (SCOs). Soil/fill samples collected showed that volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) or polychlorinated biphenyls (PCBs) were not detected in soil above the Part 375 Unrestricted Use soil cleanup objectives (SCOs). Two pesticides including, 4,4'-DDE (max. of 7.2 µg/kg) and 4,4'-DDT (max. of 27 µg/kg) were detected in two shallow soil samples above Unrestricted Use SCOs. Several metals including lead detected in one sample (at 141 mg/kg), mercury detected in three samples (max. of 0.23 mg/kg), and zinc (max. of 151 mg/kg) exceeded Unrestricted Use SCOs within shallow soil samples. All concentrations were below Restricted Residential Use SCOs. Overall, soil chemistry is unremarkable and does not indicate any disposal.
7. Groundwater samples collected during the Phase II Investigation showed no VOCs, SVOCs, pesticides or PCBs were detected in groundwater above the Class GA Standards, with the exception of chloroform in all samples and fill-related PAHs in two (2) groundwater samples. It should be noted, however, that reporting limits for some VOCs, many SVOCs and one pesticide were higher than standards. Several metals were identified, but only manganese and sodium were detected above their respective GQs.
8. Soil vapor samples collected during the Phase II Investigation showed VOCs, primarily gasoline constituents benzene, ethyl benzene, toluene and xylenes (BTEX) and isopropylbenzene, in all soil vapor samples at concentrations slightly elevated but below 25ug/m<sup>3</sup>. One (1) VOC, chloroform, was detected in all samples in concentrations ranging from 28.2 ug/m<sup>3</sup> – 82.5 ug/m<sup>3</sup>. Chloromethane and trichloroethene (TCE) were detected in one soil vapor sample at concentrations of 4.2 and 5 ug/m<sup>3</sup>. Carbon disulfide was detected at one location at a concentration of 14.6 ug/m<sup>3</sup>.

## **Summary of Proposed Redevelopment Plan**

The proposed development will consist of one new 21-story mixed residential and commercial building development with an area of approximately 150,000 square feet and will be constructed on the entire three lots. The building will contain two cellar levels for retail, residential amenities, storage and mechanical equipment room. The total depth of excavation to accommodate the two cellar levels will be approximate 27 feet below grade. The first floor will contain lobby and retail space. Floors 2-21 will contain residential condominium apartments. Affordable requirement will be through inclusionary housing certificates.

## **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. Perform a Community Air Monitoring Program (CAMP) for particulates and volatile organic carbon compounds (VOCs).
3. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to start of remedial action.
4. Selection of 6NYCRR Part 375 Table 6.8 (a) Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.

6. Installation of a dewatering system for construction purposes which will include groundwater cutoff elements at the perimeter of the Site including secant a pile wall. Dewatering discharge will include appropriate approvals obtained from New York City Department of Environmental Protection (NYCDEP) for discharges to the combined sewer system.
7. Excavation and removal of soil/fill exceeding Track 1 SCOs including excavation of the lead-contaminated soil. Excavation for development purposes would take place to a depth of approximately 27 feet below sidewalk grade and would be below the water table across the entirety of the Site. A small area for elevator pits will be excavated to greater depths. Approximately 10,000 tons of soil will be excavated and removed from this Site.
8. 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 onsite.
9. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
10. Removal and closure of underground storage tanks (if encountered) in compliance with applicable local, State and Federal laws and regulations.
11. 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.
12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
15. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, 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.

If Unrestricted Use SCOs are not achieved, the following construction elements implemented as part of new construction will constitute Engineering and Institutional controls:

17. As part of development, installation of a waterproofing/vapor barrier system beneath the building slab and outside foundation sidewalls below grade. The barrier will consist of Grace Preprufe® 300R Plus or Preprufe 300LT Plus Membrane (46 mils) and 160R or Preprufe 160LT Plus Membrane (32 mils), or an OER-approved equivalent. Grace Adcor™ ES hydrophilic non-bentonite (or an OER-approved equivalent) will be applied for non-moving concrete construction joints.
18. If Track 1 is 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.
19. As part of new development, construction and maintenance of an engineered composite cover consisting of the new building concrete slab, which will cover approximately the entire Site. This cover system will be composed of the concrete foundation slab of the future building, will be waterproofed, reinforced and 15 inches thick.
20. If Track 1 is not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

**Community Protection Statement.** The 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 safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is Mohamed Ahmed and can be reached at (646) 606-2332.

**Worker Training.** Workers participating in cleanup involving hazardous waste as determined by 40 CFR 262.11 and ECL 27-0903 or a “source area” as determined by DER-10 1.3(b)70 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 to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

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

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager Kristen Meisner/Tenen Environmental at (646) 606-2332 or NYC Office of Environmental Remediation Project Manager Eric Ilijevich and (212) 341-2034.

**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 7:00 a.m. to 6:00 p.m., Monday to 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 Philip Stevanovic at 646-559-5732 the NYC Office of Environmental Remediation Project Manager Eric Ilijevich at (212) 341-2034 , 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 **New York Public Library – Muhlenberg Library**

209 West 23rd Street

New York, New York, NY 10011 Phone: 212-924-1585

Hours (Call to verify):

Monday, Wednesday: 10:00 a.m. to 6:00 p.m.

Tuesday, Thursday: 10:00 a.m. to 7:00 p.m.

Friday, Saturday: 10:00 a.m. to 5:00 p.m.

Sunday: Closed

**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 that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed or 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**

215-219 West 28<sup>th</sup> Street Mazal Owner LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 215-219 West 28<sup>th</sup> Street in the Chelsea section of Manhattan, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

### **1.1 Site Location and Current usage**

The Site is located in the Chelsea section of Manhattan, New York and is identified as Block number 778 and Lot numbers 29, 30 and 31 on the New York City Tax Map. Figure 1 is a Site location map. The Site is 7,360-square feet and is bounded by a 17-story residential and commercial building to the north, West 28th Street/Fashion Institute of Technology to the south, a 6-story mixed use building to the east, and a 6-story residential and commercial building to the west. Currently, Lots 29 and 30 are vacant and Lot 31 is occupied by a 4-story building with a basement that houses a boiler room and other utilities.

### **1.2 Proposed Redevelopment Plan**

The proposed development will consist of one new 21-story mixed residential and commercial use building with an area of approximately 150,000 square feet and will be constructed on the entire three lots. The building will contain 3 cellar levels for retail, residential amenities, storage and mechanical equipment room. The total depth of excavation to accommodate the two cellar levels will be approximate 27 feet below grade. First floor will contain lobby and retail space. Floors 2-21 will contain residential condominium apartments.

Affordable requirement will be through inclusionary housing certificates. Proposed Development Plans are included in Appendix 1.

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

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

The Site is located on the north side of West 28<sup>th</sup> Street between 7<sup>th</sup> and 8<sup>th</sup> Avenues. The Site is 7,360 square feet and is bounded by a 17-story residential and commercial building to the north, West 28<sup>th</sup> Street/Fashion Institute of Technology to the south, a 6-story mixed use building to the east, and a 6-story residential and commercial building to the west. The surrounding area is predominantly commercial, industrial/manufacturing and public institutions with some residential and parking uses. Based on a review of the OER's Searchable Property Environmental E-Database (SPEED), no hospitals, day care facilities, or schools are present within 500 feet of the Site.

Figure 3 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, West 28<sup>th</sup> Street Rentals Site, , Phase II Subsurface Investigation Report*", dated March 2013 (RIR).

The following environmental work plans and reports were developed for the Site:

- *Phase I Environmental Site Assessment*, October 2012, prepared by Merritt Environmental Consulting Group.
- *Phase II Subsurface Remedial Investigation Work Plan*, December 2012, prepared by Tenen Environmental.
- *Phase II Subsurface Investigation*, March 2013, prepared by Tenen Environmental.
- *Soil Characterization Laboratory Results*, January 2015, samples collected by Tenen Environmental.

The following work has been performed at the site:

1. Conducted a Site inspection to identify areas of concern (AOCs) and physical obstructions (i.e. structures, buildings, etc.);
2. Installed six (6) soil borings across the entire project Site, and collected thirteen (13) soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three (3) groundwater temporary wells throughout the Site to establish groundwater flow and collected four (4) groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed four (4) soil vapor probes around Site perimeter and collected four (4) samples for chemical analysis.
5. Collected three (3) soil samples for soil disposal characterization purposes.

Digital (PDF) copies of the above referenced environmental work plans and reports were submitted to OER.

Subsurface investigations for e-designation for site were performed in accordance with the approved OER RIWP. The investigations included soil, soil gas, and groundwater sampling. A remedial investigation report and remedial action work plan were presented to OER for review and approval.

Soil/fill samples collected during the Phase II Investigation showed that no volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) or polychlorinated biphenyls (PCBs) were detected in soil above the Part 375 Unrestricted Use soil cleanup objectives (SCOs). Fill-related pesticides (4,4'-DDE and 4,4'-DDT) and metals (lead, mercury, zinc, and nickel) were detected at concentrations above the Unrestricted Use SCOs and below the Part 375/CP-51 Restricted Residential SCOs.

Soil vapor samples collected during the Phase II Investigation showed VOCs, primarily gasoline constituents benzene, ethyl benzene, toluene and xylenes (BTEX) and isopropylbenzene, in all soil vapor samples at concentrations slightly above the NYSDOH guidelines and Air Guidance Value (AGV) but below 25 ug/m<sup>3</sup>. One (1) VOC, chloroform, was detected in all samples in concentrations ranging from 28.2 ug/m<sup>3</sup> – 82.5 ug/m<sup>3</sup>). Chloromethane and trichloroethene (TCE) were detected in one soil vapor sample at concentrations of 4.2 and 5

ug/m<sup>3</sup> respectively. Carbon disulfide was detected at one location at a concentration of 14.6 ug/m<sup>3</sup>).

Groundwater samples collected during the Phase II Investigation showed no VOCs, SVOCs, pesticides or PCBs were detected in groundwater above the Class GA Standards, with the exception of chloroform in all samples and fill-related polyaromatic hydrocarbons (PAHs) in two (2) groundwater samples.

The RIR was reviewed by Ms. Cavy Chu of OER. A RAWP to address e-designation requirements was also prepared and OER comments were addressed. Prior to receiving the Notice to Proceed, the property was sold to another developer who changed the proposed building design but retained Tenen as the project environmental consultant.

On January 16, 2015, Tenen performed soil characterization sampling for disposal purposes. Elevated levels of total lead and a failure in toxicity characteristic leachate procedure (TCLP) lead analysis were detected. Based on these results, some of the soil will be disposed off site as hazardous waste. A copy of the waste characterization sampling results is presented in Attachment A.

A pre-application meeting with OER was held on February 19, 2015.

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR, soil characterization sampling, and this RAWP, disposal of a small amount of hazardous waste is expected at this site.

## **2.0 REMEDIAL ACTION OBJECTIVES**

### **2.1 Objectives**

The Site remediation and mitigation objectives are:

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

Prevent off-Site migration of contaminated groundwater above applicable groundwater standards.

#### **Soil**

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

#### **Groundwater**

- Prevent direct exposure with contaminated groundwater.
- Prevent exposure to potential off-site migration contaminants volatilizing from contaminated groundwater.

#### **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 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 Remedial Action Objectives (RAOs) for media in which chemical constituents were found in exceedance 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:**

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation soil sampling. If soil/fill-containing analytes at concentrations above Unrestricted Use SCOs is still present at the base of the excavation, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs. Footings and foundations for the proposed building would be

constructed after the removal of contaminated soil to achieve required grade prior to construction.

- No Engineering or Institutional Controls are required for a Track 1 cleanup but a waterproofing/vapor barrier system would be installed beneath the building slab and outside foundation sidewalls below grade.
- As part of development, placement of a final cover over the entire Site.

***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. For development purposes, the excavation would take place to a depth of approximately 27 feet below grade to ensure removal of all fill material. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs are 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;
- 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; and
- 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 and continued e-designation of property 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 the contaminated soils during construction would be minimized by implementing: 1) Construction Health and Safety Plan (CHASP); 2) Soil and Materials Management Plan; and 3) Community Air Monitoring Plan (CAMP). Construction Health and Safety Plan is included in Appendix 2.

Groundwater is present, at a minimum, 17 feet below grade and will be encountered during development.

### **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 through removal of soil to achieve Track 1 Unrestricted Use SCOs. As part of development, a fifteen-inch thick bottom concrete slab will prevent human exposure to residual soil/fill remaining under the Site.

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. 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 implementation, as each requires removal of soil and excavation to depths of 27 feet below grade within the footprint of the proposed building. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. 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 400 25-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development for Track 1. 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.

Both alternatives would employ appropriate measures to prevent short-term impacts, including Construction Health and Safety Plan, 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. Additionally, a waterproofing/vapor barrier system will be installed beneath the building slab and outside foundation sidewalls below grade. The barrier will consist of Grace Preprufe® 300R Plus or Preprufe 300LT Plus Membrane (46 mils) and 160R or Preprufe 160LT Plus Membrane (32 mils), or an OER-approved equivalent. Grace Adcor™ ES hydrophilic non-

bentonite (or an OER-approved equivalent) will be applied for non-moving concrete construction joints.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs, by establishing Engineering Controls (ECs) including a composite cover system across the Site; by establishing Institutional Controls (ICs) to ensure long-term management including use restrictions, a Site Management Plan and 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 will provide continued high level of protection in perpetuity.

Both alternatives would result in removal of soil, providing the highest level, most effective and permanent remedy over the long-term with respect to a remedy for contaminated soil, which will 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 provide maximum reduction of toxicity, mobility and volume of contaminated material on-Site by excavation and removal of all soils that exceed the Track 1 unrestricted use SCOs to a depth above the groundwater table.

Alternative 2 would remove all of the historic fill at the Site, and any remaining on-Site soil beneath the new proposed building will meet Track 4 - Site-Specific SCOs.

The removal of 27 feet of the fill material and native material for the new proposed building 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 proposed remedial action under both alternatives is feasible and implementable and uses reliable methods and standard construction technologies. The reliability of each remedy is high. There are no special difficulties associated with any of the activities proposed. However, implementation of either alternative will require a long period of time due to the large quantity of soil and fill material that would require removal.

### **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 the new development calls for the excavation and removal of soil to the depth of 27 feet below grade within the proposed building footprint, the costs associated with both Alternative 1 and Alternative 2 will likely be comparable. If additional soil/fill with analytes above Track 1 Unrestricted Use SCOs but below Track 4 Site-Specific SCOs remains after excavation for the sub cellar, long-term costs for Alternative 2 would likely be higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

### **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 observations by the project team, both alternatives will be acceptable to the community. This RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternative and the selected remedial action. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 3.

### **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 remedial alternatives are appropriate with respect to the proposed use and to land uses in the vicinity of the Site. The proposed redevelopment of the Site is compatible with the existing zoning designation and is consistent with recent development patterns. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Track 4 Site-Specific SCOs (with residual contamination addressed by Engineering Controls and Institutional Controls), both of which are appropriate for its planned restricted residential use. The Site is surrounded by commercial and residential uses. The proposed cleanup provides comprehensive protection of public health and the environment for these uses. Improvements in the current environmental condition of the Site achieved by both alternatives are also consistent with the City's goals for

cleanup of contaminated land and bringing such land 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 a sustainable remedial action. The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and native soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. 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 4.

## **4.0 REMEDIAL ACTION**

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

The preferred remedial action alternative is Alternative 1, 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. Perform a Community Air Monitoring Program (CAMP) for particulates and volatile organic carbon compounds (VOCs).
3. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to start of remedial action.
4. Selection of 6NYCRR Part 375 Table 6.8 (a) Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
6. Installation of a dewatering system for construction purposes which will include groundwater cutoff elements at the perimeter of the Site including secant a pile wall. Dewatering discharge will include appropriate approvals obtained from New York City Department of Environmental Protection (NYCDEP) for discharges to the combined sewer system.

7. Excavation and removal of soil/fill exceeding Track 1 SCOs including excavation of the lead-contaminated soil. Excavation for development purposes would take place to a depth of approximately 27 feet below sidewalk grade and would be below the water table across the entirety of the Site. A small area for elevator pits will be excavated to greater depths. Approximately 10,000 tons of soil will be excavated and removed from this Site.
8. 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 onsite.
9. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
10. Removal and closure of underground storage tanks (if encountered) in compliance with applicable local, State and Federal laws and regulations.
11. 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.
12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
15. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, 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.

If Unrestricted Use SCOs are not achieved, the following construction elements implemented as part of new development will constitute Engineering and Institutional controls:

17. As part of development, Installation of a waterproofing/vapor barrier system beneath the building slab and outside foundation sidewalls below grade. The barrier will consist of Grace Preprufe® 300R Plus or Preprufe 300LT Plus Membrane (46 mils) and 160R or Preprufe 160LT Plus Membrane (32 mils), or an OER-approved equivalent. Grace Adcor™ ES hydrophilic non-bentonite (or an OER-approved equivalent) will be applied for non-moving concrete construction joints.
18. If Track 1 is 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.
19. As part of new development, construction and maintenance of an engineered composite cover consisting of the new building concrete slab, which will cover approximately the entire Site. This cover system will be composed of the concrete foundation slab of the future building, will be waterproofed, reinforced and 15 inches thick.
20. If Track 1 is not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

## **4.2 Soil Cleanup Objectives and soil/Fill management**

Track 1 Soil Cleanup Objectives (SCOs) are proposed for this project. The SCOs for this Site are listed in Table 1. Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 5. The location of planned excavations is shown in Figure 4. If 6NYCRR Part 375, Table 6.8(a) Track 1 Unrestricted Use is not achieved, the 6 NYCRR Part 375, Table 6.8(b) Restricted Residential SCOs will be used as amended by the following Site-Specific Track 4 SCOs:

<u>Contaminant</u>	<u>Track 4 (SCOs)</u>
Mercury	1.5 ppm
Lead	800 ppm

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 approximately 10,000 tons. Excavation will be advanced to depths between 27 feet, and deeper in the elevators pit area.

The proposed disposal locations for Site-derived impacted materials are listed below. Additional disposal locations established at a later date will be reported promptly to the OER Project Manager.

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

<u>Disposal Facility</u>	<u>Waste Type</u>	<u>Estimated Quantities</u>
To be determined	. Historic fill	9,000 tons
To be determined	Lead-contaminated soil	1,000 tons
To be determined	Petroleum-contaminated water	1,000 gallons

### **END-POINT SAMPLING**

Removal actions for development purposes under this plan will be performed in conjunction with confirmation soil sampling. The Site will be divided into four (4) quadrants and four (4)

confirmation samples will be collected from the base of the excavation of each quadrant. Endpoint sample locations are shown on Figure 5. For comparison to Track 1 SCOs, laboratory analyses will include 6 NYCRR Part 375 list pesticides and metals according to analytical methods described below. For comparison to Track 4 SCOs, analytes will only include trigger compounds and elements established on the Track 4 SCO list (which will be analytes that exceed 6 NYCRR Part 375 Unrestricted Use SCOs).

If any soil hotspots are identified during the site remediation, hot-spot removal will be performed and additional endpoint samples will be collected as needed. Analytes for end-point sampling will be those parameters that are driving the hot-spot removal action and will be approved by OER. Frequency for hot-spot end-point sample collection is as follows:

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 subsurface removals, one sample from the excavation bottom for every 1,900 square feet of bottom area will be collected. This will amount to a total of four end-point sampling locations.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

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

all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

New York State ELAP certified labs will be used for all confirmation and end-point sample analyses. Labs performing confirmation and end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all confirmation and end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be Confirmation samples will be analyzed for compounds and elements as described above utilizing the following methodology:

Soil analytical methods will include:

- Target Analyte List metals; and
- Pesticides by EPA Method 8081.

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

## **QUALITY ASSURANCE/QUALITY CONTROL**

Quality Assurance/Quality Control (QA/QC) samples will include one duplicate soil sample per 20 samples. Sufficient field and laboratory trip blanks will be analyzed to assess sampling and laboratory artifacts.

## **IMPORT AND REUSE OF SOILS**

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 5. Based on the proposed development plans, import of soil or reuse of on-site material is not expected..

If required, soil reuse will be permitted provided there is no observable indication of contamination, and it meets the SCOs of the implemented remedial cleanup Track 1.

### **4.3 Engineering Controls (ECs)**

The excavation required for the proposed site development will achieve Track 1 Unrestricted Use SCOs. Track 1 remedial actions do not require Engineering Controls (ECs) to address residual contamination at the site. However, the following construction elements below will be incorporated into the foundation design as part of the development:

1. composite cover system; and
2. soil vapor barrier/waterproofing system.

If Track 1 is not achieved, these three construction elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

#### **COMPOSITE COVER SYSTEM**

A permanent composite cover system will cover the entire Site. This cover system will be composed of the concrete foundation slab of the future building, which will be waterproofed, reinforced and 15 inches thick.

If a Track 1 remedy is not achieved, the composite cover system will be 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.

#### **VAPOR BARRIER**

As part of development, a vapor barrier will be installed beneath the foundation slab and walls. The barrier will consist of Grace Preprufe® 300R Plus or Preprufe 300LT Plus Membrane (46 mils) and 160R or Preprufe 160LT Plus Membrane (32 mils), or an OER-approved equivalent. Grace Adcor™ ES hydrophilic non-bentonite (or an OER-approved equivalent) will be applied for non-moving concrete construction joints.

The vapor barrier will be installed in accordance with the manufacturer's specifications, including those for sealing penetrations through the foundation. Proof of installation of the barrier will be included in the Professional Engineer (P.E.) certified RAR. The barrier specifications are provided in Appendix 6. The barrier system is a permanent engineering control for the Site. 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 Remedial Action 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 manufacturer's certificate of warranty.

#### **4.4 Institutional Controls**

Institutional Controls (ICs) are not required on sites that achieve Track 1 Remedial Action. If Track 1 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. The property will continue to be registered with an E-Designation by the NYC Buildings Department.

In the event that Track 1 SCOs are not achieved, the Institutional Controls for this remedial action are as follows:

- The property will continue to be registered with an E-Designation by the NYC Buildings Department. 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 this RAWP and the approved SMP;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. SMP will require that the property owner and property owner's

successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3).

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

#### **4.5 Site Management plan**

Site Management is not required for Track 1 remedial actions. However, if Track 1 SCOs are not achieved, Site Management 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 Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in Site Management Plan are implemented.

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

Brownfield 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 by OER 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**

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

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 QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

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

Historic fill material is present at the Site from grade to approximately 8-10 feet below grade. Based on the results of the Tenen RIR, the contaminants of concern are:

Soil:

- Metals including lead, mercury, nickel and zinc exceeded Unrestricted Use SCOs, but were all below Restricted Residential Use SCOs; and

- Pesticides including 4,4'-DDE and 4,4'-DDT identified but did not exceed Restricted Residential Use SCOs.

#### Soil Vapor:

- Petroleum-related VOCs (BTEX) and isopropylbenzene were detected at low concentrations; and
- Chlorinated solvent chloromethane and trichloroethene (TCE) were detected at low concentrations and all below the NYSDOH matrix for monitoring/mitigation.

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

Soil/fill samples collected during the Phase II Investigation showed that no VOCs, SVOCs or PCBs were detected in soil above the Part 375 Unrestricted Use soil cleanup objectives (SCOs). Fill-related pesticides (4,4'-DDE and 4,4'-DDT) and metals (lead, mercury, zinc, and nickel) were detected at concentrations above the Unrestricted Use SCOs and below the Part 375/CP-51 Restricted Residential SCOs.

Gasoline constituents benzene, ethyl benzene, toluene and xylenes (BTEX) and isopropylbenzene were detected in all soil vapor samples at concentrations slightly elevated but below 25ug/m<sup>3</sup>. One (1) VOC, chloroform, was detected in all samples in concentrations ranging from 28.2 ug/m<sup>3</sup> – 82.5 ug/m<sup>3</sup>. Chloromethane and trichloroethene (TCE) were detected in one soil vapor sample at concentrations of 4.2 and 5 ug/m<sup>3</sup>. Carbon disulfide was detected at one location at a concentration of 14.6 ug/m<sup>3</sup>.

### **Potential Routes of Exposure**

The five elements of an exposure pathway are:

1. The source of contamination;
2. The environmental media and transport mechanisms;
3. The point of exposure;
4. The route of exposure; and
5. The receptor population.

These elements of an exposure pathway may be based on past, present, or future events. 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:** There is no potential for direct exposure and ingestion of water, soil and fill, or accumulation of soil vapor currently at the Site due to the existing paved parking lot and the 4-story building. Groundwater 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, there is no potential for exposure.

**Construction/ Remediation Activities:** Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils, as a result of on Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with 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, most or all soils in excess of the Site specific Track 1 SCOs will be removed. Soil will be excavated at about 10 feet below the water table. The Site will be fully capped, limiting potential direct exposure to soil and groundwater, and engineering controls including a vapor barrier system and composite cover will

prevent potential for inhalation via soil vapor intrusion. The Site is served by a public water supply and groundwater is not used at the Site. There are no plausible off-site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site.

### **Receptor Populations**

**On-Site Receptors** - The Site is currently capped with vacant buildings. Onsite receptors are limited to trespassers and Site representatives. During redevelopment of the Site, potential on-Site receptors will include construction workers, site representatives and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include 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 0.25 mile) – existing and future
5. Schools (up to 0.25 mile) – existing and future

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

There are no exposure pathways for the current site condition. There is a potential complete exposure pathway that requires mitigation during implementation of the remedy. 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. There is no complete exposure pathway under future conditions after the Site is developed. The vapor barrier and composite cover will interrupt any remaining exposure pathways. This assessment takes into consideration the reasonably anticipated use of the Site, which includes a residential structure, composite cover, 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.

## **5.0 REMEDIAL ACTION MANAGEMENT**

### **5.1 Project Organization and oversight**

Principal personnel who will participate in the remedial action include:

Kristen Meisner	Tenen Project Manager
Mathew Carroll, PE	Tenen The Professional Engineer (PE)
Mohamed Ahmed, Ph.D., CPG	Tenen Qualified Environmental Professionals (QEP)

A qualified environmental professional (QEP) or the remediation engineer (RE) will directly supervise field engineers, scientists and geologists that will be on-site during remedial action to monitor particulates and organic vapor in accordance with the CAMP. CAMP results that exceed specified action levels will be reported to OER in daily reports.

A photo log will be kept to document construction activities by still photos. The photo log may also be used to record activities recorded in the daily report.

The project field book will be used to document all sampling activities and how they correspond to the RAWP. All observations, field and/or laboratory tests will be recorded in the project field book or on separate logs. Recorded field observations may take the form of notes, charts, sketches, or photographs.

### **5.2 Site Security**

Site access will be controlled by construction fencing with gated entrances to the Site. Barriers will be installed as needed to delineate and restrict access to the work areas. If there are any work areas of limited size, barrier tape will be sufficient to delineate and restrict access.

### **5.3 Work Hours**

The hours for operation of remedial construction will be from 7:00 a.m. to 6:00 p.m. 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 2. The Site Safety Coordinator will be Mohamed Ahmed of Tenen. 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**

Dewatering activities is anticipated during the construction of the proposed building to depress groundwater to about 10 feet. A New York City Department of Environmental Protection (NYCDEP) de-watering permit will be obtained if dewatering fluid is directed to the sewer system. All dewatering fluid will be disposed in accordance with federal, state and local regulations.

### **Equipment and Material Staging**

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

### **Stabilized Construction Entrance**

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete 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 onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

### **Storm Response Reporting**

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

to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

## **5.8 Traffic Control**

Drivers of trucks leaving the 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 as follow:

- Trucks will travel east on West 28<sup>th</sup> Street to 7<sup>th</sup> Avenue where they will turn right (south) and continue to West 23<sup>rd</sup> Street;
- Trucks will take a right on West 23<sup>rd</sup> Street and travel west to the West Side Highway (Route 9A) which is a truck through route. Both the Lincoln and Holland Tunnels can be accessed by truck from the West Side Highway.

The above information was obtained from the New York City Department of Transportation (NYC DOT)-issued 2011-2012 New York City Truck Route Map.

## **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 (if Track 1 is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results 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 by 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, Mathew Carroll, 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 215-219 West 28<sup>th</sup> Street Site, 15CVCP092K.*

*I, Mohamed Ahmed, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 215-219 West 28<sup>th</sup> Street Site, 15CVCP092K.*

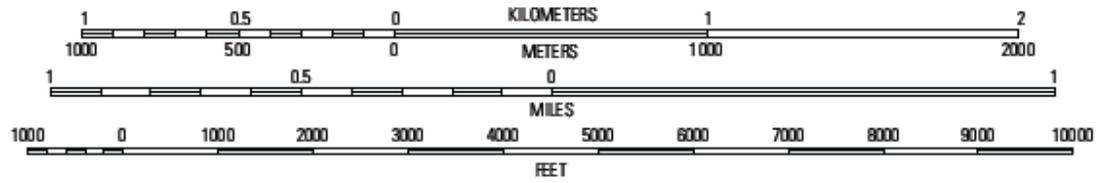
*I certify that the OER-approved Remedial Action Work Plan dated **month day year** and Stipulations in a letter dated **month day, year; if any** were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other 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 three-month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	4	1
Remedial Excavation	5	8
Demobilization	13	1
Submit Remedial Action Report	14	4

## FIGURES



CONTOUR INTERVAL 10 FEET



Based on USGS Brooklyn NY Quadrangle, 2010 topographic map.

217 West 28th Street - New York, NY

### Site Location Map

Figure 1

December 2012

TAX LOT 48

1 STORY HIGH BRICK BUILDING

TAX LOT 28

6 STORY BRICK BUILDING # 221

PARKING LIFTS

CONCRETE

PARKING LIFTS

TAX LOT 30

TAX LOT 29

ASPHALT PARKING

BOOTH

Site Boundary

TAX LOT 22

5 STORY BRICK BUILDING

2-4 STORY BRICK COMMERCIAL BUILDING # 215  
TAX LOT 31

CELLAR ENTRANCE

WEST 28th STREET

1 inch = 15 feet



217 West 28th Street - New York, NY

Based on architectural survey by Leonard J. Strandberg and Associates Consulting Engineers and Land Surveyors, P.C., dated October 15, 2012.

### Site Plan

Figure 2

January 2013



TAX LOT 48

1 STORY HIGH BRICK BUILDING

TAX  
LOT 28

6 STORY BRICK  
BUILDING  
# 221

AREA TO BE EXCAVATED

TAX  
LOT 22

5 STORY BRICK  
BUILDING

N

WEST 28th STREET



1 inch = 15 feet

TENEN ENVIRONMENTAL

217 West 28th Street - New York, NY

Based on architectural survey by Leonard J. Strandberg and Associates Consulting Engineers and Land Surveyors, P.C., dated October 15, 2012.

### Site Excavation Plan

Figure 4

January 2013

TAX LOT 48

1 STORY HIGH BRICK BUILDING

N

TAX LOT 28

I

II

TAX LOT 22

6 STORY BRICK BUILDING # 221

III

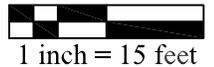
IV

5 STORY BRICK BUILDING

# WEST 28th STREET

● Proposed End-Point Sample Locations

III Quadrant Designation



217 West 28th Street - New York, NY

## Proposed End-Point Sample Locations

Based on architectural survey by Leonard J. Strandberg and Associates Consulting Engineers and Land Surveyors, P.C., dated October 15, 2012.

Figure 5

June 2013

## **TABLES**

**Table 1**  
**List of Proposed Soil Cleanup Objectives (SCOs)**  
**217 West 28th Street - New York, NY**  
**OER #13EHAN231M**

From Table 375-6.8(b) or CP51 Table 1: Restricted Residential Use Soil Cleanup Objectives.

Contaminant	CAS Number	Retricted-Residential
<i>Metals</i>		
Arsenic	7440-38-2	16 <sup>f</sup>
Barium	7440-39-3	400
Beryllium	7440-41-7	72
Cadmium	7440-43-9	4.3
Chromium, hexavalent <sup>h</sup>	18540-29-9	110
Chromium, trivalent <sup>h</sup>	16065-83-1	180
Copper	7440-50-8	270
Total Cyanide <sup>h</sup>		27
Lead	7439-92-1	400
Manganese	7439-96-5	2,000 <sup>f</sup>
Total Mercury		0.81
Nickel	7440-02-0	310
Selenium	7782-49-2	180
Silver	7440-22-4	180
Zinc	7440-66-6	10,000 <sup>g</sup>
<i>PCBs/Pesticides</i>		
2,4,5-TP Acid (Silvex)	93-72-1	100 <sup>a</sup>
4,4'-DDE	72-55-9	8.9
4,4'-DDT	50-29-3	7.9
4,4'-DDD	72-54-8	13
Aldrin	309-00-2	0.097
alpha-BHC	319-84-6	0.48
beta-BHC	319-85-7	0.36
Chlordane (alpha)	5103-71-9	4.2
delta-BHC	319-86-8	0.36
Dibenzofuran	132-64-9	59
Dieldrin	60-57-1	0.2
Endosulfan I	959-98-8	24 <sup>i</sup>
Endosulfan II	33213-65-9	24 <sup>i</sup>
Endosulfan sulfate	1031-07-8	24 <sup>i</sup>
Endrin	72-20-8	11
Heptachlor	76-44-8	2.1
Lindane	58-89-9	1.3
Polychlorinated biphenyl	1336-36-3	1

Contaminant	CAS Number	Retricted-Residential
<i>Semivolatiles</i>		
Acenaphthene	83-32-9	100 <sup>a</sup>
Acenaphthylene	208-96-8	100 <sup>a</sup>
Anthracene	120-12-7	100 <sup>a</sup>
Aniline	62-53-3	100 <sup>a</sup>
Benz(a)anthracene	56-55-3	1 <sup>f</sup>
Benzo(a)pyrene	50-32-8	1 <sup>f</sup>
Benzo(b)fluoranthene	205-99-2	1 <sup>f</sup>
Benzo(g,h,i)perylene	191-24-2	100 <sup>a</sup>
Benzo(k)fluoranthene	207-08-9	3.9
Chrysene	218-01-9	3.9
Dibenz(a,h)anthracene	53-70-3	0.33 <sup>e</sup>
Fluoranthene	206-44-0	100 <sup>a</sup>
Fluorene	86-73-7	100 <sup>a</sup>
Indeno(1,2,3-cd)pyrene	193-39-5	0.5 <sup>f</sup>
m-Cresol	108-39-4	100 <sup>a</sup>
Naphthalene	91-20-3	100 <sup>a</sup>
Nitrobenzene	98-95-3	15
o-Cresol	95-48-7	100 <sup>a</sup>
p-Cresol	106-44-5	100 <sup>a</sup>
Pentachlorophenol	87-86-5	6.7
Phenanthrene	85-01-8	100 <sup>a</sup>
Phenol	108-95-2	100 <sup>a</sup>
Pyrene	129-00-0	100 <sup>a</sup>
<i>Volatiles</i>		
1,1,1-Trichloroethane	71-55-6	100 <sup>a</sup>
1,1-Dichloroethane	75-34-3	26
1,1-Dichloroethene	75-35-4	100 <sup>a</sup>
1,2-Dichlorobenzene	95-50-1	100 <sup>a</sup>
1,2-Dichloroethane	107-06-2	3.1
cis-1,2-Dichloroethene	156-59-2	100 <sup>a</sup>
trans-1,2-Dichloroethene	156-60-5	100 <sup>a</sup>
1,3-Dichlorobenzene	541-73-1	49
1,4-Dichlorobenzene	106-46-7	13
1,4-Dioxane	123-91-1	13
Acetone	67-64-1	100 <sup>b</sup>
Benzene	71-43-2	4.8
Butylbenzene	104-51-8	100 <sup>a</sup>
Carbon tetrachloride	56-23-5	2.4
Chlorobenzene	108-90-7	100 <sup>a</sup>
Chloroform	67-66-3	49
Ethylbenzene	100-41-4	41
Hexachlorobenzene	118-74-1	1.2
Methyl ethyl ketone	78-93-3	100 <sup>a</sup>
Methyl tert-butyl ether	1634-04-4	100 <sup>a</sup>
Methylene chloride	75-09-2	100 <sup>a</sup>
n-Propylbenzene	103-65-1	100 <sup>a</sup>
sec-Butylbenzene	135-98-8	100 <sup>a</sup>
tert-Butylbenzene	98-06-6	100 <sup>a</sup>
Tetrachloroethene	127-18-4	19
Toluene	108-88-3	100 <sup>a</sup>
Trichloroethene	79-01-6	21
1,2,4-Trimethylbenzene	95-63-6	52
1,3,5- Trimethylbenzene	108-67-8	52
Vinyl chloride	75-01-4	0.9
Xylene (mixed)	1330-20-7	100 <sup>a</sup>

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified.  
Bolded and shaded values are proposed SCOs that are not the Restricted Residential Use SCOs.  
Footnotes (designations are from Table in Part 375). See Technical Support Document (TSD).

- a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.
- b The SCOs for commercial use were capped at a maximum value of 500 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.
- f For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.
- i This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.





Appendix 1  
*Proposed Development Plans*

GENERAL NOTES:

- I - CODES
1. 2006 BUILDING CODE OF THE CITY OF NEW YORK...
2. AMERICAN INSTITUTE OF STEEL CONSTRUCTION...
3. AMERICAN CONCRETE INSTITUTE...
4. AMERICAN CONCRETE INSTITUTE...
5. AMERICAN IRON AND STEEL INSTITUTE...

II - MATERIALS

- UNLESS OTHERWISE SHOWN OR NOTED ON DRAWINGS:
1. STRUCTURAL STEEL: ALL ROLLED SHAPES...
2. METAL DECK: FABRICATE FROM ASTM A611 OR ASTM A653 STEEL...
3. SHEAR CONNECTIONS: 1/2" DIAMETER HEADED STUDS, U.O.N.
4. CAST-IN-PLACE CONCRETE: FOUNDATIONS: AS NOTED ON DRAWINGS...
5. REINFORCEMENT: DEFORMED BARS: ASTM A615, GRADE 60...

III - GENERAL

- 1. NOTES, TYPICAL DETAILS AND SCHEDULES APPLY TO ALL STRUCTURAL WORK...
2. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE SPECIFICATIONS...
3. DO NOT SCALE DRAWINGS TO OBTAIN DIMENSIONAL INFORMATION...
4. SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR WATER/DAMP-PROOFING...
5. TOP OF CONCRETE SLABS ARE AT FLOOR REFERENCE ELEVATIONS EXCEPT AS NOTED...

IV - FOUNDATION NOTES

- 1. CAISSON DESIGN AND CAPACITIES PER GEOTECHNICAL REPORT DATED DECEMBER 20, 2013...
2. NO BACKFILL SHALL BE PLACED AGAINST FOUNDATION WALLS UNLESS SUPPORTING SLABS ARE IN PLACE...
3. UNDERPINNING OF EXISTING ADJACENT FOUNDATIONS MAY BE REQUIRED...
4. DEWATERING OF THE SITE DURING CONSTRUCTION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR...
5. ALL PIERS ARE TO BE CENTERED ON COLUMNS ABOVE, U.O.N.

V - UNDERPINNING NOTES

- 1. CONTRACTOR SHALL RETAIN THE SERVICE OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK...
2. SUBMIT COPY OF FILED DRAWINGS TO DESIMONE FOR INFORMATION ONLY...
3. THE FULL SCOPE OF THIS WORK IS TO BE DETERMINED BY THE CONTRACTOR...
4. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE SAFETY OF ALL EXISTING ADJACENT BUILDINGS...

VI - CONCRETE NOTES

- 1. REINFORCING STEEL SHALL HAVE A MINIMUM CLEAR COVER AS FOLLOWS, U.O.N. IN DRAWINGS: CONCRETE POURED AGAINST EARTH...
2. ALL REINFORCEMENT SHALL BE SECURELY HELD IN POSITION WHILE PLACING CONCRETE...
3. THE CONTRACTOR SHALL VERIFY THE DIMENSIONS AND LOCATIONS OF ALL OPENINGS...
4. LOCATION OF ALL CONSTRUCTION JOINTS NOT SHOWN IN DRAWINGS SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL...
5. DIMENSIONS "Ld" AS NOTED ON DRAWINGS SHALL BE AS FOLLOWS:

Tables for BEAMS, COLUMNS, WALLS, and SLABS / MATS with dimensions and reinforcement details.

Tables for WALLS and SLABS / MATS with reinforcement details and thickness requirements.

Table for CONDUIT PLACEMENT with dimensions and spacing requirements.

- 6. ALL LAP SPICES SHALL BE 1.3xL UNLESS NOTED OTHERWISE ON DRAWINGS.
7. FOR LIGHTWEIGHT AGGREGATE CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.3.
8. FOR EPOXY-COATED BARS, MULTIPLY THE TABULATED VALUES BY 1.5.
9. COMBINATIONS OF EFFECTS DUE TO CONCRETE STRENGTH, CONCRETE WEIGHT, AND EPOXY BARS ARE CUMULATIVE, Ld SHALL BE MULTIPLIED BY EACH FACTOR TO FIND THE CORRECT VALUE.
10. ACH DOES NOT PERMIT LAP SPICES OF #14 OR #18 BARS. BARS OF THIS SIZE SHALL BE COUPLED BY ACCEPTABLE MECHANICAL MEANS.
11. DOWEL BAR SUBSTITUTIONS SHALL BE PERMITTED PROVIDED THAT MANUFACTURER'S DATA SUPPORTS FULL TENSION SPICES.
12. ALL SLEEVES AND PENETRATIONS SHALL BE PROVIDED BY THE SUB-CRONTACTOR REQUIRING THE OPENINGS.
13. CONCRETE COLUMN LENGTH ADJUSTMENT: FOR ELASTIC SHORTENING, SHRINKAGE AND CREEP EFFECTS SHALL BE DISCUSSED WITH THE CONCRETE CONTRACTOR.
14. CONDUIT PLACED IN CONCRETE SLABS MUST BE PLACED IN ACCORDANCE WITH THE FOLLOWING GUIDELINES:

- a. CONTRACTOR SHALL NOT INSTALL CONDUIT THAT IS NOT SHOWN ON MECHANICAL DRAWINGS.
b. DO NOT CROSS MORE THAN ONE LAYER OF CONDUIT OVER ANOTHER IN ANY GIVEN AREA.
c. PLACE CENTROD OF CONDUIT OR CONDUIT GROUP AT THE MID-HEIGHT OF THE SLAB.
d. CONDUIT OR CONDUIT GROUP CAN NOT EXTEND OUTSIDE THE MIDDLE 1/3 OF THE SLAB.
e. MAINTAIN A MINIMUM CLEAR SPACING BETWEEN THE CONDUIT OF 3 DIAMETERS. THIS REQUIREMENT APPLIES EXCEPT WHERE CONDUITS ACCUMULATE AT "TURN DOWNS". THE CONDITIONS AT "TURN DOWNS" LOCATIONS MUST BE EVALUATED AT EACH LOCATION BY THE STRUCTURAL ENGINEER. "TURN DOWNS" CAN NOT OCCUR AT COLUMN OR BUTTRESS LOCATIONS.
f. DO NOT PLACE ANY CONDUIT IN THE SLAB WITHIN 36" FROM THE EDGE OF ANY COLUMN OR WALL ABOVE OR BELOW THE SLAB.
g. SLAB REINFORCEMENT MUST NOT BE COVERED, CUT, OR BENT TO ACCOMMODATE CONDUIT PLACEMENT.
h. CONDUIT IS NOT TO RUN THROUGH OR WITHIN A COLUMN OR WALL.
i. ALUMINUM CONDUIT SHALL NOT BE EMBEDDED IN A SLAB UNLESS IT IS EFFECTIVELY COATED.
IF THE ABOVE REQUIREMENTS ARE ALL MET, CONDUIT LOCATIONS NEED NOT BE REVIEWED BY THE STRUCTURAL ENGINEER. ANY DEVIATIONS MUST BE SUBMITTED ON A SHOP DRAWING FOR APPROVAL BY THE STRUCTURAL ENGINEER PRIOR TO CONDUIT PLACEMENT.
THE FOLLOWING CASES MUST BE SUBMITTED FOR REVIEW BY THE STRUCTURAL ENGINEER:
a. LOCATIONS OF ANY CONDUIT LARGER THAN 2" IN OUTSIDE DIAMETER.
b. LOCATIONS OF ANY BUNDLED CONDUITS.

VII - STEEL NOTES

- 1. BOLTED CONNECTIONS: BOLTS ARE TO BE A325 OR A490 SUP. CRITICAL CLASS A. FLOOR BEAM CONNECTIONS TO OTHER BEAMS OR GIRDERS CAN BE MADE WITH BEARING CONNECTIONS. MINIMUM DIAMETER OF ALL BOLTS SHALL BE 3/4"; MAX. DIA. 1 1/2"; PROVIDE AT LEAST 2 BOLTS PER CONNECTION.
UNLESS OTHERWISE NOTED IN PLAN, DETAIL FLOOR MEMBER CONNECTIONS FOR THE FOLLOWING VERTICAL REACTIONS:
SHAPE MINIMUM REACTIONS (KIPS) MINIMUM NUMBER OF ROWS
TO GIRDERS TO COLUMNS
WB16S 12 17
W10/C10 12 20
W12/C12 20 25
W14 25 30
W16 30 38
W18 38 46
W21 46 58
W24 57 72
W27 70 89
W30 85 100
W36 100 120
W36 115 135

VIII - METAL DECK NOTES

- 1. U.O.N. ALL METAL DECKING HAS BEEN DESIGNED FOR UNSHORED CONSTRUCTION, WHERE POSSIBLE, DECK SHALL EXTEND OVER TWO OR MORE SPANS.
2. DECK SUPPLIER SHALL FURNISH ANY AND ALL SCREDS, CLOSURES, POUR STOPS, COLUMN CLOSURES, GIRT STRIPS, RIDGE AND VALLEY PLATES, SUMPS, ETC. AS REQUIRED FOR COMPLETE INSTALLATION OF DECK.
3. COMPOSITE FLOOR DECK SHALL BE WELDED TO ALL SUPPORTING MEMBERS WITH 3/4" DIA. PUDDLE WELDS OR #12 TENS SELF-DRILLING FASTENERS AT 12" O.C. SHEAR STUDS SHALL BE CONSIDERED TO REPLACE WELDS. FASTEN SIDE LAPS AS REQUIRED IN SPECIFICATIONS FOR SPANS OVER 5'-0".
4. ROOF DECK SHALL BE WELDED TO ALL SUPPORTING MEMBERS WITH 3/4" DIA. PUDDLE WELDS AT 18" O.C. OR #12 TENS SELF-DRILLING FASTENERS @ 12" O.C. FASTEN SIDE LAPS AS REQUIRED IN SPECIFICATIONS FOR SPANS OVER 5'-0".
5. FORM DECK SHALL BE WELDED TO ALL SUPPORTING MEMBERS USING 16 GAUGE WELD WASHERS WITH 3/4" DIA. HOLES IN PATTERN AS RECOMMENDED BY DECK MANUFACTURER. FASTEN SIDE LAPS WITH SCREWS AT 24" MAX FOR SPANS OVER 5'-0".
6. PROVIDE 2" MIN LAPS AND END BEARING FOR ALL DECKING.
7. UNFRAMED OPENINGS, IN FLOOR OR ROOF DECKS, LARGER THAN 6" PERPENDICULAR TO SPAN OF DECK SHALL BE REINFORCED.

VIII - SURVEYING

- [USER NOTE: PRIMARILY FOR CONCRETE SLAB DEFLECTIONS, SEE RESHORES]
1. PRIOR TO REMOVING RESHORES THE UNDERSIDE OF THE SLAB SHALL BE SURVEYED TO DETERMINE THE RELATIVE ELEVATION OF THE SLAB. AT A MINIMUM, SURVEY POINTS ARE TO BE LOCATED NEXT TO THE COLUMNS AND AT CENTER OF COLUMN STRIPS AND MIDDLE STRIPS. SLAB EDGES AND CANTILEVERS ARE TO BE SURVEYED AT POINTS OF THEORETICAL MAXIMUM AND MINIMUM DEFLECTIONS WITHIN EACH SPAN. SURVEYOR IS TO SUBMIT A GENERAL LAYOUT OF POINTS TO ENGINEER FOR APPROVAL PRIOR TO SURVEYING THE SLABS. ADDITIONAL POINTS MAY BE REQUIRED AT ENGINEER'S DISCRETION. THE C.M. IS TO CONTRACT OUT THE SURVEYING SERVICE TO A SURVEYOR NOT AFFILIATED WITH THE CONCRETE CONTRACTOR. THE COST OF THIS SURVEY IS TO BE INCLUDED IN THE CONSTRUCTION COST.

X - MASONRY NOTES

- 1. STRUCTURAL CONCRETE MASONRY, AS SHOWN ON THESE DRAWINGS, SHALL HAVE A COMPRESSIVE STRENGTH (Fm) OF 1500 PSI.
2. MASONRY UNITS SHALL CONFORM TO ASTM C90, TYPE II, NORMAL WEIGHT, HOLLOW UNLESS SPECIFICALLY NOTED OTHERWISE ON THESE DRAWINGS, WITH A UNIT STRENGTH AS REQUIRED TO ACHIEVE COMPRESSIVE STRENGTH SPECIFIED ABOVE.
3. MORTAR SHALL CONFORM TO ASTM C270, TYPE II OR S FOR ABOVE GRADE, TYPE M FOR BELOW GRADE.
4. GROUT FOR FILLED CELLS SHALL CONFORM TO ASTM C476 WITH 3000 PSI STRENGTH AT 28 DAYS. CELLS SHALL BE GROUTED IN INCREMENTS NOT EXCEEDING 5 FEET VERTICALLY. FILL ALL CELLS BELOW GRADE.
5. VERTICAL REINFORCING SHALL BE ASTM A615, GRADE 60 DEFORMED BARS. MINIMUM LAP SPICES SHALL BE AS FOLLOWS:
#3 BARS - 1'-0"
#4 BARS - 2'-0"
#5 BARS - 2'-6"
#6 BARS - 3'-0"
6. HORIZONTAL REINFORCING SHALL BE NO. 9 GAUGE "DUROWALL" OR EQUIVALENT AND SHALL BE PLACED EVERY OTHER COURSE U.O.N.
7. ALL BLOCK SHALL BE PLACED IN RUNNING BOND.

XI - SPECIAL INSPECTIONS

- OWNER WILL ENGAGE AND PAY FOR A SPECIAL INSPECTOR AND AN INDEPENDENT TESTING AGENCY TO PERFORM THE FOLLOWING SPECIAL INSPECTION AND TESTING AS SPECIFIED ON THE APPLICABLE SECTIONS OF THE NEW YORK CITY BUILDING CODE, CHAPTER 17, SECTION 1704. TECHNICAL REPORT STATEMENT OF RESPONSIBILITY TR-1 FORM SHALL BE FILLED WITH THE BUILDING DEPARTMENT FOR APPROVAL OF SPECIAL INSPECTOR. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE PRIOR NOTICE FOR COMPLETION OF INSPECTIONS.
1. CONCRETE: ALL CONCRETE WORK SHALL BE SUBJECT TO SPECIAL INSPECTION BY OR UNDER THE DIRECT SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER AS REQUIRED BY SUBCHAPTERS 1704.4 AND 1905.3 AND TABLE 1704.4 OF THE N.Y.C. BUILDING CODE.
A. THE OWNER SHALL ENGAGE A LICENSED PROFESSIONAL ENGINEER, APPROVED BY THE ENGINEER OF RECORD, TO SUPERVISE THE TESTING OF THE MATERIALS AND THE SUPERVISION OF CONCRETE CONSTRUCTION.
B. THE PRELIMINARY TEST FOR CONTROLLED CONCRETE SHALL BE MADE IN ACCORDANCE WITH SUBCHAPTER 1905.3 OF SECTION 1905 OF THE N.Y.C. BUILDING CODE AND THE APPROVED DESIGN MIXES FILED ON TECHNICAL REPORT TR-3. NO CONCRETE SHALL BE PLACED BEFORE ACCEPTANCE BY ENGINEER.
C. QUALITY CONTROL AND INSPECTION OF MATERIALS AND OF BATCHING SHALL BE MADE IN ACCORDANCE WITH SUBCHAPTER 1905.3 OF SECTION 1905 OF THE N.Y.C. BUILDING CODE.
D. ALL FIELD TESTS AND INSPECTIONS SHALL BE PERFORMED AS REQUIRED BY SUBCHAPTER 1905.4 OF SECTION 1905 OF THE N.Y.C. BUILDING CODE. CONCRETE TEST CYLINDER RESULTS SHALL BE FILED ON TECHNICAL REPORT TR-2.
E. PRIOR TO PERMIT OWNER TO ENGAGE CONCRETE TESTING AGENCY FOR TR-2 AND TR-3 FORMS.
2. SOILS: INSPECT SUBGRADE FOR FOUNDATIONS, PIERS AND WALLS PER SECTION 1704.7.1 OF THE N.Y.C. BUILDING CODE.
3. STEEL: INSPECT WELDING OPERATIONS, DETAILS AND TENSIONING OF HIGH STRENGTH BOLTS PER SECTIONS 1704.3.1 THROUGH 1704.3.3 AND TABLE 1704.3 OF THE N.Y.C. BUILDING CODE.
4. DEEP FOUNDATIONS: INSPECT DEEP FOUNDATIONS AND TESTING OPERATIONS PER SUBCHAPTER 1704.8 OF THE N.Y.C. BUILDING CODE.
5. STRUCTURAL MASONRY: INSPECT MASONRY CONSTRUCTION PER SECTION 1704.5 AND TABLES 1704.5.1 AND 1704.5.3 OF THE N.Y.C. BUILDING CODE. TESTING SHALL COMPLY WITH REQUIREMENTS OF A313/SI/SPACE STMS 402 AS CITED BY REFERENCE STANDARD RS. 10.

XI - SPECIAL INSPECTIONS

- OWNER WILL ENGAGE AND PAY FOR A SPECIAL INSPECTOR AND AN INDEPENDENT TESTING AGENCY TO PERFORM THE FOLLOWING SPECIAL INSPECTION AND TESTING AS SPECIFIED ON THE APPLICABLE SECTIONS OF THE NEW YORK CITY BUILDING CODE, CHAPTER 17, SECTION 1704. TECHNICAL REPORT STATEMENT OF RESPONSIBILITY TR-1 FORM SHALL BE FILLED WITH THE BUILDING DEPARTMENT FOR APPROVAL OF SPECIAL INSPECTOR. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE PRIOR NOTICE FOR COMPLETION OF INSPECTIONS.
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C. QUALITY CONTROL AND INSPECTION OF MATERIALS AND OF BATCHING SHALL BE MADE IN ACCORDANCE WITH SUBCHAPTER 1905.3 OF SECTION 1905 OF THE N.Y.C. BUILDING CODE.
D. ALL FIELD TESTS AND INSPECTIONS SHALL BE PERFORMED AS REQUIRED BY SUBCHAPTER 1905.4 OF SECTION 1905 OF THE N.Y.C. BUILDING CODE. CONCRETE TEST CYLINDER RESULTS SHALL BE FILED ON TECHNICAL REPORT TR-2.
E. PRIOR TO PERMIT OWNER TO ENGAGE CONCRETE TESTING AGENCY FOR TR-2 AND TR-3 FORMS.
2. SOILS: INSPECT SUBGRADE FOR FOUNDATIONS, PIERS AND WALLS PER SECTION 1704.7.1 OF THE N.Y.C. BUILDING CODE.
3. STEEL: INSPECT WELDING OPERATIONS, DETAILS AND TENSIONING OF HIGH STRENGTH BOLTS PER SECTIONS 1704.3.1 THROUGH 1704.3.3 AND TABLE 1704.3 OF THE N.Y.C. BUILDING CODE.
4. DEEP FOUNDATIONS: INSPECT DEEP FOUNDATIONS AND TESTING OPERATIONS PER SUBCHAPTER 1704.8 OF THE N.Y.C. BUILDING CODE.
5. STRUCTURAL MASONRY: INSPECT MASONRY CONSTRUCTION PER SECTION 1704.5 AND TABLES 1704.5.1 AND 1704.5.3 OF THE N.Y.C. BUILDING CODE. TESTING SHALL COMPLY WITH REQUIREMENTS OF A313/SI/SPACE STMS 402 AS CITED BY REFERENCE STANDARD RS. 10.

XII - SYMBOLS USED ON DRAWINGS

- 1. U.O.N. DENOTES "UNLESS OTHERWISE NOTED".
2. F, F DENOTES FINISHED (MILLED) SURFACES.
3. (C -) DENOTES CAMBER OF FLOOR MEMBERS.
4. T DENOTES TENSION.
C DENOTES COMPRESSION.
T/C DENOTES TENSION OR COMPRESSION.
5. (---) DENOTES MEMBER ELEVATION IF OTHER THAN BASELINE ESTABLISHED ON DRAWING OR TOP OF PILE CAP ELEVATION.
6. L, J DENOTES NUMBER OF SHEAR STUDS, EQUALLY SPACED.
7. V DENOTES SHEAR FORCE (KIPS).
F DENOTES AXIAL FORCE (KIPS).
M DENOTES MOMENT (KIP-FT).
8. LD DENOTES LENGTH AS PREVIOUSLY DEFINED IN CONCRETE NOTES.
9. BP DENOTES BEAM PENETRATION. SEE DWG. S-\_\_\_ FOR TYPICAL DETAIL AND SCHEDULE.
10. ---> DENOTES SPAN DIRECTION OF METAL DECK.

DRAWING INDEX

Table listing drawing titles and sheet numbers: S-000 - GENERAL NOTES, S-001 - INDEX OF DRAWINGS, GENERAL NOTES, SYMBOLS AND ABBREVIATIONS, FO-100 - FOUNDATION PLANS, SECTIONS AND DETAILS, FO-101 - FOUNDATION PLAN, FO-102 - CELLAR PLAN, FO-103 - TYPICAL FOUNDATION SECTIONS AND DETAILS, S-200 - SHEAR WALLS COLUMNS AND BRACING SCHEDULES, S-201 - COLUMN SCHEDULE AND DETAILS, S-210 - SHEAR WALL REINFORCING DETAILS, S-211 - SHEAR WALL REINFORCING PLANS.

Table listing drawing titles and sheet numbers: S-300 - SUPERSTRUCTURE PLANS, S-301 - 1st FLOOR PLAN, S-302 - 2nd FLOOR PLAN, S-303 - 3rd FLOOR PLAN, S-304 - 4TH TO 6TH FLOOR PLAN, S-307 - 7TH FLOOR PLAN, S-308 - 8TH FLOOR PLAN, S-309 - 9TH FLOOR PLAN, S-310 - 10TH FLOOR PLAN, S-311 - 11TH FLOOR PLAN, S-312 - 12TH FLOOR PLAN, S-313 - 13TH FLOOR PLAN, S-314 - 14TH FLOOR PLAN, S-315 - 15TH FLOOR PLAN, S-316 - 16TH FLOOR PLAN, S-317 - 17TH FLOOR PLAN, S-318 - 18TH FLOOR PLAN, S-319 - 19TH FLOOR PLAN, S-320 - 20TH FLOOR PLAN, S-321 - 21ST FLOOR PLAN, S-322 - ROOF PLAN, S-323 - BULKHEAD PLAN AND BULKHEAD ROOF PLAN.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

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Table listing drawing titles and sheet numbers: S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE, S-401 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-402 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-403 - TYPICAL CONCRETE SECTIONS AND DETAILS, S-404 - CONCRETE SECTIONS AND DETAILS.

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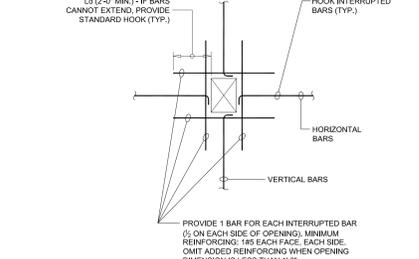
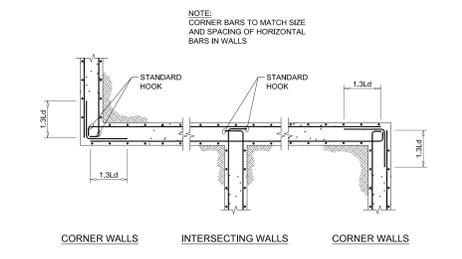
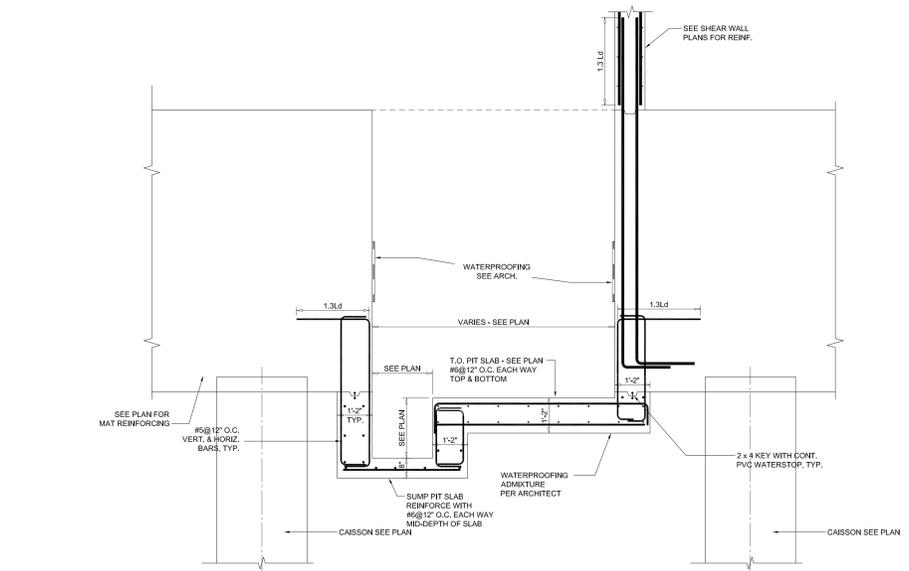
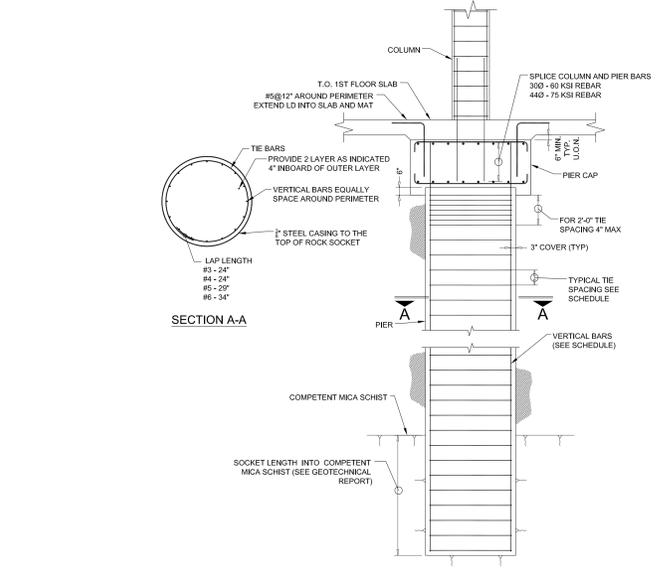
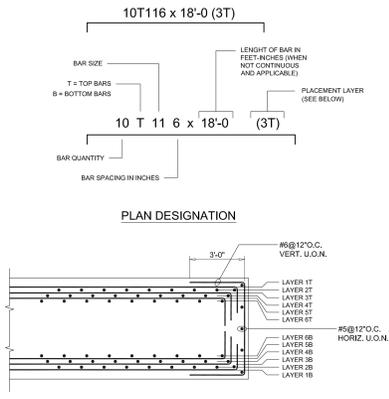
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Client information: HAP INVESTMENT DEVELOPERS, 347 5th Avenue, Suite 906 - New York NY 10016. Architect: WASA ARCHITECTURE / ENGINEERING / INTERIORS / PRESERVATION, 740 Broadway, 4th Floor - New York, NY 10003. Designer: DESIMONE, 428 West 54th Street - New York, NY 10019. Structural Engineer: DESIMONE, 18 WEST 18TH STREET - NEW YORK, NY 10011. Key Plan showing site location. Project North arrow. Reference bar scale designation. Revisions table with 2 entries. Title block with project name HAP 8, address 215-219 WEST 28TH STREET NEW YORK, NY 10001, and drawing title GENERAL NOTES DESIGN CRITERIA INDEX OF DRAWINGS. Date: NOV 28, 2014. Project No: 13399.00. Scale: AS NOTED. Drawing by: K.K. Checked by: K.K. DWG No: S-001.00. NYC Code Number: 13399.05-001-00g.





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KEY PLAN

WEST 28TH STREET  
7TH AVENUE  
WEST 27TH STREET

REFERENCE BAR  
SEE DRAWINGS FOR SCALE DESIGNATION

NO.	REVISIONS	DATE
2	65% SUBMISSION SET	19 NOV. 14
1	PRELIMINARY DCB FILING	28 MAY. 14
NO.	SUBMISSIONS	DATE

PROJECT  
**HAP 8**  
215-219 WEST 28TH STREET  
NEW YORK, NY 10001

TYPICAL FOUNDATION DETAILS

DATE: MAY 28, 2014  
PROJECT NO: 13389.00  
SCALE: AS NOTED  
DRAWING BY: K.K.  
CHECKED BY: K.K.  
DWG NO: **FO-103.00**  
RVC DCB NUMBER

Desimone Consulting Engineers - 400 West 61st Street, 10th Floor, New York, NY 10023  
 Drawing No: FO-103.00 - Drawing Title: Typical Foundation Details - Date: November 19, 2014 - 12:29PM









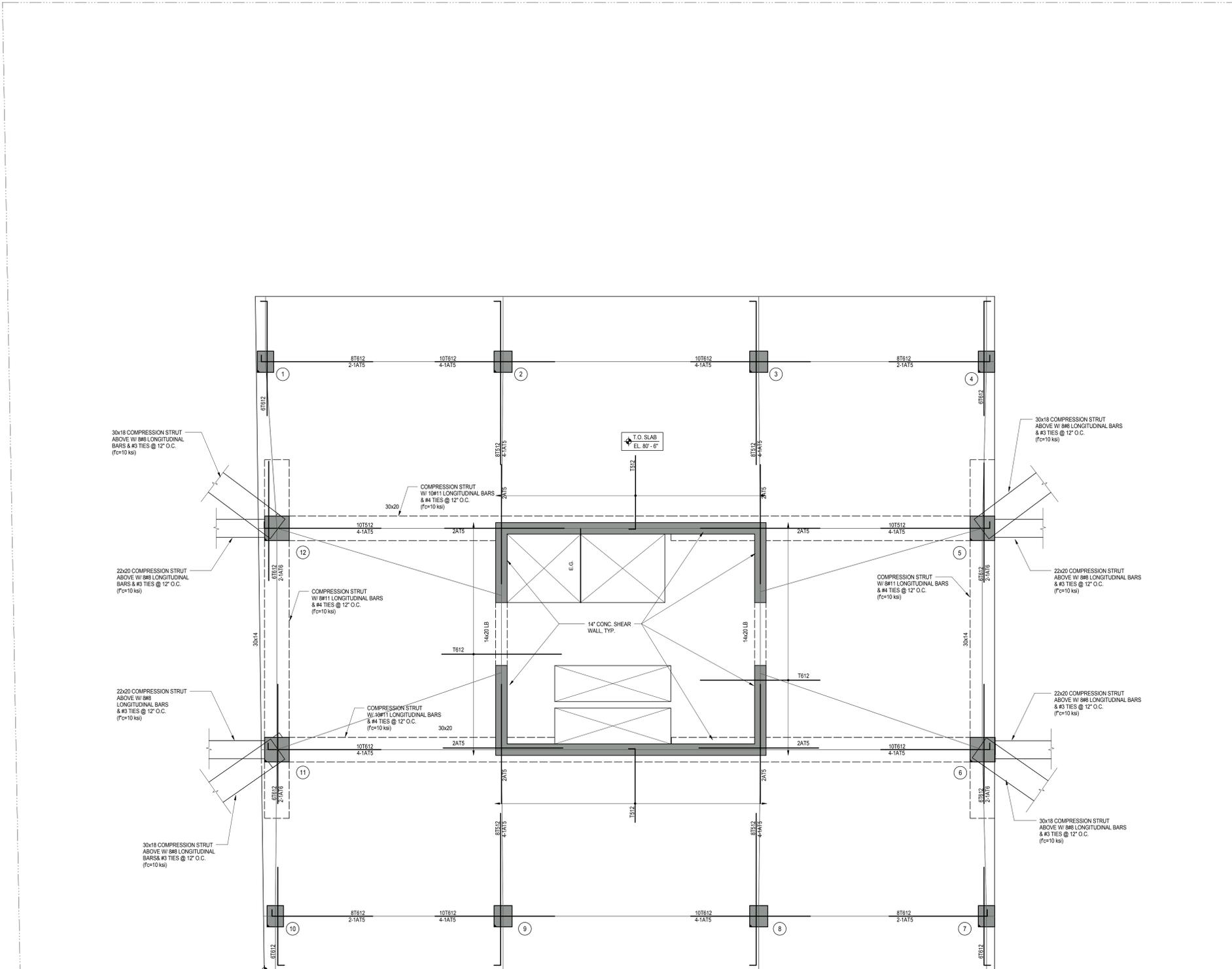












**9TH FLOOR PLAN**  
SCALE: 1/4" = 1'-0"

TOP OF SLAB ELEVATION U.O.N.: <b>SEE PLAN</b>	SLAB BASIC BOTTOM BARS U.O.N.: <b>#4@12" E.W.</b>
SLAB THICKNESS U.O.N.: <b>t = 9"</b>	SLAB MIDDLE STRIP TOP BARS U.O.N.: <b>#4@12" E.W.</b>
SLAB CONCRETE STRENGTH: <b>f'c = 7.5 ksi</b>	

- DRAWING NOTES:**
- FOR GENERAL NOTES SEE DRAWING S-001
  - FOR COLUMN SCHEDULE AND DETAILS, SEE S-200 SERIES.
  - FOR SHEAR WALL PLANS AND DETAILS, SEE S-200 SERIES.
  - FOR TYPICAL CONCRETE SECTIONS AND DETAILS, SEE S-400 SERIES.
  - OUTER MOST REINFORCING RUNS EAST-WEST
  - ALL COLUMN AND OPENING DIMENSIONS GIVEN AS EAST-WEST x NORTH-SOUTH.
  - CONTRACTOR TO LOCATE / VERIFY ALL THE OPENINGS THROUGH THE SLAB FROM ARCHITECTURAL AND MEP DRAWINGS.
  - (S) DENOTES SLOPING COLUMN
  - (H) DENOTES COLUMN HANGER
  - (\*) DENOTES STUDDRAIL SYMBOL. SEE S-404 FOR SCHEDULE AND DETAILS

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KEY PLAN  
WEST 28TH STREET  
7TH AVENUE  
WEST 27TH STREET  
PROJECT NORTH  
REFERENCE BAR  
SEE DRAWINGS FOR SCALE DESIGNATION

2	65% SUBMISSION SET	19 NOV, 14
2	PRELIMINARY DOB FILING	28 MAY, 14
1	NO. SUBMISSIONS	DATE

PROJECT	HAP 8
215-219 WEST 28TH STREET NEW YORK, NY 10001	
<b>9TH FLOOR PLAN</b>	
DATE: MAY 28, 2014	PROJECT No: 13399
SCALE: As Noted	DRAWING BY: [Signature]
CHECKED BY: [Signature]	DATE: MAY 28, 2014
DWG No: [Blank]	DWG DATE Number: <b>S-309.00</b>

**NOT FOR CONSTRUCTION**





















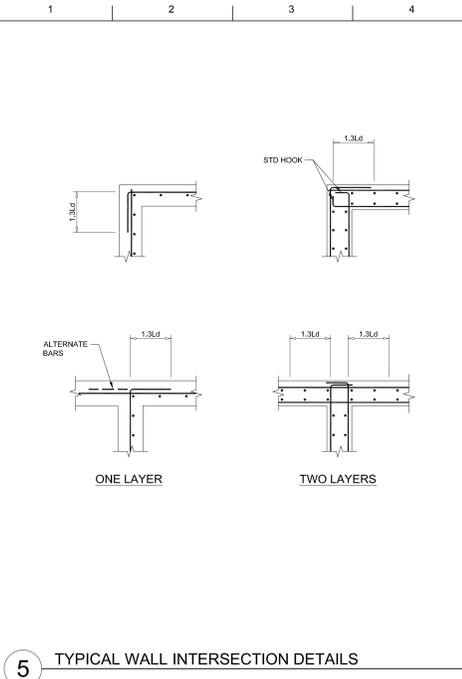




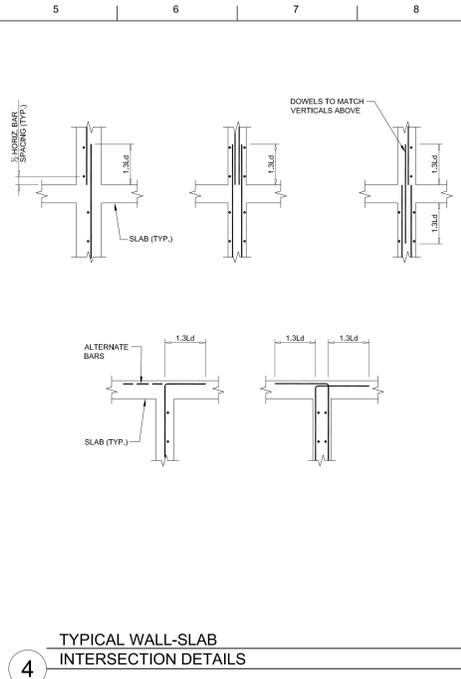




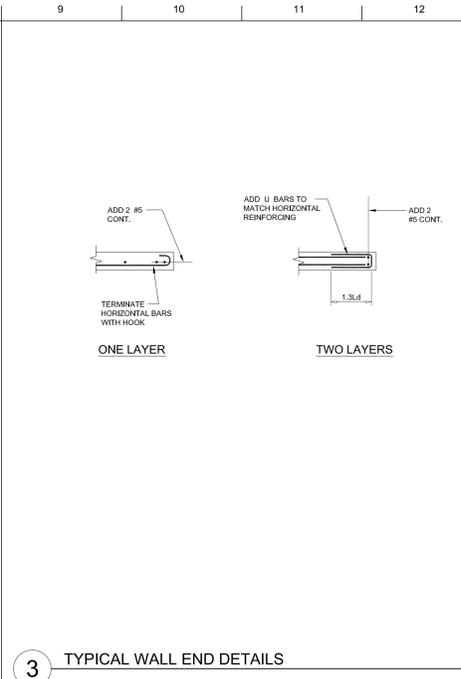




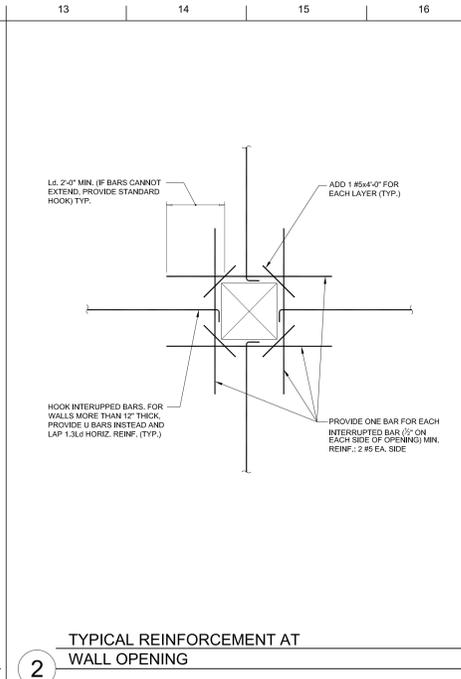
5 TYPICAL WALL INTERSECTION DETAILS



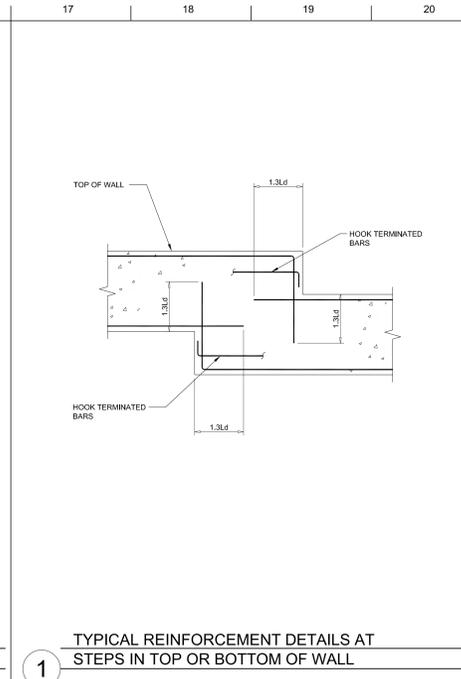
4 TYPICAL WALL-SLAB INTERSECTION DETAILS



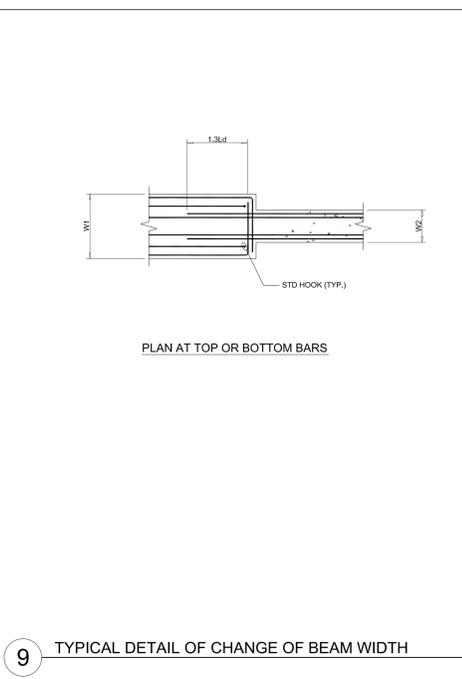
3 TYPICAL WALL END DETAILS



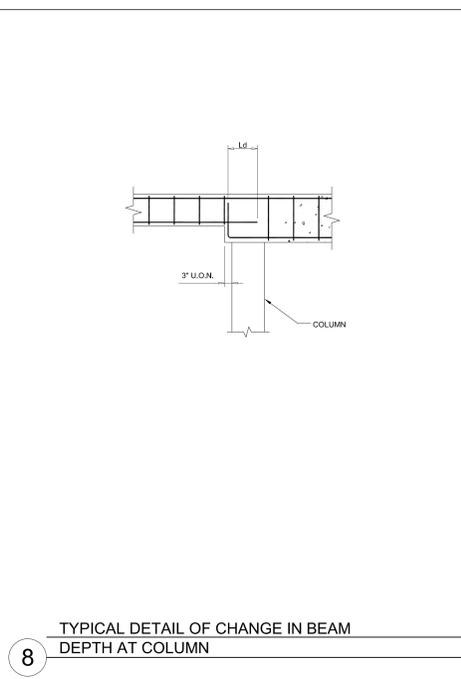
2 TYPICAL REINFORCEMENT AT WALL OPENING



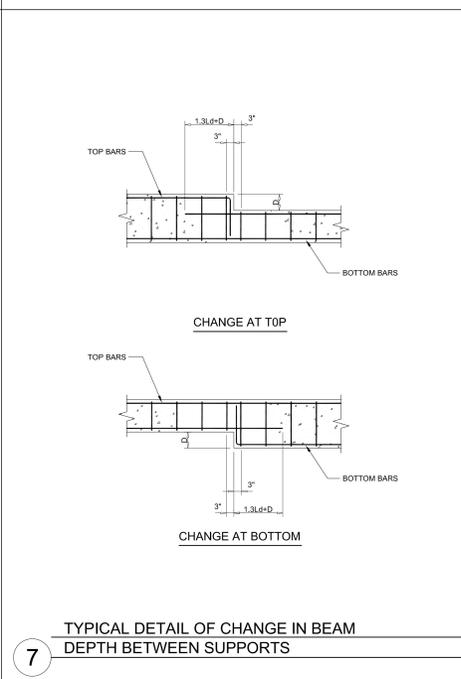
1 TYPICAL REINFORCEMENT DETAILS AT STEPS IN TOP OR BOTTOM OF WALL



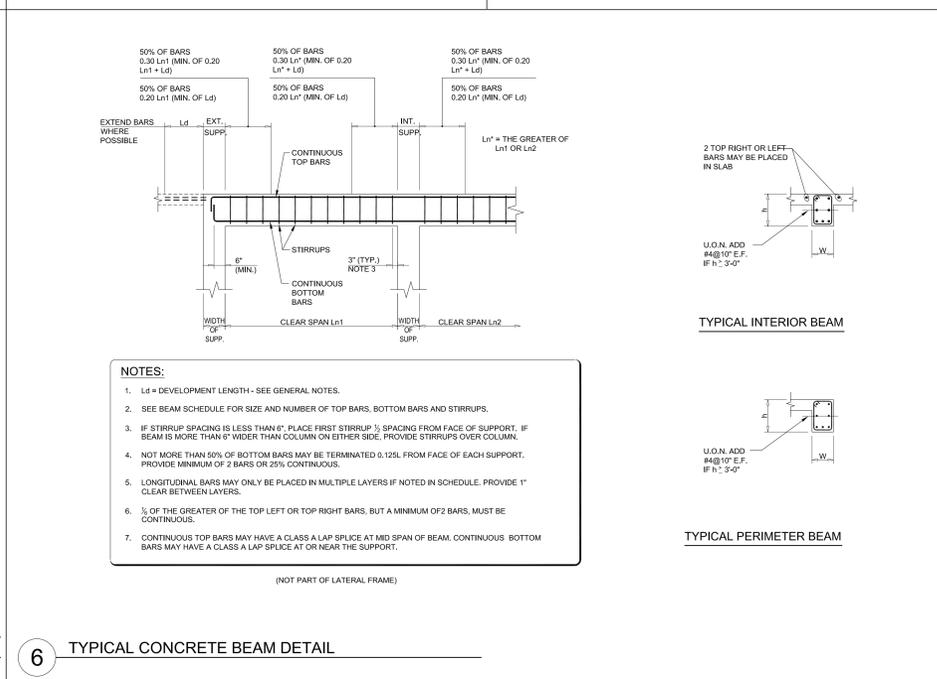
9 TYPICAL DETAIL OF CHANGE OF BEAM WIDTH



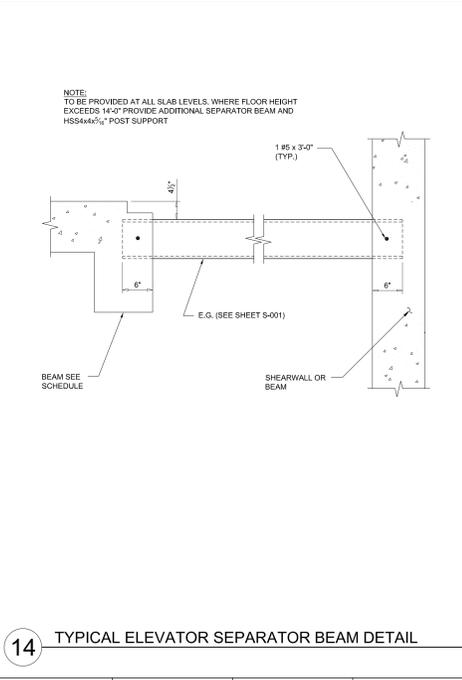
8 TYPICAL DETAIL OF CHANGE IN BEAM DEPTH AT COLUMN



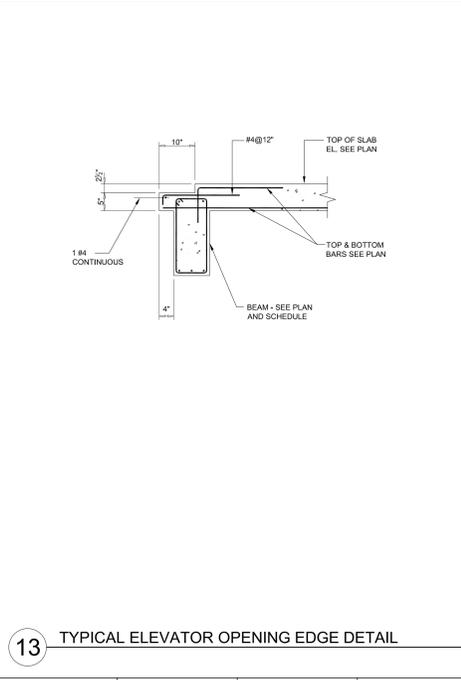
7 TYPICAL DETAIL OF CHANGE IN BEAM DEPTH BETWEEN SUPPORTS



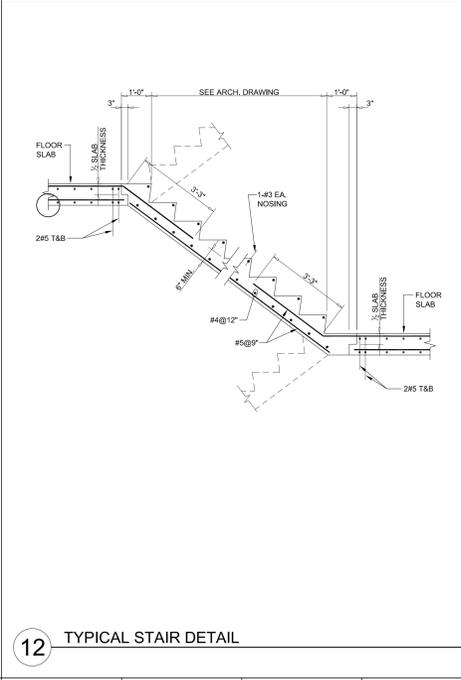
6 TYPICAL CONCRETE BEAM DETAIL



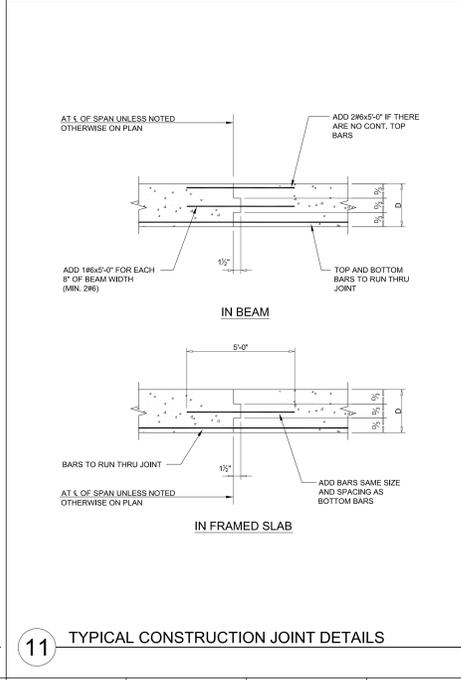
14 TYPICAL ELEVATOR SEPARATOR BEAM DETAIL



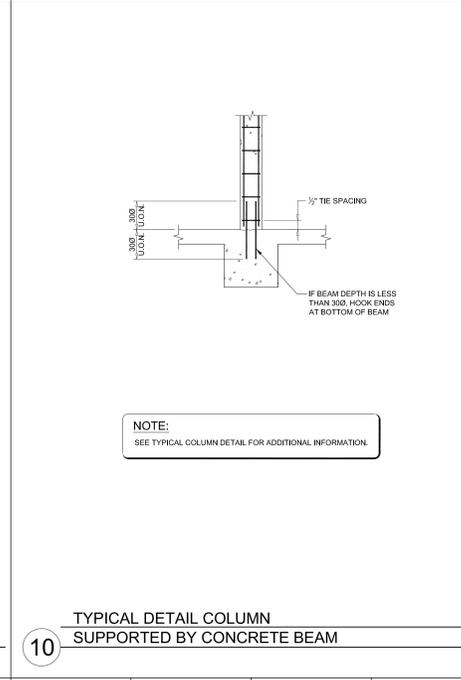
13 TYPICAL ELEVATOR OPENING EDGE DETAIL



12 TYPICAL STAIR DETAIL



11 TYPICAL CONSTRUCTION JOINT DETAILS



10 TYPICAL DETAIL COLUMN SUPPORTED BY CONCRETE BEAM

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KEY PLAN  
WEST 28TH STREET  
7TH AVENUE  
WEST 27TH STREET

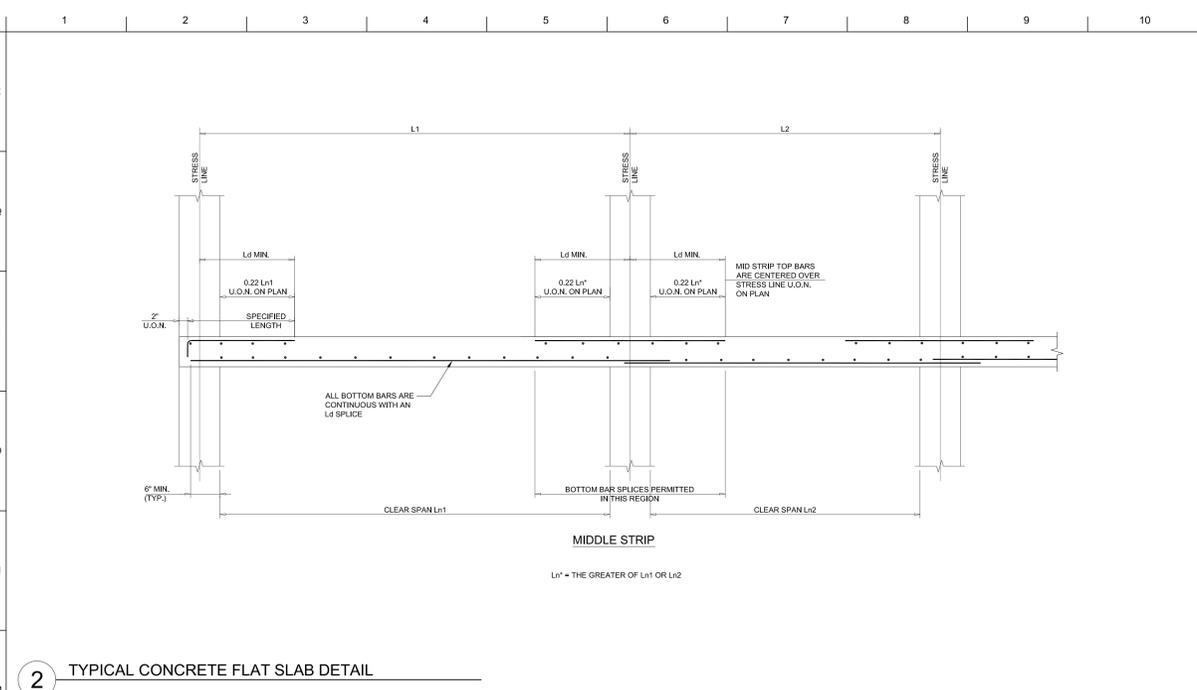
PROJECT NORTH  
REFERENCE BAR  
SEE DRAWINGS FOR SCALE DESIGNATION

NO.	REVISIONS	DATE
2	65% SUBMISSION SET	19 NOV. 14
1	PRELIMINARY DOB FILING	28 MAY. 14
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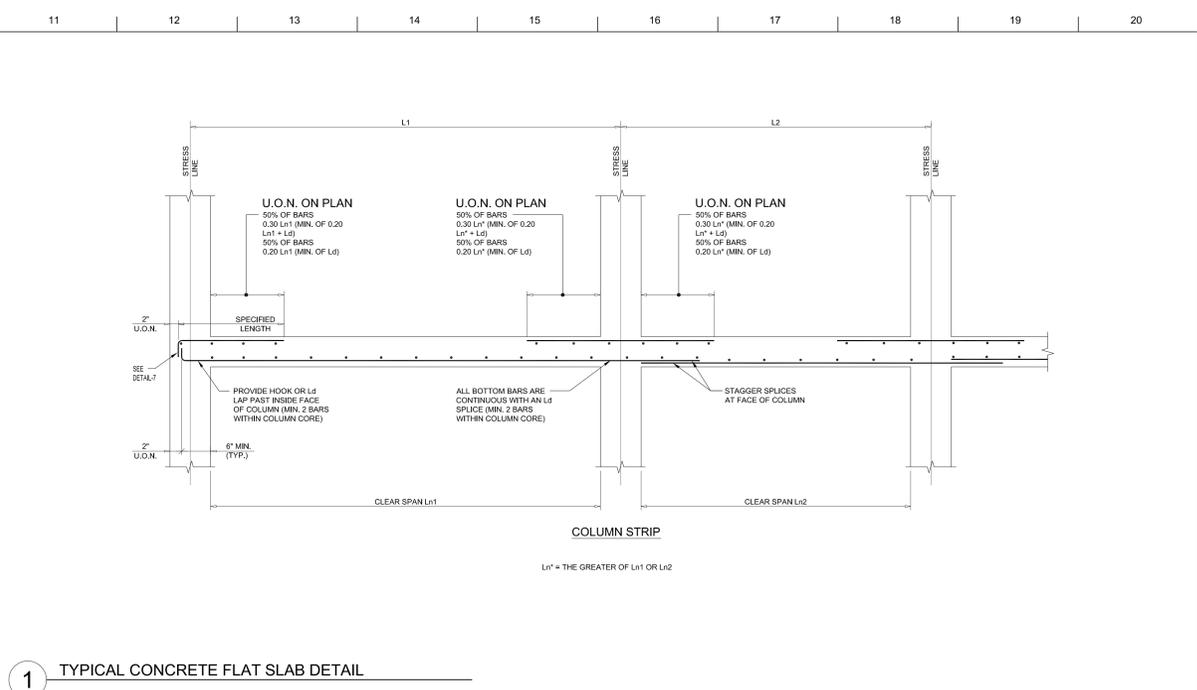
PROJECT  
**HAP 8**  
215-219 WEST 28TH STREET  
NEW YORK, NY 10001

TYPICAL CONCRETE DETAILS

SCALE & DATE/TIME	DATE
PROJECT NO.	NOV 28, 2014
SCALE	13399.00
DRAWING BY	AS NOTED
CHECKED BY	K.K.
DWG. NO.	K.K.
NYC DOB Number	S-402.00



2 TYPICAL CONCRETE FLAT SLAB DETAIL



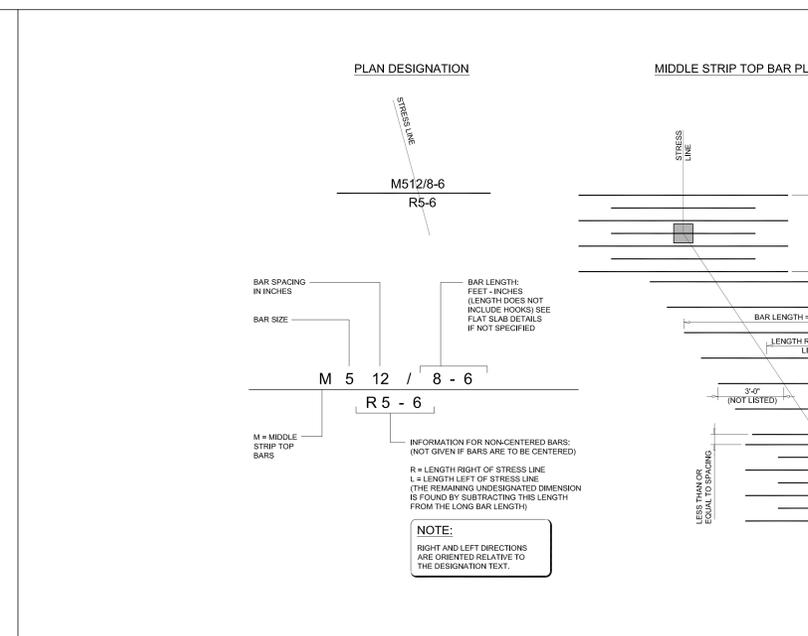
1 TYPICAL CONCRETE FLAT SLAB DETAIL

BAR #	F'c (IN INCHES)						
	4000 psi	5000 psi	6000 psi	7000 psi	8000 psi	10000 psi	12000 psi
3	7	6	6	6	6	6	6
4	7	6	6	6	6	6	6
5	10	8	7	7	6	6	6
6	11	9	8	8	7	6	6
7	13	11	10	9	9	8	7
8	14	12	11	10	10	8	8
9	17	14	13	12	11	10	9
10	19	16	15	14	13	11	10
11	20	17	16	15	14	12	11

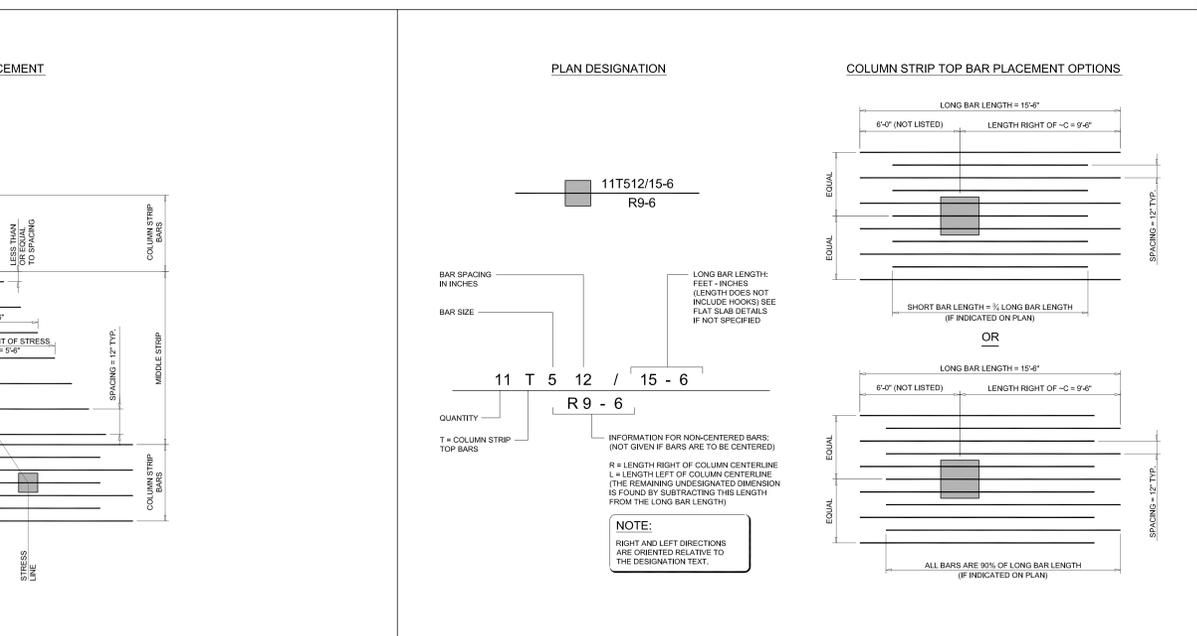
\* ASSUMES Fy = 60 ksi

NOTES:  
 FOR LIGHT WEIGHT AGGREGATE MULTIPLY TABLE VALUES BY 1.3  
 FOR EPOXY COATED REBAR MULTIPLY TABLE VALUES BY 1.2  
 FOR Fy = 75 MULTIPLY TABLE VALUES BY 1.25  
 COMBINATIONS OF EFFECTS DUE TO CONCRETE DENSITY AND EPOXY COATING ARE CUMULATIVE

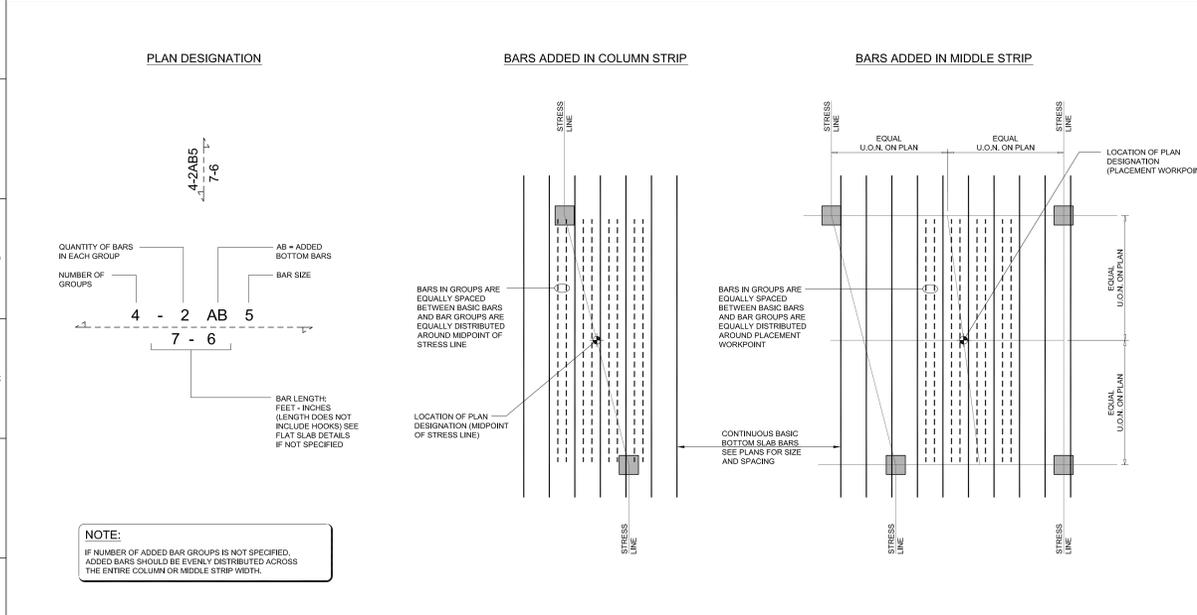
5 HOOK LENGTHS FOR CONNECTIONS



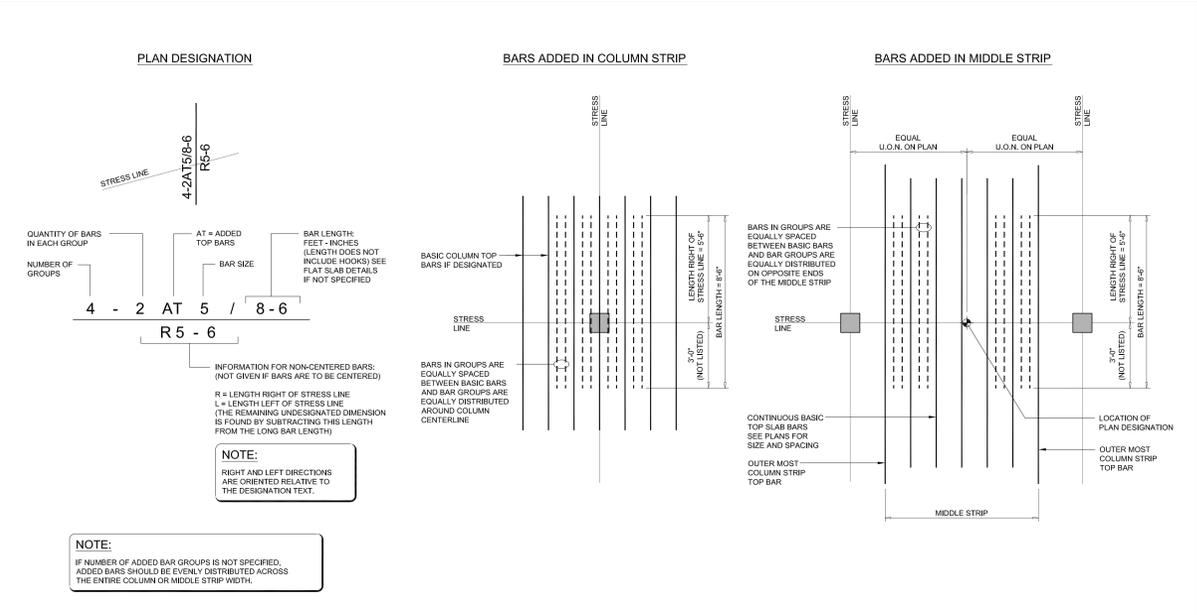
4 MIDDLE STRIP TOP BAR PLACEMENT



3 COLUMN STRIP TOP BAR PLACEMENT



7 ADDED BOTTOM BAR PLACEMENT



6 ADDED TOP BAR PLACEMENT

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STRUCTURAL ENGINEER  
**DESIMONE**  
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KEY PLAN

PROJECT NORTH

NO.	REVISIONS	DATE
2	65% SUBMISSION SET	19 NOV. 14
1	PRELIMINARY DOB FILING	28 MAY. 14
NO.	SUBMISSIONS	DATE

PROJECT  
**HAP 8**  
 215-219 WEST 28TH STREET  
 NEW YORK, NY 10001

TYPICAL CONCRETE  
 DETAILS

SCALE & DATE/TIME	DATE
	NOV 28, 2014
PROJECT NO.	13399.00
SCALE	AS NOTED
DRAWING BY	K.K.
CHECKED BY	K.K.
DWG. NO.	S-403.00
NYS JOB NUMBER	

1339.05-403.00



# HAP 8

## 215-219 WEST 28TH STREET NEW YORK, NY 10001

65% SUBMISSION SET  
19 NOVEMBER, 2014



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KEY PLAN  
WEST 28TH STREET  
7TH AVENUE  
WEST 28TH STREET

PROJECT NORTH  
REFERENCE BAR  
SEE DRAWINGS FOR  
SCALE DESIGNATION

GENERAL		ARCHITECTURAL (CONT'D)		STRUCTURAL		PLUMBING		MECHANICAL		ELECTRICAL	
T-000	TITLE SHEET	A-700	FLOOR C2 - SUB-CELLAR REFLECTED CEILING PLAN	S-001	INDEX OF DRAWINGS, GENERAL NOTES, SYMBOLS AND ABBREVIATIONS	P-001	PLUMBING - LEGEND, ABBREVIATIONS AND NOTES	M-001	HVAC - SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES	E-001	ELECTRICAL - LEGEND, ABBREVIATIONS, AND GENERAL NOTES
<b>ZONING</b>		A-701	FLOOR C1 - CELLAR REFLECTED CEILING PLAN	FO-101	CELLAR FLOOR PLAN	P-002	PLUMBING - FIXTURES AND DRAINS SCHEDULE	M-002	HVAC SCHEDULE	E-002	ELECTRICAL - LIGHTING FIXTURE SCHEDULE
Z-001	ZONING ANALYSIS	A-702	FLOOR 02 REFLECTED CEILING PLAN	FO-102	CELLAR FLOOR PLAN	P-100	PLUMBING - SUB-CELLAR C2 CONSTRUCTION PLAN	M-003	HVAC SCHEDULE	E-100L	ELECTRICAL - FLOOR C2 SUB-CELLAR LIGHTING PLAN
Z-002	ZONING SITE PLAN AND AXON	A-703	FLOOR 03 REFLECTED CEILING PLAN	FO-103	TYPICAL FOUNDATION SECTIONS AND DETAILS	P-101	PLUMBING - CELLAR C1 CONSTRUCTION PLAN	M-100	HVAC - SUB-CELLAR C2 CONSTRUCTION PLAN	E-100P	ELECTRICAL - FLOOR C2 SUB-CELLAR POWER PLAN
Z-003	ZONING ELEVATION AND SECTION	A-704	FLOOR 04 REFLECTED CEILING PLAN	S-201	COLUMN SCHEDULE AND DETAILS	P-102	PLUMBING - FLOOR 02 CONSTRUCTION PLAN	M-101	HVAC - CELLAR C1 CONSTRUCTION PLAN	E-101L	ELECTRICAL - FLOOR C1 CELLAR LIGHTING PLAN
Z-005	ZONING UNIT AREA PLANS	A-705	FLOOR 05 REFLECTED CEILING PLAN	S-210	SHEARWALL REINFORCING DETAILS	P-103	PLUMBING - FLOOR 03 CONSTRUCTION PLAN	M-102	HVAC - FLOOR 01 CONSTRUCTION PLAN	E-101P	ELECTRICAL - FLOOR C1 CELLAR POWER PLAN
<b>ARCHITECTURAL</b>		A-706	FLOOR 06 REFLECTED CEILING PLAN	S-211	SHEARWALL REINFORCING PLANS	P-104	PLUMBING - FLOOR 04 CONSTRUCTION PLAN	M-103	HVAC - FLOOR 02 CONSTRUCTION PLAN	E-102L	ELECTRICAL - FLOOR 01 LIGHTING PLAN
A-001	GENERAL NOTES	A-707	FLOOR 07 REFLECTED CEILING PLAN	S-301	1ST FLOOR PLAN	P-105	PLUMBING - FLOOR 05 CONSTRUCTION PLAN	M-104	HVAC - FLOOR 03 CONSTRUCTION PLAN	E-102P	ELECTRICAL - FLOOR 01 POWER PLAN
A-002	ACCESSIBILITY REQUIREMENTS	A-708	FLOOR 08 REFLECTED CEILING PLAN	S-302	2ND FLOOR PLAN	P-106	PLUMBING - FLOOR 06 CONSTRUCTION PLAN	M-105	HVAC - FLOOR 04 CONSTRUCTION PLAN	E-103	ELECTRICAL - FLOOR 02 LIGHTING AND POWER PLAN
A-003	MULTIPLE DWELLING LAW HOUSING MAINTENANCE CODE	A-709	FLOOR 09 REFLECTED CEILING PLAN	S-303	3RD FLOOR PLAN	P-107	PLUMBING - FLOOR 07 CONSTRUCTION PLAN	M-106	HVAC - FLOOR 05 CONSTRUCTION PLAN	E-104	ELECTRICAL - FLOOR 03 LIGHTING AND POWER PLAN
A-010	LIFE SAFETY PLANS	A-710	FLOOR 10 REFLECTED CEILING PLAN	S-304	4TH TO 6TH FLOOR PLAN	P-108	PLUMBING - FLOOR 08 CONSTRUCTION PLAN	M-107	HVAC - FLOOR 06 CONSTRUCTION PLAN	E-105	ELECTRICAL - FLOOR 04 LIGHTING AND POWER PLAN
A-011	LIFE SAFETY PLANS	A-711	FLOOR 11 REFLECTED CEILING PLAN	S-307	7TH FLOOR PLAN	P-109	PLUMBING - FLOOR 09 CONSTRUCTION PLAN	M-108	HVAC - FLOOR 07 CONSTRUCTION PLAN	E-106	ELECTRICAL - FLOOR 05 LIGHTING AND POWER PLAN
A-012	LIFE SAFETY PLANS	A-712	FLOOR 12 REFLECTED CEILING PLAN	S-308	8TH FLOOR PLAN	P-110	PLUMBING - FLOOR 10 CONSTRUCTION PLAN	M-109	HVAC - FLOOR 08 CONSTRUCTION PLAN	E-107	ELECTRICAL - FLOOR 06 LIGHTING AND POWER PLAN
A-013	LIFE SAFETY PLANS	A-713	FLOOR 13 REFLECTED CEILING PLAN	S-309	9TH FLOOR PLAN	P-111	PLUMBING - FLOOR 11 CONSTRUCTION PLAN	M-110	HVAC - FLOOR 09 CONSTRUCTION PLAN	E-108	ELECTRICAL - FLOOR 07 LIGHTING AND POWER PLAN
A-014	LIFE SAFETY PLANS	A-714	FLOOR 14 REFLECTED CEILING PLAN	A-715	FLOOR 10TH REFLECTED CEILING PLAN	P-112	PLUMBING - FLOOR 12 CONSTRUCTION PLAN	M-111	HVAC - FLOOR 10 CONSTRUCTION PLAN	E-109	ELECTRICAL - FLOOR 08 PLAN LIGHTING AND POWER PLAN
A-020	SITE PLAN	A-715	FLOOR 15 REFLECTED CEILING PLAN	A-716	FLOOR 15 REFLECTED CEILING PLAN	P-113	PLUMBING - FLOOR 13 CONSTRUCTION PLAN	M-112	HVAC - FLOOR 11 CONSTRUCTION PLAN	E-110	ELECTRICAL - FLOOR 09 LIGHTING AND POWER PLAN
A-100	FLOOR C2 - SUB-CELLAR CONSTRUCTION PLAN	A-716	FLOOR 16 REFLECTED CEILING PLAN	A-717	FLOOR 16 REFLECTED CEILING PLAN	P-114	PLUMBING - FLOOR 14 CONSTRUCTION PLAN	M-113	HVAC - FLOOR 12 CONSTRUCTION PLAN	E-111	ELECTRICAL - FLOOR 10 LIGHTING AND POWER PLAN
A-101	FLOOR C1 - CELLAR CONSTRUCTION PLAN	A-717	FLOOR 17 REFLECTED CEILING PLAN	A-718	FLOOR 17 REFLECTED CEILING PLAN	P-115	PLUMBING - FLOOR 15 CONSTRUCTION PLAN	M-114	HVAC - FLOOR 13 CONSTRUCTION PLAN	E-112	ELECTRICAL - FLOOR 11 LIGHTING AND POWER PLAN
A-102	FLOOR 01 CONSTRUCTION PLAN	A-718	FLOOR 18 REFLECTED CEILING PLAN	A-719	FLOOR 18 REFLECTED CEILING PLAN	P-116	PLUMBING - FLOOR 16 CONSTRUCTION PLAN	M-115	HVAC - FLOOR 14 CONSTRUCTION PLAN	E-113	ELECTRICAL - FLOOR 12 LIGHTING AND POWER PLAN
A-103	FLOOR 02 CONSTRUCTION PLAN	A-719	FLOOR 19 REFLECTED CEILING PLAN	A-720	FLOOR 19 REFLECTED CEILING PLAN	P-117	PLUMBING - FLOOR 17 CONSTRUCTION PLAN	M-116	HVAC - FLOOR 15 CONSTRUCTION PLAN	E-114	ELECTRICAL - FLOOR 13 LIGHTING AND POWER PLAN
A-104	FLOOR 03 CONSTRUCTION PLAN	A-720	FLOOR 20 REFLECTED CEILING PLAN	A-721	FLOOR 20 REFLECTED CEILING PLAN	P-118	PLUMBING - FLOOR 18 CONSTRUCTION PLAN	M-117	HVAC - FLOOR 16 CONSTRUCTION PLAN	E-115	ELECTRICAL - FLOOR 14 LIGHTING AND POWER PLAN
A-105	FLOOR 04 CONSTRUCTION PLAN	A-721	FLOOR 21 REFLECTED CEILING PLAN	A-722	FLOOR 21 REFLECTED CEILING PLAN	P-119	PLUMBING - FLOOR 19 CONSTRUCTION PLAN	M-118	HVAC - FLOOR 17 CONSTRUCTION PLAN	E-116	ELECTRICAL - FLOOR 15 LIGHTING AND POWER PLAN
A-106	FLOOR 05 CONSTRUCTION PLAN	A-722	FLOOR 22 - ROOF REFLECTED CEILING PLAN	A-723	FLOOR 22 - ROOF REFLECTED CEILING PLAN	P-120	PLUMBING - FLOOR 20 CONSTRUCTION PLAN	M-119	HVAC - FLOOR 18 CONSTRUCTION PLAN	E-117	ELECTRICAL - FLOOR 16 LIGHTING AND POWER PLAN
A-107	FLOOR 06 CONSTRUCTION PLAN	A-723	FLOOR 23 - BULKHEAD & FLOOR 24 - BULKHEAD ROOF REFLECTED CEILING PLANS	A-724	FLOOR 23 - BULKHEAD & FLOOR 24 - BULKHEAD ROOF REFLECTED CEILING PLANS	P-121	PLUMBING - FLOOR 21 CONSTRUCTION PLAN	M-120	HVAC - FLOOR 19 CONSTRUCTION PLAN	E-118	ELECTRICAL - FLOOR 17 LIGHTING AND POWER PLAN
A-108	FLOOR 07 CONSTRUCTION PLAN	A-724	CEILING DETAILS	A-750	CEILING DETAILS	P-122	PLUMBING - FLOOR 22 CONSTRUCTION PLAN	M-121	HVAC - FLOOR 20 CONSTRUCTION PLAN	E-119	ELECTRICAL - FLOOR 18 LIGHTING AND POWER PLAN
A-109	FLOOR 08 CONSTRUCTION PLAN	A-800	PARTITION TYPES	A-800	PARTITION TYPES	P-123	PLUMBING - FLOOR 23 CONSTRUCTION PLAN	M-122	HVAC - FLOOR 21 CONSTRUCTION PLAN	E-120	ELECTRICAL - FLOOR 19 LIGHTING AND POWER PLAN
A-110	FLOOR 09 CONSTRUCTION PLAN	A-850	ELEVATOR DRAWINGS	A-850	ELEVATOR DRAWINGS	P-124	PLUMBING - FLOOR 24 CONSTRUCTION PLAN	M-123	HVAC - FLOOR 22 CONSTRUCTION PLAN	E-121	ELECTRICAL - FLOOR 20 LIGHTING AND POWER PLAN
A-111	FLOOR 10 CONSTRUCTION PLAN	A-851	MATERIAL LIFT	A-851	MATERIAL LIFT	P-125	PLUMBING - FLOOR 25 CONSTRUCTION PLAN	M-124	HVAC - FLOOR 23 CONSTRUCTION PLAN	E-122	ELECTRICAL - FLOOR 21 LIGHTING AND POWER PLAN
A-112	FLOOR 11 CONSTRUCTION PLAN					S-323	BULKHEAD PLAN AND BULKHEAD ROOF PLAN	M-125	HVAC - FLOOR 24 CONSTRUCTION PLAN	E-123L	ELECTRICAL - FLOOR 22 ROOF LIGHTING PLAN
A-113	FLOOR 12 CONSTRUCTION PLAN					S-401	TYPICAL CONCRETE SECTIONS AND DETAILS	M-300	REFRIGERANT PIPING AND SYSTEM WIRING DIAGRAMS 1 OF 4	E-124P	ELECTRICAL - FLOOR 23 BULKHEAD AND BULKHEAD ROOF POWER PLANS
A-114	FLOOR 13 CONSTRUCTION PLAN					S-402	TYPICAL CONCRETE SECTIONS AND DETAILS	M-301	REFRIGERANT PIPING AND SYSTEM WIRING DIAGRAMS 2 OF 4	E-200	ELECTRICAL - POWER RISER DIAGRAM
A-115	FLOOR 14 CONSTRUCTION PLAN					S-403	TYPICAL CONCRETE SECTIONS AND DETAILS	M-302	REFRIGERANT PIPING AND SYSTEM WIRING DIAGRAMS 3 OF 4	E-201	ELECTRICAL - LOW VOLTAGE RISER DIAGRAM
A-116	FLOOR 15 CONSTRUCTION PLAN					S-404	TYPICAL CONCRETE SECTIONS AND DETAILS	M-303	REFRIGERANT PIPING AND SYSTEM WIRING DIAGRAMS 4 OF 4	E-300	ELECTRICAL - PANEL SCHEDULES
A-117	FLOOR 16 CONSTRUCTION PLAN							M-304	HVAC - WATER RISER DIAGRAM	E-401	ELECTRICAL - DETAILS
A-118	FLOOR 17 CONSTRUCTION PLAN							M-305	HVAC - CONTROL DIAGRAMS	E-501	ELECTRICAL - LIGHTNING PROTECTION DETAILS
A-119	FLOOR 18 CONSTRUCTION PLAN							M-400	HVAC DETAILS		
A-120	FLOOR 19 CONSTRUCTION PLAN							M-401	HVAC DETAILS		
A-121	FLOOR 20 CONSTRUCTION PLAN							M-402	HVAC DETAILS		
A-122	FLOOR 21 CONSTRUCTION PLAN										
A-123	FLOOR 22 - ROOF CONSTRUCTION PLAN										
A-124	FLOOR 23 - BULKHEAD & FLOOR 24 - BULKHEAD ROOF CONSTRUCTION PLANS										
A-200	SOUTH ELEVATION	EN-001	ENERGY COMPLIANCE CERTIFICATES			SD/SP-001	FIRE STANDPIPE AND SPRINKLERS - LEGEND, NOTES AND PLOT PLAN			FA-001	FIRE ALARM - LEGEND, ABBREVIATIONS, AND GENERAL NOTES
A-201	EAST ELEVATION	EN-002	ENERGY COMPLIANCE CERTIFICATES			SD/SP-002	FIRE STANDPIPE AND SPRINKLERS - EQUIPMENT SCHEDULE			FA-101	FIRE ALARM - FLOOR C2 SUB-CELLAR PLAN
A-202	NORTH ELEVATION	EN-003	ENERGY COMPLIANCE CERTIFICATES			SD/SP-100	FIRE STANDPIPE AND SPRINKLERS - SUB-CELLAR C2 PLAN			FA-102	FIRE ALARM - FLOOR C1 CELLAR PLAN
A-203	WEST ELEVATION					SD/SP-101	FIRE STANDPIPE AND SPRINKLERS - CELLAR C1 PLAN			FA-103	FIRE ALARM - FLOOR 01 PLAN
A-300	BUILDING SECTION					SD/SP-102	FIRE STANDPIPE AND SPRINKLERS - FLOOR 02 PLAN			FA-104	FIRE ALARM - FLOOR 02 PLAN
A-301	BUILDING SECTION					SD/SP-103	FIRE STANDPIPE AND SPRINKLERS - FLOOR 03 PLAN			FA-105	FIRE ALARM - FLOOR 03 PLAN
A-350	SOUTH FACADE WALL SECTION					SD/SP-104	FIRE STANDPIPE AND SPRINKLERS - FLOOR 04 PLAN			FA-106	FIRE ALARM - FLOOR 04 PLAN
A-351	NORTH FACADE WALL SECTION					SD/SP-105	FIRE STANDPIPE AND SPRINKLERS - FLOOR 05 PLAN			FA-107	FIRE ALARM - FLOOR 05 PLAN
A-352	EAST & WEST FACADE WALL SECTION					SD/SP-106	FIRE STANDPIPE AND SPRINKLERS - FLOOR 06 PLAN			FA-108	FIRE ALARM - FLOOR 06 PLAN
A-400	STAIR PLANS					SD/SP-107	FIRE STANDPIPE AND SPRINKLERS - FLOOR 07 PLAN			FA-109	FIRE ALARM - FLOOR 07 PLAN
A-403	STAIR SECTIONS					SD/SP-108	FIRE STANDPIPE AND SPRINKLERS - FLOOR 08 PLAN			FA-110	FIRE ALARM - FLOOR 08 PLAN
A-501	GFRP PANEL ATTACHMENT DETAILS - AT CURTAIN WALL ATTACHMENT					SD/SP-109	FIRE STANDPIPE AND SPRINKLERS - FLOOR 09 PLAN			FA-111	FIRE ALARM - FLOOR 09 PLAN
A-502	GFRP PANEL ATTACHMENT - AT TERRACES					SD/SP-110	FIRE STANDPIPE AND SPRINKLERS - FLOOR 10 PLAN			FA-112	FIRE ALARM - FLOOR 10 PLAN
A-503	GFRP PANEL ATTACHMENT - PLAN VIEWS					SD/SP-111	FIRE STANDPIPE AND SPRINKLERS - FLOOR 11 PLAN			FA-113	FIRE ALARM - FLOOR 11 PLAN
A-504	SIDE WALL / RAINSCREEN WALL SECTION - WITH GFRP ATTACHMENT					SD/SP-112	FIRE STANDPIPE AND SPRINKLERS - FLOOR 12 PLAN			FA-114	FIRE ALARM - FLOOR 12 PLAN
A-505	GFRP PANEL TYPE					SD/SP-113	FIRE STANDPIPE AND SPRINKLERS - FLOOR 13 PLAN			FA-115	FIRE ALARM - FLOOR 13 PLAN
A-506	GFRP PANEL TYPE					SD/SP-114	FIRE STANDPIPE AND SPRINKLERS - FLOOR 14 PLAN			FA-116	FIRE ALARM - FLOOR 14 PLAN
A-507	GFRP PANEL TYPE					SD/SP-115	FIRE STANDPIPE AND SPRINKLERS - FLOOR 15 PLAN			FA-117	FIRE ALARM - FLOOR 15 PLAN
A-508	GFRP PANEL TYPE					SD/SP-116	FIRE STANDPIPE AND SPRINKLERS - FLOOR 16 PLAN			FA-118	FIRE ALARM - FLOOR 16 PLAN
A-509	GFRP PANEL TYPE					SD/SP-117	FIRE STANDPIPE AND SPRINKLERS - FLOOR 17 PLAN			FA-119	FIRE ALARM - FLOOR 17 PLAN
A-510	GFRP PANEL TYPE FOR FL 10&11					SD/SP-118	FIRE STANDPIPE AND SPRINKLERS - FLOOR 18 PLAN			FA-120	FIRE ALARM - FLOOR 18 PLAN
A-511	GFRP PANEL TYPE FOR ENTRANCE CANOPY					SD/SP-119	FIRE STANDPIPE AND SPRINKLERS - FLOOR 19 PLAN			FA-121	FIRE ALARM - FLOOR 19 PLAN
A-520	SSG MULLION PLAN DETAIL					SD/SP-120	FIRE STANDPIPE AND SPRINKLERS - FLOOR 20 PLAN			FA-122	FIRE ALARM - FLOOR 20 PLAN
A-600	DOOR SCHEDULES - FLOOR C2 TO FLOOR 08					SD/SP-121	FIRE STANDPIPE AND SPRINKLERS - FLOOR 21 PLAN			FA-123	FIRE ALARM - FLOOR 21 PLAN
A-601	DOOR SCHEDULES - FLOOR 09 TO FLOOR 15					SD/SP-122	FIRE STANDPIPE AND SPRINKLERS - FLOOR 22 PLAN			FA-124	FIRE ALARM - FLOOR 22 ROOF PLAN
A-602	DOOR SCHEDULES - FLOOR 16 TO FLOOR 24					SD/SP-123	FIRE STANDPIPE AND SPRINKLERS - ROOF PLAN			FA-125	FIRE ALARM - FLOOR 23 BULKHEAD PLAN
A-610	DOOR TYPES					SD/SP-300	FIRE STANDPIPE AND SPRINKLERS - RISER DIAGRAM			FA-200	FIRE ALARM - RISER DIAGRAM
A-611	SILL DETAILS					SD/SP-400	FIRE STANDPIPE AND SPRINKLERS - DETAILS				
A-610	SILL DETAILS					SD/SP-401	FIRE STANDPIPE AND SPRINKLERS - DETAILS				

NO. REVISIONS DATE

1	65% SUBMISSION SET	19 NOV. 14
2	PRELIMINARY DOB FILING	28 MAY. 14

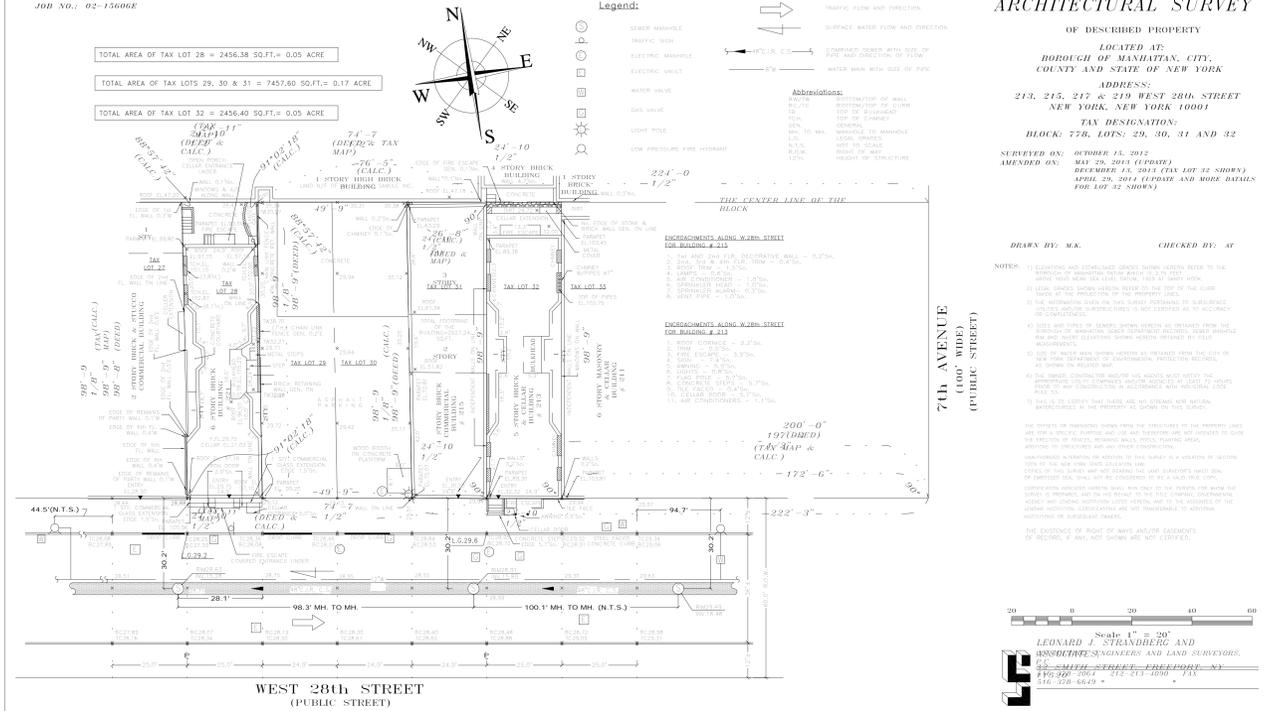
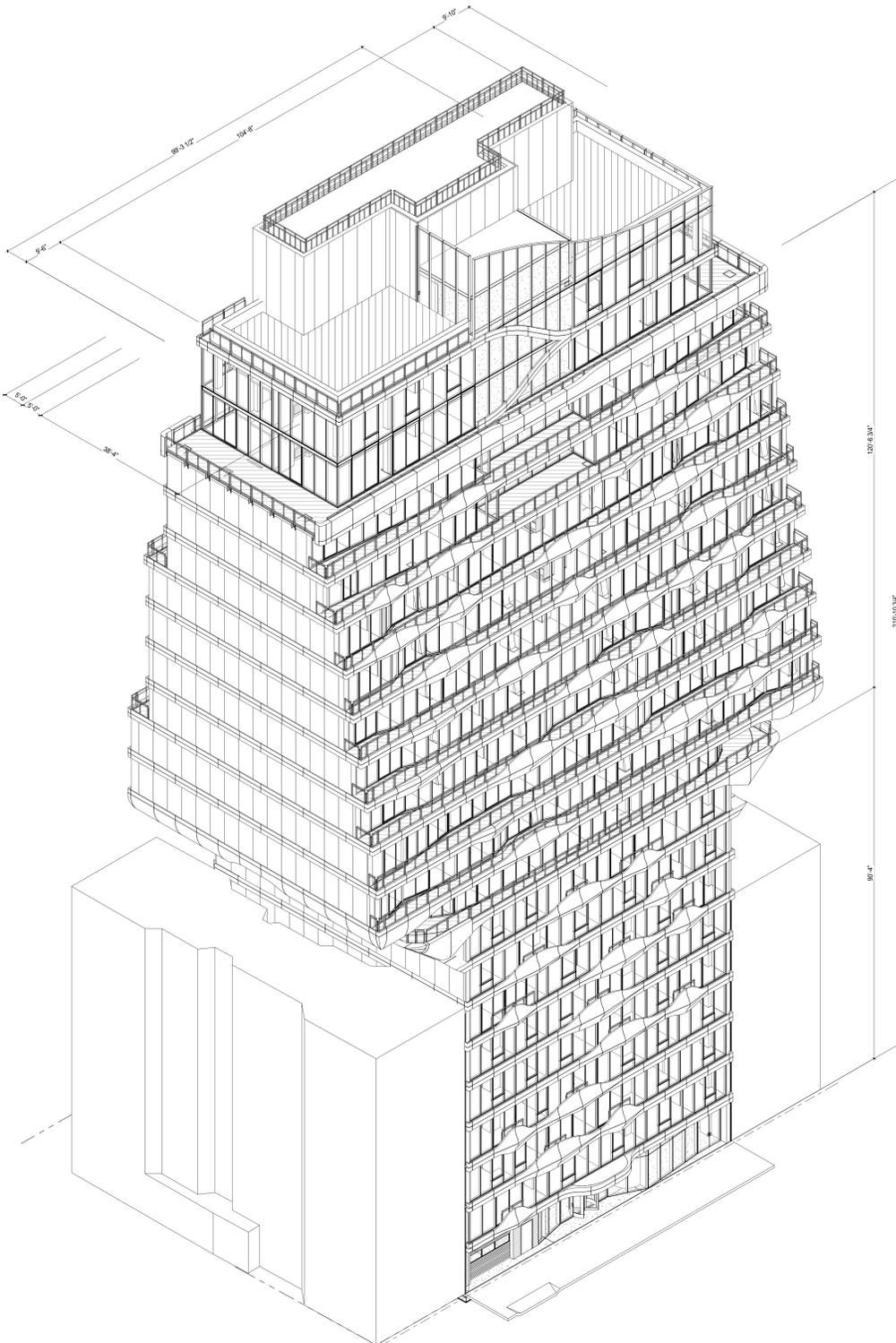
NO. SUBMISSIONS DATE

PROJECT  
**HAP 8**  
215-219 WEST 28TH STREET  
NEW YORK, NY 10001

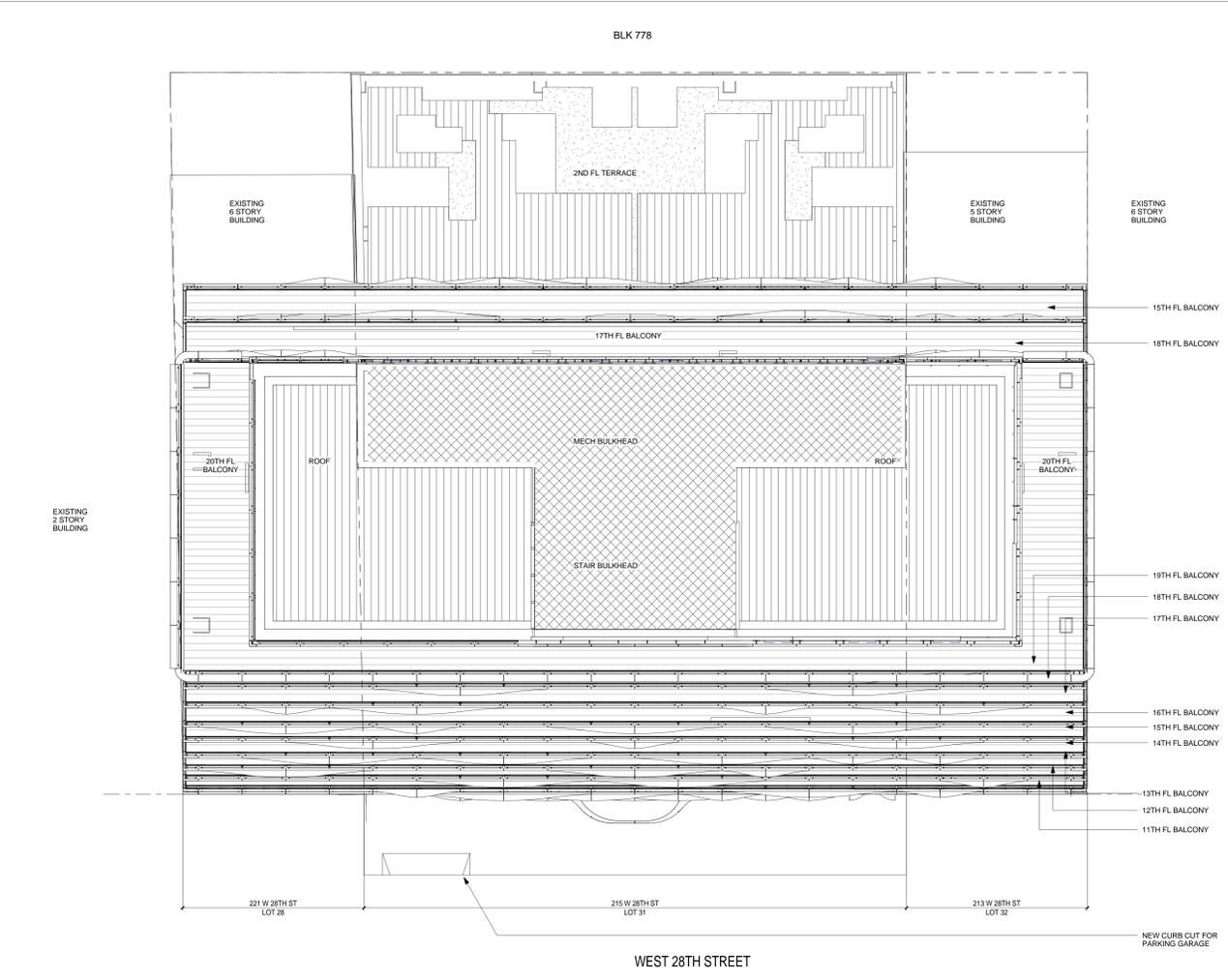
**TITLE SHEET**

DATE: 19 Nov 2014  
PROJECT No: 8000  
SCALE:  
DRAWING BY: Subir  
CHECKED BY: Chander  
DWG No: T-000.00  
NYC DOB Number:





3 SURVEY 1" = 20'-0"



2 ZONING SITE PLAN 1/8" = 1'-0"

CLIENT  
**HAP**  
 INVESTMENT DEVELOPERS  
 347 5th Avenue, Suite 906 - New York NY 10016

ARCHITECT / MEP ENGINEERING  
**WASA**  
 STUDIO  
 ARCHITECTURE / ENGINEERING / INTERIORS / PRESERVATION  
 740 Broadway, 4th Floor - New York, NY 10003

DESIGNER  
*Seaton*  
 428 West 54th Street - New York, NY 10019

STRUCTURAL ENGINEER  
**DESIMONE**  
 18 West 18th Street, 10th Floor - New York, NY 10011

KEY PLAN

WEST 28TH STREET  
 7TH AVENUE  
 WEST 28TH STREET

PROJECT NORTH

REFERENCE BAR  
 SEE DRAWINGS FOR  
 SCALE DESIGNATION

NO.	REVISIONS	DATE
2	65% SUBMISSION SET	19 NOV. 14
1	PRELIMINARY DOB FILING	28 MAY. 14
NO.	SUBMISSIONS	DATE

NOT FOR CONSTRUCTION

PROJECT  
**HAP 8**  
 213-219 WEST 28TH STREET  
 NEW YORK, NY 10001

ZONING SITE PLAN AND AXON

SCALE AND SIGNATURE

DATE: Issued Date  
 PROJECT NO.: 8000  
 SCALE: As Shown  
 DRAWING BY: Author  
 CHECKED BY: Checker  
 DWG No.:  
 NYC DOB Number: **Z-002.00**





















































































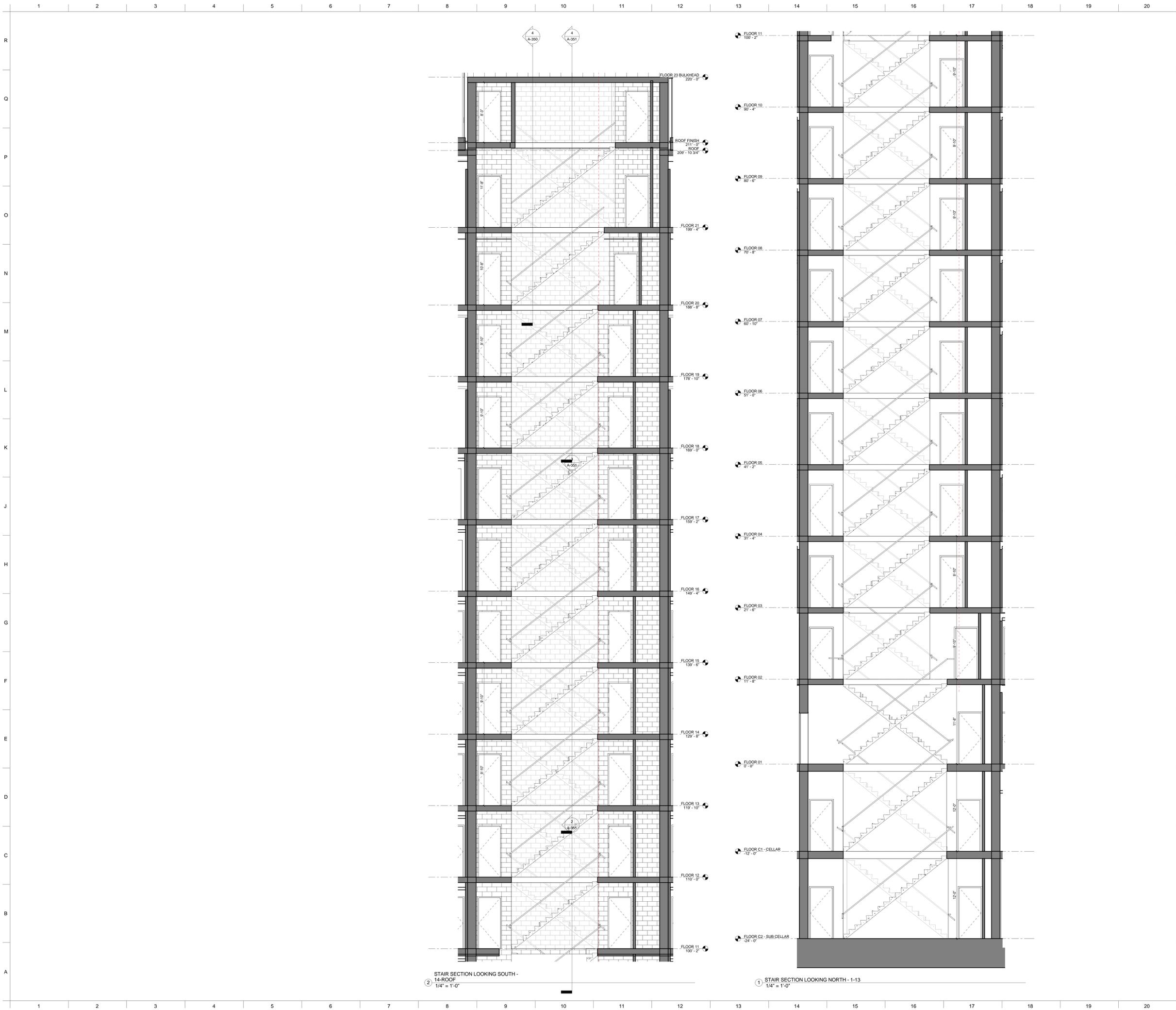












STAIR SECTION LOOKING SOUTH -  
 14-ROOF  
 ② 1/4" = 1'-0"

① STAIR SECTION LOOKING NORTH - 1-13  
 1/4" = 1'-0"

CLIENT  
**HAP**  
 INVESTMENT DEVELOPERS  
 347 8th Avenue, Suite 906 - New York, NY 10016

ARCHITECT / MEP ENGINEERING  
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KEY PLAN  
 WEST 28TH STREET  
 7TH AVENUE  
 WEST 28TH STREET

PROJECT NORTH  
 REFERENCE BAR  
 SEE DRAWINGS FOR  
 SCALE DESIGNATION

NO.	REVISIONS	DATE
2	65% SUBMISSION SET	19 NOV. 14
1	PRELIMINARY DOB FILING	28 MAY. 14

PROJECT  
**HAP 8**  
 213-219 WEST 28TH STREET  
 NEW YORK, NY 10001

STAIR SECTIONS

SCALE & SIGNATURE	DATE	ISSUED DATE
PROJECT No.	6400	
SCALE	1/4" = 1'-0"	
DRAWING BY	Author	
CHECKED BY	Checker	
DWG No.		
<b>A-403.00</b>		
DWG CODE Number		

























**DOOR SCHEDULE - FLOOR C2 TO FLOOR 08**

FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR C2 - SUB CELLAR						
FLOOR C2 - SUB CELLAR	C2-01	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-01B	3A	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-01C	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-02	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-03	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-04	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-05	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-07	2C	6'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-07A	65	4'-6"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-07B	3A	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-08	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-08A	1C	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR C2 - SUB CELLAR	C2-STB	3A	3'-0"	7'-0"	90 MIN	

FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR C1 - CELLAR						
FLOOR C1 - CELLAR	C1-01A	3A	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-01B	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-02	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-03	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-04	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-05	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-05A	2C	6'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-06	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-07	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-08	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-08A	1A	3'-0"	7'-0"	NR	
FLOOR C1 - CELLAR	C1-08B	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-09	1C	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-09A	1A	3'-0"	7'-0"	NR	
FLOOR C1 - CELLAR	C1-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR C1 - CELLAR	C1-STB	3A	3'-0"	7'-0"	90 MIN	

FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 01						
FLOOR 01	01-01	12	3'-5 1/2"	7'-10"	NR	
FLOOR 01	01-01	3A	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-01B	12	3'-5 9/16"	7'-10"	NR	
FLOOR 01	01-01C	1C	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-01D	3A	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-01E	3A	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-02A	1A	3'-0"	7'-0"	NR	
FLOOR 01	01-02B	1A	3'-0"	7'-0"	NR	
FLOOR 01	01-02C	1A	3'-0"	7'-0"	NR	
FLOOR 01	01-02D	3A	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-03	2C	6'-0"	7'-0"	90 MIN	
FLOOR 01	01-03A	3A	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-04	1C	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-06	3A	3'-0"	7'-0"	90 MIN	
FLOOR 01	01-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR 01	789	65	4'-6"	7'-0"	90 MIN	

FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 02						
FLOOR 02	02-02	3A	3'-0"	7'-0"	90 MIN	
FLOOR 02	02-03	5C	4'-0"	8'-0"	90 MIN	
FLOOR 02	02-04	4C	2'-6"	8'-0"	90 MIN	
FLOOR 02	02-05	5D	4'-6"	8'-0"	90 MIN	
FLOOR 02	02-STA	6	3'-0"	7'-0"	90 MIN	
FLOOR 02	02-STB	6	3'-0"	7'-0"	90 MIN	
FLOOR 02	02A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 02	02A-04	1A	3'-0"	7'-0"	NR	
FLOOR 02	02A-05	12	3'-0"	9'-2"	NR	
FLOOR 02	02A-06	8A	3'-0"	7'-0"	NR	
FLOOR 02	02A-06A	11D	7'-6"	7'-0"	NR	
FLOOR 02	02A-07	8B	3'-6"	7'-0"	90 MIN	
FLOOR 02	02A-07A	11C	6'-0"	7'-0"	NR	
FLOOR 02	02A-08	8B	3'-6"	7'-0"	NR	
FLOOR 02	02A-08A	10D	5'-0"	7'-0"	NR	
FLOOR 02	02A-08B	10D	5'-0"	7'-0"	NR	
FLOOR 02	02A-09	8B	3'-6"	7'-0"	NR	
FLOOR 02	02A-10A	10D	5'-0"	7'-0"	NR	
FLOOR 02	02A-11	7	3'-0"	7'-0"	90 MIN	
FLOOR 02	02A-11A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 02	02B-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 02	02B-02A	11C	7'-0"	7'-0"	NR	
FLOOR 02	02B-03	8B	3'-6"	7'-0"	NR	
FLOOR 02	02B-04	8B	3'-6"	7'-0"	NR	
FLOOR 02	02B-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 02	02B-04B	9C	3'-0"	7'-0"	90 MIN	
FLOOR 02	02B-04C	9C	3'-0"	7'-0"	90 MIN	
FLOOR 02	02B-05	8B	3'-6"	7'-0"	NR	
FLOOR 02	02B-05A	10B	4'-0"	7'-0"	NR	
FLOOR 02	02B-05B	10B	4'-0"	7'-0"	NR	
FLOOR 02	02B-06	1A	3'-0"	7'-0"	NR	
FLOOR 02	02B-06A	11D	7'-6"	7'-0"	NR	
FLOOR 02	02B-07	8B	3'-6"	7'-0"	NR	
FLOOR 02	02B-07A	10C	4'-6"	7'-0"	NR	
FLOOR 02	02B-07B	10C	4'-6"	7'-0"	NR	
FLOOR 02	02C-01	8A	3'-0"	7'-0"	90 MIN	
FLOOR 02	02C-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 02	02C-02A	11D	7'-6"	7'-0"	NR	
FLOOR 02	02C-03	8B	3'-6"	7'-0"	NR	
FLOOR 02	02C-04	10B	4'-0"	7'-0"	NR	
FLOOR 02	02C-04A	10B	4'-0"	7'-0"	NR	
FLOOR 02	02C-05	8B	3'-6"	7'-0"	NR	
FLOOR 02	02C-06	8B	3'-6"	7'-0"	NR	
FLOOR 02	02C-06A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 02	02C-06B	8B	3'-6"	7'-0"	NR	
FLOOR 02	02C-07	8B	3'-6"	7'-0"	NR	
FLOOR 02	02C-07A	11C	7'-0"	7'-0"	NR	

**DOOR SCHEDULE - FLOOR C2 TO FLOOR 08**

FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 03						
FLOOR 03	03-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 03	03-06	5E	5'-0"	8'-0"	90 MIN	
FLOOR 03	03-10	5E	5'-0"	8'-0"	90 MIN	
FLOOR 03	03-11	5D	4'-6"	8'-0"	90 MIN	
FLOOR 03	03-40	5C	4'-0"	8'-0"	90 MIN	
FLOOR 03	03-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR 03	03-STB	3A	3'-0"	7'-0"	90 MIN	
FLOOR 03	03A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03A-01A	9A	2'-6"	7'-0"	NR	
FLOOR 03	03A-02A	11C	7'-0"	7'-0"	NR	
FLOOR 03	03A-03	12	3'-0"	9'-1"	NR	
FLOOR 03	03B-01A	9B	2'-8"	7'-0"	NR	
FLOOR 03	03B-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 03	03B-03A	10B	4'-0"	7'-0"	NR	
FLOOR 03	03B-05	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03C-01	9B	2'-8"	7'-0"	NR	
FLOOR 03	03C-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 03	03C-03A	10B	4'-0"	7'-0"	NR	
FLOOR 03	03C-04	12	3'-0"	9'-1"	NR	
FLOOR 03	03C-05	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03D-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03D-01A	9A	2'-6"	7'-0"	NR	
FLOOR 03	03D-02A	11C	7'-0"	7'-0"	NR	
FLOOR 03	03D-03	12	3'-0"	9'-1"	NR	
FLOOR 03	03E-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03E-01A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 03	03E-02A	11C	6'-0"	7'-0"	NR	
FLOOR 03	03E-03	12	3'-0"	9'-1"	NR	
FLOOR 03	03F-02A	9B	2'-8"	7'-0"	NR	
FLOOR 03	03F-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 03	03F-03A	9D	3'-0"	7'-0"	NR	
FLOOR 03	03F-04	12	3'-0"	9'-1"	NR	
FLOOR 03	03F-05	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03G-02A	9B	2'-8"	7'-0"	NR	
FLOOR 03	03G-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 03	03G-03A	9D	3'-0"	7'-0"	NR	
FLOOR 03	03G-04	12	3'-0"	9'-1"	NR	
FLOOR 03	03G-05	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03H-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 03	03H-02A	11C	6'-0"	7'-0"	NR	
FLOOR 03	03H-02C	9C	3'-0"	7'-0"	90 MIN	
FLOOR 03	03H-03	12	3'-0"	9'-1"	NR	
FLOOR 03	788	11C	7'-0"	7'-0"	NR	
FLOOR 03	793	11C	7'-0"	7'-0"	NR	

FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 04						
FLOOR 04	04-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 04	04-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 04	04-05	4C	2'-6"	8'-0"	90 MIN	
FLOOR 04	04-06	5E	5'-0"	8'-0"	90 MIN	
FLOOR 04	04-08	5E	5'-0"	8'-0"	90 MIN	
FLOOR 04	04-STA	7	3'-0"	7'-0"	90 MIN	
FLOOR 04	04-STB	7	3'-0"	7'-0"	90 MIN	
FLOOR 04	04A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 04	04A-01A	9A	2'-6"	7'-0"	NR	
FLOOR 04	04A-02A	11C	7'-0"	7'-0"	NR	
FLOOR 04	04A-03	12	3'-0"	9'-1"	NR	
FLOOR 04	04B-01A	9B	2'-8"	7'-0"	NR	
FLOOR 04	04B-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 04	04B-03A	10B	4'-0"	7'-0"	NR	
FLOOR 04	04B-04	12	3'-0"	9'-1"	NR	
FLOOR 04	04B-05	6	3'-0"	7'-0"	90 MIN	
FLOOR 04	04C-02A	9B	2'-8"	7'-0"	NR	
FLOOR 04	04C-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 04	04C-03A	10B	4'-0"	7'-0"	NR	
FLOOR 04	04C-04	12	3'-0"	9'-1"	NR	
FLOOR 04	04C-05	6	3'-0"	7'-0"	90 MIN	
FLOOR 04	04D-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 04	04D-01A	9A	2'-6"	7'-0"	NR	
FLOOR 04	04D-02A	11C	7'-0"	7'-0"	NR	
FLOOR 04	04D-03	12	3'-0"	9'-1"	NR	
FLOOR 04	04E-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 04	04E-02A	11D	7'-6"	7'-0"	NR	
FLOOR 04	04E-03	8B	3'-6"	7'-0"	NR	
FLOOR 04	04E-04	8B	3'-6"	7'-0"	NR	
FLOOR 04	04E-05	8B	3'-6"	7'-0"	NR	
FLOOR 04	04E-05A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 04	04E-05B	8B	3'-6"	7'-0"	NR	
FLOOR 04	04E-06	8B	3'-6"	7'-0"	NR	
FLOOR 04	04E-06A	11D	7'-6"	7'-0"	NR	
FLOOR 04	04E-07	10A	3'-6"	7'-0"	NR	
FLOOR 04	04F-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 04	04F-02A	11D	7'-6"	7'-0"	NR	
FLOOR 04	04F-03	8B	3'-6"	7'-0"	NR	
FLOOR 04	04F-03A	11D	7'-6"	7'-0"	NR	
FLOOR 04	04F-04	8B	3'-6"	7'-0"	NR	
FLOOR 04	04F-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 04	04F-04B	8B	3'-6"	7'-0"	NR	
FLOOR 04	04F-05	8B	3'-6"	7'-0"	NR	
FLOOR 04	04F-05	10A	3'-6"	7'-0"	NR	
FLOOR 04	04F-06	8B	3'-6"	7'-0"	NR	
FLOOR 04	10-STB	3A	3'-0"	7'-0"	90 MIN	

FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 05						
FLOOR 05	05-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 05	05-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 05	05-05	4C	2'-6"	8'-0"	90 MIN	
FLOOR 05	05					

DOOR SCHEDULE - FLOOR 09 TO FLOOR 15						
FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 09	09-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 09	09-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 09	09-05	5E	5'-0"	8'-0"	90 MIN	
FLOOR 09	09-10	5E	5'-0"	8'-0"	90 MIN	
FLOOR 09	09-11	5D	4'-6"	8'-0"	90 MIN	
FLOOR 09	09-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR 09	09-STB	3A	3'-0"	7'-0"	90 MIN	
FLOOR 09	09A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 09	09A-01A	9A	2'-6"	7'-0"	NR	
FLOOR 09	09A-02B	11C	7'-0"	7'-0"	NR	
FLOOR 09	09A-03	12	3'-0"	9'-11"	NR	
FLOOR 09	09B-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 09	09B-02	12	3'-0"	9'-11"	NR	
FLOOR 09	09B-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 09	09B-03A	10B	4'-0"	7'-0"	NR	
FLOOR 09	09B-05	9C	3'-0"	7'-0"	90 MIN	
FLOOR 09	09B-06	8B	3'-6"	7'-0"	NR	
FLOOR 09	09B-06A	11C	6'-0"	7'-0"	NR	
FLOOR 09	09C-07A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 09	09D-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 09	09D-02	8A	3'-0"	7'-0"	NR	
FLOOR 09	09D-02A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 09	09D-05	8B	3'-6"	7'-0"	NR	
FLOOR 09	09D-05A	10C	4'-6"	7'-0"	NR	
FLOOR 09	09D-05B	10C	4'-6"	7'-0"	NR	
FLOOR 09	09D-06	7	3'-0"	7'-0"	90 MIN	
FLOOR 09	09E-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 09	09E-02A	10C	4'-6"	7'-0"	NR	
FLOOR 09	09E-03	8B	3'-6"	7'-0"	NR	
FLOOR 09	09E-03A	10D	5'-0"	7'-0"	NR	
FLOOR 09	09E-03B	10D	5'-0"	7'-0"	NR	
FLOOR 09	09E-04	7	3'-0"	7'-0"	90 MIN	
FLOOR 09	09E-05	7	3'-0"	7'-0"	90 MIN	
FLOOR 09	09E-05A	11C	6'-0"	7'-0"	NR	
FLOOR 09	09E-06	8B	3'-6"	7'-0"	NR	
FLOOR 09	09E-06A	10C	4'-6"	7'-0"	NR	
FLOOR 09	09E-06B	10C	4'-6"	7'-0"	NR	
FLOOR 09	09E-07	8B	3'-6"	7'-0"	NR	
FLOOR 09	09E-07A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 09	09E-07B	9D	3'-0"	7'-0"	NR	
FLOOR 09	09E-08	8B	3'-6"	7'-0"	NR	

DOOR SCHEDULE - FLOOR 09 TO FLOOR 15						
FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 11	11-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 11	11-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 11	11-05	5E	5'-0"	8'-0"	90 MIN	
FLOOR 11	11-05A	5E	5'-0"	8'-0"	90 MIN	
FLOOR 11	11-12	4C	2'-6"	8'-0"	90 MIN	
FLOOR 11	11-07A	5D	4'-6"	8'-0"	90 MIN	
FLOOR 11	11-07B	5D	4'-6"	8'-0"	90 MIN	
FLOOR 11	11-10	5D	4'-6"	8'-0"	90 MIN	
FLOOR 11	11-11	5D	4'-6"	8'-0"	90 MIN	
FLOOR 11	11A-02A	8B	3'-6"	7'-0"	NR	
FLOOR 11	11-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR 11	11-STB	3A	3'-0"	7'-0"	90 MIN	
FLOOR 11	11A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11A-03	12	3'-0"	9'-11"	NR	
FLOOR 11	11A-04	8B	3'-6"	7'-0"	NR	
FLOOR 11	11A-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11A-05	8B	3'-6"	7'-0"	NR	
FLOOR 11	11A-05A	11C	6'-0"	7'-0"	NR	
FLOOR 11	11A-06	8B	3'-6"	7'-0"	NR	
FLOOR 11	11A-07	8B	3'-6"	7'-0"	NR	
FLOOR 11	11A-09	7	3'-0"	7'-0"	90 MIN	
FLOOR 11	11B-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11B-02A	11D	7'-6"	7'-0"	NR	
FLOOR 11	11B-02B	9B	2'-8"	7'-0"	NR	
FLOOR 11	11B-03	8B	3'-6"	7'-0"	NR	
FLOOR 11	11B-03A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11B-04	8A	3'-0"	7'-0"	NR	
FLOOR 11	11B-04A	11C	6'-0"	7'-0"	NR	
FLOOR 11	11B-04B	8A	3'-0"	7'-0"	NR	
FLOOR 11	11C-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11C-02A	9B	2'-8"	7'-0"	NR	
FLOOR 11	11C-02B	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11C-03	12	3'-0"	9'-11"	NR	
FLOOR 11	11D-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11D-03	8B	3'-6"	7'-0"	NR	
FLOOR 11	11D-04	8B	3'-6"	7'-0"	NR	
FLOOR 11	11D-05	7	3'-0"	7'-0"	90 MIN	
FLOOR 11	11D-05	8B	3'-6"	7'-0"	NR	
FLOOR 11	11D-05A	11C	6'-0"	7'-0"	NR	
FLOOR 11	11D-06	8B	3'-6"	7'-0"	NR	
FLOOR 11	11D-06A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11D-07	12	3'-0"	9'-11"	NR	
FLOOR 11	11E-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11E-03	8B	3'-6"	7'-0"	NR	
FLOOR 11	11E-04	8B	3'-6"	7'-0"	NR	
FLOOR 11	11E-05	7	3'-0"	7'-0"	90 MIN	
FLOOR 11	11E-05	12	3'-0"	9'-11"	NR	
FLOOR 11	11E-06	8B	3'-6"	7'-0"	NR	
FLOOR 11	11E-06A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11E-07	8B	3'-6"	7'-0"	NR	
FLOOR 11	11E-07A	11C	6'-0"	7'-0"	NR	
FLOOR 11	11F-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11F-02A	9B	2'-8"	7'-0"	NR	
FLOOR 11	11F-03	8A	3'-0"	7'-0"	NR	
FLOOR 11	11F-03	8B	3'-6"	7'-0"	NR	
FLOOR 11	11F-03A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11F-04	8A	3'-0"	7'-0"	NR	
FLOOR 11	11F-04A	10D	5'-0"	7'-0"	NR	
FLOOR 11	11G-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11G-02A	9B	2'-8"	7'-0"	NR	
FLOOR 11	11G-03	8A	3'-0"	7'-0"	NR	
FLOOR 11	11G-03A	10D	5'-0"	7'-0"	NR	
FLOOR 11	11G-04	8A	3'-0"	7'-0"	NR	
FLOOR 11	11G-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11G-04C	8A	3'-0"	7'-0"	NR	
FLOOR 11	11H-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 11	11H-03	8B	3'-6"	7'-0"	NR	
FLOOR 11	11H-03A	11C	6'-0"	7'-0"	NR	
FLOOR 11	11H-04	12	3'-0"	9'-11"	NR	
FLOOR 11	11H-05	8B	3'-6"	7'-0"	NR	
FLOOR 11	11H-05A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 11	11H-06	8B	3'-6"	7'-0"	NR	
FLOOR 11	11H-07	8B	3'-6"	7'-0"	NR	
FLOOR 11	11H-08	7	3'-0"	7'-0"	90 MIN	

DOOR SCHEDULE - FLOOR 09 TO FLOOR 15						
FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 12	12-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 12	12-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 12	12-05	5E	5'-0"	8'-0"	90 MIN	
FLOOR 12	12-07	5E	5'-0"	8'-0"	90 MIN	
FLOOR 12	12-11	5D	4'-6"	8'-0"	90 MIN	
FLOOR 12	12-13	5D	4'-6"	8'-0"	90 MIN	
FLOOR 12	12-STA	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12-STB	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12A-03	12	3'-0"	9'-11"	NR	
FLOOR 12	12A-04	8B	3'-6"	7'-0"	NR	
FLOOR 12	12A-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12A-05	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12A-05	8B	3'-6"	7'-0"	NR	
FLOOR 12	12A-05A	11C	6'-0"	7'-0"	NR	
FLOOR 12	12A-06	8B	3'-6"	7'-0"	NR	
FLOOR 12	12A-07	8B	3'-6"	7'-0"	NR	
FLOOR 12	12B-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12B-03	8A	3'-0"	7'-0"	NR	
FLOOR 12	12B-03A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12B-04	8A	3'-0"	7'-0"	NR	
FLOOR 12	12B-04A	8B	3'-6"	7'-0"	NR	
FLOOR 12	12C-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12C-03	8A	3'-0"	7'-0"	NR	
FLOOR 12	12C-03A	8B	3'-6"	7'-0"	NR	
FLOOR 12	12C-04	8A	3'-0"	7'-0"	NR	
FLOOR 12	12C-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12D-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12D-03	8B	3'-6"	7'-0"	NR	
FLOOR 12	12D-04	8B	3'-6"	7'-0"	NR	
FLOOR 12	12D-04A	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12D-05	8B	3'-6"	7'-0"	NR	
FLOOR 12	12D-05A	11C	6'-0"	7'-0"	NR	
FLOOR 12	12D-05B	8B	3'-6"	7'-0"	NR	
FLOOR 12	12D-06A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12D-07	12	3'-0"	9'-11"	NR	
FLOOR 12	12E-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12E-01A	9A	2'-6"	7'-0"	NR	
FLOOR 12	12E-03	8B	3'-6"	7'-0"	NR	
FLOOR 12	12E-03A	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12E-04	8B	3'-6"	7'-0"	NR	
FLOOR 12	12E-05	12	3'-0"	9'-11"	NR	
FLOOR 12	12E-06	8B	3'-6"	7'-0"	NR	
FLOOR 12	12E-06A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12E-07	8B	3'-6"	7'-0"	NR	
FLOOR 12	12E-07A	11C	6'-0"	7'-0"	NR	
FLOOR 12	12F-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12F-02B	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12F-02C	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12F-03	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12F-04	8A	3'-0"	7'-0"	NR	
FLOOR 12	12F-04A	10C	4'-6"	7'-0"	NR	
FLOOR 12	12F-04B	8B	3'-6"	7'-0"	NR	
FLOOR 12	12G-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12G-02A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12G-03	8A	3'-0"	7'-0"	NR	
FLOOR 12	12G-03A	10C	4'-6"	7'-0"	NR	
FLOOR 12	12G-03B	8B	3'-6"	7'-0"	NR	
FLOOR 12	12G-04	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12G-04	7	3'-0"	7'-0"	90 MIN	
FLOOR 12	12G-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12G-04A	11C	6'-0"	7'-0"	NR	
FLOOR 12	12H-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 12	12H-01A	9A	2'-6"	7'-0"	NR	
FLOOR 12	12H-03	8B	3'-6"	7'-0"	NR	
FLOOR 12	12H-03A	11C	6'-0"	7'-0"	NR	
FLOOR 12	12H-04	8B	3'-6"	7'-0"	NR	
FLOOR 12	12H-04A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 12	12H-05	12	3'-0"	9'-11"	NR	
FLOOR 12	12H-06	8B	3'-6"	7'-0"	NR	
FLOOR 12	12H-10	7	3'-0"	7'-0"	90 MIN	

DOOR SCHEDULE - FLOOR 09 TO FLOOR 15						
FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 13	13-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 13	13-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 13	13-05	5E	5'-0"	8'-0"	90 MIN	
FLOOR 13	13-09	5D	4'-6"	8'-0"	90 MIN	
FLOOR 13	13-10	4C	2'-6"	8'-0"	90 MIN	
FLOOR 13	13-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR 13	13-STB	3A	3'-0"	7'-0"	90 MIN	
FLOOR 13	13A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 13	13A-01A	10C	4'-6"	7'-0"	NR	
FLOOR 13	13A-01B	11D	7'-6"	7'-0"	NR	
FLOOR 13	13A-01C	11D	7'-6"	7'-0"	NR	
FLOOR 13	13A-04	8B	3'-6"	7'-0"	NR	
FLOOR 13	13A-05	8B	3'-6"	7'-0"	NR	
FLOOR 13	13A-06	8B	3'-6"			

DOOR SCHEDULE - FLOOR 16 TO FLOOR 24						
FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 16	16-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 16	16-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 16	16-06	5C	4'-0"	8'-0"	90 MIN	
FLOOR 16	16-09	5C	4'-0"	8'-0"	90 MIN	
FLOOR 16	16-STA	7	3'-0"	7'-0"	90 MIN	
FLOOR 16	16-STB	7	3'-0"	7'-0"	90 MIN	
FLOOR 16	16A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 16	16A-02A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 16	16A-03	8A	3'-0"	7'-0"	NR	
FLOOR 16	16A-03A	10C	4'-6"	7'-0"	NR	
FLOOR 16	16A-03B	10C	4'-6"	7'-0"	NR	
FLOOR 16	16A-03C	10C	4'-6"	7'-0"	NR	
FLOOR 16	16A-04	8A	3'-0"	7'-0"	NR	
FLOOR 16	16A-05	8B	3'-6"	7'-0"	NR	
FLOOR 16	16A-05A	10D	5'-0"	7'-0"	NR	
FLOOR 16	16A-05B	10D	5'-0"	7'-0"	NR	
FLOOR 16	16A-06	12	3'-0"	9'-1"	NR	
FLOOR 16	16B-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 16	16B-01A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 16	16B-03	12	3'-0"	9'-1"	NR	
FLOOR 16	16B-04	8B	3'-6"	7'-0"	NR	
FLOOR 16	16B-04A	10D	5'-0"	7'-0"	NR	
FLOOR 16	16B-04B	10D	5'-0"	7'-0"	NR	
FLOOR 16	16B-05	8A	3'-0"	7'-0"	NR	
FLOOR 16	16B-05A	10C	4'-6"	7'-0"	NR	
FLOOR 16	16B-05B	10C	4'-6"	7'-0"	NR	
FLOOR 16	16B-06	8A	3'-0"	7'-0"	NR	
FLOOR 16	16B-07	10C	4'-6"	7'-0"	NR	
FLOOR 16	16C-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 16	16C-02A	11D	7'-6"	7'-0"	NR	
FLOOR 16	16C-03	8B	3'-6"	7'-0"	NR	
FLOOR 16	16C-03A	7	3'-0"	7'-0"	90 MIN	
FLOOR 16	16C-04	8C	4'-0"	7'-0"	NR	
FLOOR 16	16C-05	12	3'-0"	9'-1"	NR	
FLOOR 16	16C-07	7	3'-0"	7'-0"	90 MIN	
FLOOR 16	16C-08	8A	3'-0"	7'-0"	NR	
FLOOR 16	16C-08A	9A	2'-6"	7'-0"	NR	
FLOOR 16	16C-09	8B	3'-6"	7'-0"	NR	
FLOOR 16	16C-09A	9D	3'-0"	7'-0"	NR	
FLOOR 16	16C-14	9C	3'-0"	7'-0"	90 MIN	
FLOOR 16	16D-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 16	16D-01A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 16	16D-02A	11D	7'-6"	7'-0"	NR	
FLOOR 16	16D-03	8B	3'-6"	7'-0"	NR	
FLOOR 16	16D-03A	9D	3'-0"	7'-0"	NR	
FLOOR 16	16D-04	8A	3'-0"	7'-0"	NR	
FLOOR 16	16D-04A	9A	2'-6"	7'-0"	NR	
FLOOR 16	16D-05	7	3'-0"	7'-0"	90 MIN	
FLOOR 16	16D-06	12	3'-0"	9'-1"	NR	
FLOOR 16	16D-08	8C	4'-0"	7'-0"	NR	
FLOOR 16	16D-09	8B	3'-6"	7'-0"	NR	
FLOOR 16	16D-09A	7	3'-0"	7'-0"	90 MIN	

FLOOR 17	17-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 17	17-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 17	17-06	5C	4'-0"	8'-0"	90 MIN	
FLOOR 17	17-08	5D	4'-6"	8'-0"	90 MIN	
FLOOR 17	17-09	4C	2'-6"	8'-0"	90 MIN	
FLOOR 17	17-10	5D	4'-6"	8'-0"	90 MIN	
FLOOR 17	17-STA	3A	3'-0"	7'-0"	90 MIN	
FLOOR 17	17-STB	3A	3'-0"	7'-0"	90 MIN	
FLOOR 17	17A-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 17	17A-01A	10B	4'-0"	7'-0"	NR	
FLOOR 17	17A-03	8B	3'-6"	7'-0"	NR	
FLOOR 17	17A-03A	10C	4'-6"	7'-0"	NR	
FLOOR 17	17A-03B	10C	4'-6"	7'-0"	NR	
FLOOR 17	17A-04	8A	3'-0"	7'-0"	NR	
FLOOR 17	17A-05	8B	3'-6"	7'-0"	NR	
FLOOR 17	17A-05A	10D	5'-0"	7'-0"	NR	
FLOOR 17	17A-05B	10D	5'-0"	7'-0"	NR	
FLOOR 17	17A-06	8A	3'-0"	7'-0"	NR	
FLOOR 17	17A-06A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 17	17B-01	6	3'-0"	7'-0"	90 MIN	
FLOOR 17	17B-01A	10B	4'-0"	7'-0"	NR	
FLOOR 17	17B-03	8A	3'-0"	7'-0"	NR	
FLOOR 17	17B-03A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 17	17B-04	8B	3'-6"	7'-0"	NR	
FLOOR 17	17B-04A	10D	5'-0"	7'-0"	NR	
FLOOR 17	17B-04B	10D	5'-0"	7'-0"	NR	
FLOOR 17	17B-05	8B	3'-6"	7'-0"	NR	
FLOOR 17	17B-05A	10D	5'-0"	7'-0"	NR	
FLOOR 17	17B-05B	10D	5'-0"	7'-0"	NR	
FLOOR 17	17B-06	8A	3'-0"	7'-0"	NR	
FLOOR 17	17C-02	6	3'-0"	7'-0"	90 MIN	
FLOOR 17	17C-02A	9D	3'-0"	7'-0"	NR	
FLOOR 17	17C-03	8B	3'-6"	7'-0"	NR	
FLOOR 17	17C-03A	11C	6'-0"	7'-0"	NR	
FLOOR 17	17C-04	8A	3'-0"	7'-0"	NR	
FLOOR 17	17C-04A	10D	5'-0"	7'-0"	NR	
FLOOR 17	17C-05	12	3'-0"	9'-1"	NR	
FLOOR 17	17C-06A	11C	7'-0"	7'-0"	NR	
FLOOR 17	17C-06B	11C	7'-0"	7'-0"	NR	
FLOOR 17	17C-06C	11C	7'-0"	7'-0"	NR	
FLOOR 17	17C-06D	9C	3'-0"	7'-0"	90 MIN	
FLOOR 17	17C-07	8B	3'-6"	7'-0"	NR	
FLOOR 17	17C-07A	7	3'-0"	7'-0"	90 MIN	
FLOOR 17	17C-08	8B	3'-6"	7'-0"	NR	
FLOOR 17	17D-02	6	3'-0"	7'-0"	90 MIN	
FLOOR 17	17D-03	8B	3'-6"	7'-0"	NR	
FLOOR 17	17D-03A	7	3'-0"	7'-0"	90 MIN	
FLOOR 17	17D-04	8B	3'-6"	7'-0"	NR	
FLOOR 17	17D-04A	11C	7'-0"	7'-0"	NR	
FLOOR 17	17D-04B	11C	7'-0"	7'-0"	NR	
FLOOR 17	17D-04C	11C	7'-0"	7'-0"	NR	
FLOOR 17	17D-04D	9C	3'-0"	7'-0"	90 MIN	
FLOOR 17	17D-05	12	3'-0"	9'-1"	NR	
FLOOR 17	17D-06	8A	3'-0"	7'-0"	NR	
FLOOR 17	17D-06A	10B	4'-0"	7'-0"	NR	
FLOOR 17	17D-07	8B	3'-6"	7'-0"	NR	
FLOOR 17	17D-07A	11C	6'-0"	7'-0"	NR	

DOOR SCHEDULE - FLOOR 16 TO FLOOR 24						
FLOOR LEVEL	DOOR NUMBER	DOOR TYPE	WIDTH	HEIGHT	FIRE RATING	COMMENTS
FLOOR 18	18-11	12	2'-8"	9'-1"	NR	
FLOOR 18	18-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 18	18-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 18	18-05	5C	4'-0"	8'-0"	90 MIN	
FLOOR 18	18-07	5D	4'-6"	8'-0"	90 MIN	
FLOOR 18	18-08	5D	4'-6"	8'-0"	90 MIN	
FLOOR 18	18-09	4C	2'-6"	8'-0"	90 MIN	
FLOOR 18	18-STA	7	3'-0"	7'-0"	90 MIN	
FLOOR 18	18-STB	7	3'-0"	7'-0"	90 MIN	
FLOOR 18	18A-02	7	3'-0"	7'-0"	90 MIN	
FLOOR 18	18A-02A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 18	18A-02B	9C	3'-0"	7'-0"	90 MIN	
FLOOR 18	18A-03	8C	4'-0"	7'-0"	NR	
FLOOR 18	18A-04	8C	4'-0"	7'-0"	NR	
FLOOR 18	18A-05	8A	3'-0"	7'-0"	NR	
FLOOR 18	18A-06	8B	3'-6"	7'-0"	NR	
FLOOR 18	18A-06A	7	3'-0"	7'-0"	90 MIN	
FLOOR 18	18A-07	8B	3'-6"	7'-0"	NR	
FLOOR 18	18A-07A	10D	5'-0"	7'-0"	NR	
FLOOR 18	18A-07B	12	2'-8"	9'-1"	NR	
FLOOR 18	18A-08	8C	4'-0"	7'-0"	NR	
FLOOR 18	18A-08A	10A	3'-6"	7'-0"	NR	
FLOOR 18	18A-09	12	3'-0"	9'-1"	NR	
FLOOR 18	18A-10	12	3'-0"	9'-1"	NR	
FLOOR 18	18A-11	8B	3'-6"	7'-0"	NR	
FLOOR 18	18A-11A	10C	4'-6"	7'-0"	NR	
FLOOR 18	18A-11B	9C	3'-0"	7'-0"	90 MIN	
FLOOR 18	18A-13	12	2'-6"	9'-0"	NR	
FLOOR 18	18B-02	7	3'-0"	7'-0"	90 MIN	
FLOOR 18	18B-02A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 18	18B-02B	9C	3'-0"	7'-0"	90 MIN	
FLOOR 18	18B-03	8B	3'-6"	7'-0"	NR	
FLOOR 18	18B-04	8B	3'-6"	7'-0"	NR	
FLOOR 18	18B-04A	7	3'-0"	7'-0"	90 MIN	
FLOOR 18	18B-04B	10D	5'-0"	7'-0"	NR	
FLOOR 18	18B-05	8A	3'-0"	7'-0"	NR	
FLOOR 18	18B-06	8C	4'-0"	7'-0"	NR	
FLOOR 18	18B-07	8C	4'-0"	7'-0"	NR	
FLOOR 18	18B-08	12	2'-6"	9'-0"	NR	
FLOOR 18	18B-09	8B	3'-6"	7'-0"	NR	
FLOOR 18	18B-10	12	3'-0"	9'-1"	NR	
FLOOR 18	18B-10A	10C	4'-6"	7'-0"	NR	
FLOOR 18	18B-11	12	3'-0"	9'-1"	NR	
FLOOR 18	18B-12	8C	4'-0"	7'-0"	NR	
FLOOR 18	18B-12A	10A	3'-6"	7'-0"	NR	

FLOOR 19	19-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 19	19-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 19	19-05	5C	4'-0"	8'-0"	90 MIN	
FLOOR 19	19-07	5C	4'-0"	8'-0"	90 MIN	
FLOOR 19	19-STA	7	3'-0"	7'-0"	90 MIN	
FLOOR 19	19-STB	7	3'-0"	7'-0"	90 MIN	
FLOOR 19	19A-02	7	3'-0"	7'-0"	90 MIN	
FLOOR 19	19A-02A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 19	19A-02B	10B	4'-0"	7'-0"	NR	
FLOOR 19	19A-03	8C	4'-0"	7'-0"	NR	
FLOOR 19	19A-04	8C	4'-0"	7'-0"	NR	
FLOOR 19	19A-05	8A	3'-0"	7'-0"	NR	
FLOOR 19	19A-06	8A	3'-0"	7'-0"	NR	
FLOOR 19	19A-06A	7	3'-0"	7'-0"	90 MIN	
FLOOR 19	19A-07	8B	3'-6"	7'-0"	NR	
FLOOR 19	19A-07A	10D	5'-0"	7'-0"	NR	
FLOOR 19	19A-07B	12	2'-8"	9'-1"	NR	
FLOOR 19	19A-08	8C	4'-0"	7'-0"	NR	
FLOOR 19	19A-08A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 19	19A-09	12	3'-0"	9'-1"	NR	
FLOOR 19	19A-10	12	3'-0"	9'-1"	NR	
FLOOR 19	19A-11	8B	3'-6"	7'-0"	NR	
FLOOR 19	19A-11A	10C	4'-6"	7'-0"	NR	
FLOOR 19	19A-16	12	2'-6"	9'-0"	NR	
FLOOR 19	19B-01A	9C	3'-0"	7'-0"	90 MIN	
FLOOR 19	19B-01B	9C	3'-0"	7'-0"	90 MIN	
FLOOR 19	19B-02	7	3'-0"	7'-0"	90 MIN	
FLOOR 19	19B-02B	10B	4'-0"	7'-0"	NR	
FLOOR 19	19B-03	8B	3'-6"	7'-0"	NR	
FLOOR 19	19B-03A	10D	5'-0"	7'-0"	NR	
FLOOR 19	19B-04	8A	3'-0"	7'-0"	NR	
FLOOR 19	19B-04A	7	3'-0"	7'-0"	90 MIN	
FLOOR 19	19B-05	8A	3'-0"	7'-0"	NR	
FLOOR 19	19B-06	8C	4'-0"	7'-0"	NR	
FLOOR 19	19B-07	8C	4'-0"	7'-0"	NR	
FLOOR 19	19B-08	12	2'-6"	9'-0"	NR	
FLOOR 19	19B-09	8B	3'-6"	7'-0"	NR	
FLOOR 19	19B-09A	10C	4'-6"	7'-0"	NR	
FLOOR 19	19B-10	12	3'-0"	9'-1"	NR	
FLOOR 19	19B-11	12	3'-0"	9'-1"	NR	
FLOOR 19	19B-12	8C	4'-0"	7'-0"	NR	
FLOOR 19	19B-12A	9C	3'-0"	7'-0"	90 MIN	

FLOOR 20	20-03	3A	3'-0"	7'-0"	90 MIN	
FLOOR 20	20-04	10D	5'-0"	7'-0"	NR	
FLOOR 20	20-04	5C	4'-0"	8'-0"	90 MIN	
FLOOR 20	20-05	5C	4'-0"	8'-0"	90 MIN	
FLOOR 20	20-07	5D	4'-6"	8'-0"	90 MIN	
FLOOR 20	20					























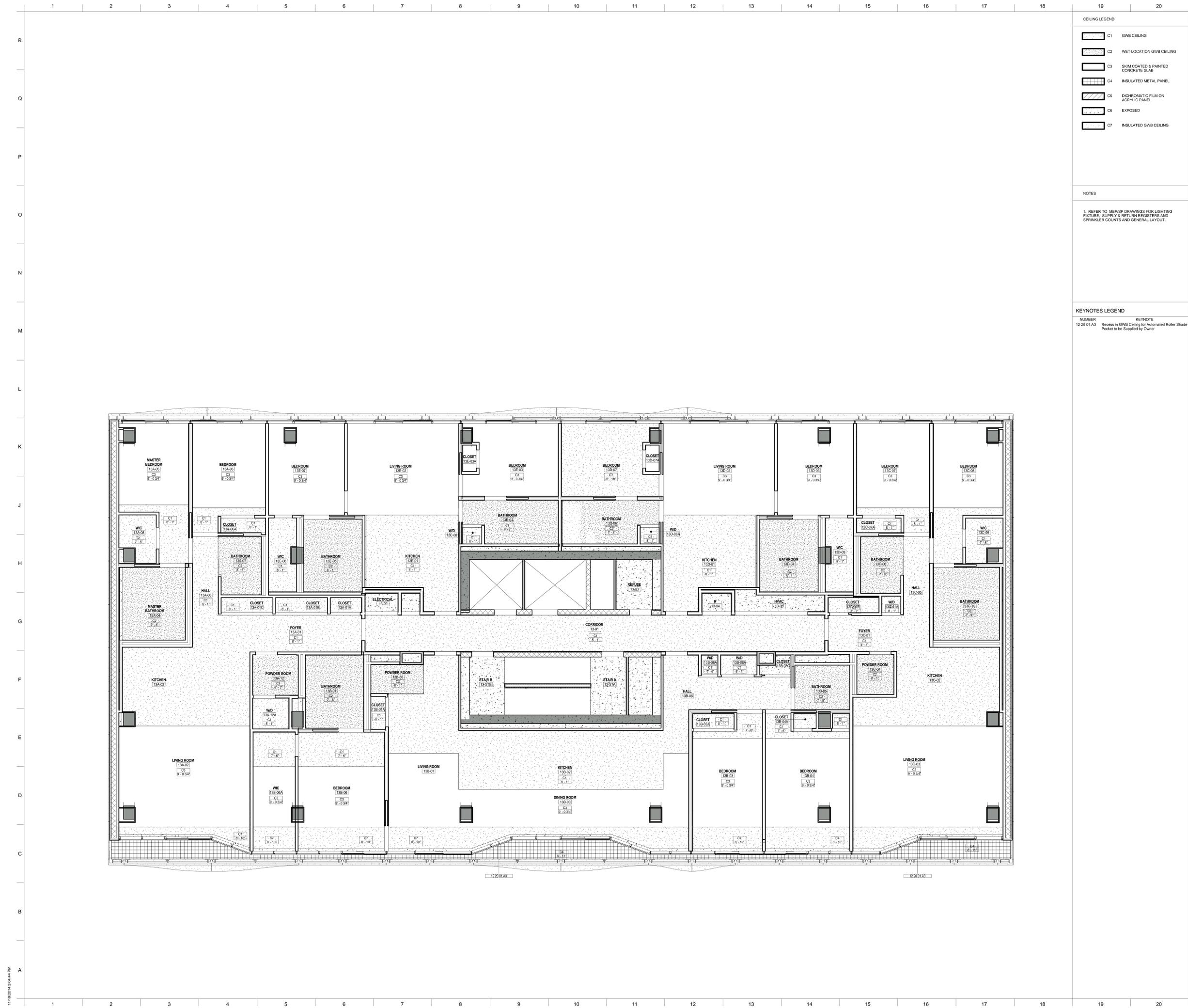












**CEILING LEGEND**

[Hatching Pattern]	C1	GWB CEILING
[Hatching Pattern]	C2	WET LOCATION GWB CEILING
[Hatching Pattern]	C3	SWIM COATED & PAINTED CONCRETE SLAB
[Hatching Pattern]	C4	INSULATED METAL PANEL
[Hatching Pattern]	C5	DICHROMATIC FILM ON ACRYLIC PANEL
[Hatching Pattern]	C6	EXPOSED
[Hatching Pattern]	C7	INSULATED GWB CEILING

**NOTES**

1: REFER TO MEP/SP DRAWINGS FOR LIGHTING FIXTURE, SUPPLY & RETURN REGISTERS AND SPRINKLER COUNTS AND GENERAL LAYOUT.

**KEYNOTES LEGEND**

NUMBER	KEYNOTE
12 20 01 A3	Recess in GWB Ceiling for Automated Roller Shade Pocket to be Supplied by Owner



**CLIENT**  
**HAP**  
 INVESTMENT DEVELOPERS  
 347 5th Avenue, Suite 905 - New York NY 10016

**ARCHITECT / MEP ENGINEERING**  
**WASA**  
 STUDIO  
 ARCHITECTURE / ENGINEERING / INTERIORS / PRESERVATION  
 740 Broadway, 4th Floor - New York, NY 10003

**DESIGNER**  
  
 428 West 54th Street - New York, NY 10019

**STRUCTURAL ENGINEER**  
**DESIMONE**  
 18 West 18th Street, 10th Floor - New York, NY 10011

NO.	REVISIONS	DATE
2	65% SUBMISSION SET	19 NOV. 14
1	PRELIMINARY DOB FILING	28 MAY. 14
NO.	SUBMISSIONS	DATE

**PROJECT**  
**HAP 8**  
 213-219 WEST 28TH STREET  
 NEW YORK, NY 10001

**FLOOR 13 REFLECTED CEILING PLAN**

SEAL & SIGNATURE	DATE	Issue Date
	PROJECT No.	6405
	SCALE	1/8" = 1'-0"
	DRAWING BY	Author
	CHECKED BY	Checker
	DWG No.	<b>A-714.00</b>
	W/C CODE Number	

**NOT FOR CONSTRUCTION**

























**APPENDIX 2**

**COSTRUCTION HEALTH AND SAFETY PLAN**

# **Appendix 2**

## **Construction Health and Safety Plan**

### **For**

### **West 28<sup>th</sup> Street Site**

### **Remedial Action Plan**

**215-219 West 28<sup>th</sup> Street**

**New York, New York**

**Block 778, Lots 29, 30, and 31**

**NYC VCP Number: 15CVCP116M**

**OER Project Number 13EHAN231M**

**E-Designation E-276**

**CEQR Number 10DCP004M**

**West 28<sup>th</sup> Street Rezoning Action**

Submitted to:

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

Prepared for:

215-219 West 28<sup>th</sup> Street Mazal Owner LLC.  
c/o HAP Investment Developers  
Philip Stevanovic  
phil@hap-ny.com

Prepared by:



121 West 27<sup>th</sup> Street, Suite 1004  
New York, NY 10001

**March 2015**

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## **1.0 INTRODUCTION**

This Construction Health and Safety Plan (CHASP) has been prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and guidance that govern site investigation activities, other applicable regulations, and Tenen Environmental LLC (Tenen) health and safety policies and procedures. The purpose of this CHASP is the protection of Tenen field personnel and others during the implementation of the Remedial Work Plan.

The Site is located in the Chelsea section of Manhattan, New York and is identified as Block 778 and Lots 29, 30, and 31 on the New York City Tax Map. Figure 1 is a Site location map. The Site is located on the north side of West 28th Street between 7<sup>th</sup> and 8<sup>th</sup> Avenue. The Site is 7,360 square feet and is bounded by a 17-story residential and commercial building to the north, West 28th Street/Fashion Institute of Technology to the south, a 6-story mixed use building to the east, and a 6-story residential and commercial building to the west. Currently, Lots 29 and 30 are used for parking with a car stacker located on the south portion of the lots. Lot 31 is occupied by a 4-story building with a basement that houses a boiler room and other utilities (Figure 2).

The proposed development will consist of one new 21-story mixed residential and commercial use building development with an area of approximately 150,000 square feet and will be constructed on the entire three lots. The building will contain 3 cellar levels for retail, residential amenities, storage and mechanical equipment room. The total depth of excavation to accommodate the two cellar levels will be approximate 27 feet below grade. First floor will contain lobby and retail space. Floors 2-21 will contain residential condominium apartments. Affordable requirement will be through inclusionary housing certificates.

Approximately 10,000 cubic yards (CY) of material will be excavated to the depth of 27 feet below grade. The water table is approximately 17 to 18 feet below grade and no dewatering is anticipated.

### **1.1 Scope of CHASP**

This CHASP includes safety procedures to be used by Tenen staff during the following activities:

- Implementation of remedial oversight and air monitoring activities
- Collection of endpoint soil samples.

Contractors performing remedial construction work will ensure that performance of the work is in compliance with this CHASP and applicable laws and regulations. The CHASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Satisfaction.

## **2.0 PROJECT SAFETY AUTHORITY**

The following personnel are responsible for project health and safety under this CHASP.

- Project Manager
- Health and Safety Officer (HSO)

In addition, each individual working at the Site will be responsible for compliance with this CHASP and general safe working practices. All Site workers will have the authority to stop work if a potentially hazardous situation or event is observed.

### **2.1 Designated Personnel**

The Project Manager is responsible for the overall operation of the project, including compliance with the CHASP and general safe work practices. The Project Manager may also act as the Health and Safety Officer (HSO) for this project.

Tenen will appoint one of its on-site personnel as the on-site HSO. This individual will be responsible for the implementation of the CHASP. The HSO will have a 4-year college degree in occupational safety or a related science/engineering field, and at least two (2) years of experience in implementation of air monitoring and hazardous materials sampling programs. The HSO will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards.

The HSO will be present on-site during all field operations involving soil excavation or other subsurface disturbance, and will be responsible for all health and safety activities and the delegation of duties to the field crew. The HSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the HSO must be absent from the field, a replacement who is familiar with the Construction Health and Safety Plan, air monitoring and personnel protective equipment (PPE) will be designated.

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### 3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

An October 2012 Phase I ESA report identified an open out-of-service oil tank fill port, possibly associated with a former underground storage tank, was observed on the exterior of the attendant's booth.

Site stratigraphy consists of approximately 5 to 10 feet of fill material that consists of sand with cinders, ash, coal fragments and red brick. Fill material is underlain by clayey silt with little sand and fine to medium reddish brown sand with cobbles and gravel. Depth to groundwater ranges from 17 to 18 feet below grade.

The January 2013 remedial investigation conducted at the Site included a geophysical survey, and soil vapor, soil, and groundwater sampling.

**Geophysical Survey.** The results of the geophysical survey indicate the following:

- A suspected remote fill port in the sidewalk south of the attendant booth, running north approximately 41 and northwest for another 5 feet;
- An anomaly measuring approximately 17 by 7 feet in size near the termination of the fill port utility; its location around the suspected fill port line suggests it may be an UST, Phase II field observations and sample results did not indicate any petroleum impacts in this area;
- An electric line extending 53 feet north from the attendant booth to an electrical conduit supplying the car stackers;
- A potential UST-related utility line connecting the attendant booth with the suspected UST metal anomaly;
- A natural gas valve in the roadway south of the attendant booth, connected to a line (possibly capped) terminating approximately four feet north.

**Soil Vapor.** Benzene, ethyl benzene, toluene, and xylene (BTEX) and isopropylbenzene, were detected in all soil vapor samples at concentrations below or slightly above the AGV background levels and chloroform was detected in all samples at concentrations above the background levels. Chloromethane and trichloroethene were detected in one soil vapor sample at concentrations slightly above the background levels. Carbon disulfide was also detected at one location above the background levels. No VOCs or PCBs were detected above the Unrestricted Use SCOs. Low levels of petroleum-related VOCs (ethylbenzene, toluene and/or xylenes), acetone and/or methylene chloride were detected in the shallow samples collected from SB1 and SB3.

**Soil.** No VOCs or PCBs were detected above the Commercial or Unrestricted Use SCOs. Several polyaromatic hydrocarbons (PAHs) typical of historic fill were detected above the Unrestricted Use SCOs and Commercial Use SCOs in the shallow samples including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene and benzo(k)fluoranthene. Three pesticides commonly found in historic fill, 4,4'-DDD, 4,4'-DDE and/or 4,4'-DDT, were also detected above the Unrestricted Use SCO, but below the Commercial Use SCO at one location. Several metals typical of historic fill, copper, lead,

mercury and/or zinc, were detected above the Unrestricted Use SCOs. No metals were detected above the Commercial Use SCOs.

**Groundwater.** The only VOC detected in groundwater was methyl-tert butyl ether (MTBE), which was found in each sample at low levels. Arsenic, beryllium, chromium, magnesium, manganese, iron, nickel and sodium were detected above the Class GA Standards in unfiltered groundwater samples. However, only manganese, iron and sodium were detected in the filtered samples at levels above relevant standards. The metals detected in the unfiltered samples only are typical of historic fill and are likely due to the soil particles present in the samples.

### **3.1 Human Exposure Pathways**

The media of concern at the Site include potentially impacted soil, groundwater and soil vapor. Potential exposure pathways include dermal contact, incidental ingestion and inhalation of vapors. The risk of dermal contact and incidental ingestion will be minimized through general safe work practices, a personal hygiene program and the use of PPE. The risk of inhalation will be minimized through the use of an air monitoring program for volatile organic compounds and particulates.

### **3.2 Chemical Hazards**

Based on historic research and sampling data, the following contaminants of concern are present at the Site:

#### Chlorinated Solvents

- Trichloroethene (TCE)
- Chloromethane
- Chloroform

#### Petroleum Constituents

- Benzene
- Toluene
- Ethylbenzene
- Xylenes
- Isopropylbenzene

#### Metals

- Arsenic
- Beryllium
- Chromium
- Copper
- Lead
- Mercury
- Nickel

- Zinc

Pesticides

4,4'-DDD

4,4-DDE

4,4-DDT

Solvents

- Carbon disulfide

Material Safety Data Sheets (MSDSs) for each contaminant of concern are included in Appendix C. All personnel are required to review the MSDSs included in this CHASP.

### 3.3 Physical Hazards

The physical hazards associated with the field activities likely present a greater risk of injury than the chemical constituents at the Site. Activities within the scope of this project shall comply with New York State and Federal OSHA construction safety standards.

#### Head Trauma

To minimize the potential for head injuries, field personnel will be required to wear National Institutes of Occupational Safety and Health (NIOSH)-approved hard hats during field activities. Hats must be worn properly and not altered in any way that would decrease the degree of protection provided.

#### Foot Trauma

To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed. To afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

#### Eye Trauma

Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed to prevent eye injuries caused by contact with chemical or physical agents.

#### Noise Exposure

Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed.

#### Buried Utilities and Overhead Power Lines

Boring locations will be cleared by an underground utility locator service. In addition, prior to intrusive activities, the drilling subcontractor will contact the One Call Center to arrange for a utility mark-out, in accordance with New York State requirements. Protection from overhead power lines will be accomplished by maintaining safe distances of at least 15 feet at all times.

Thermal Stress

The effects of ambient temperature can cause physical discomfort, personal injury, and increase the probability of accidents. In addition, heat stress due to lack of body ventilation caused by protective clothing is an important consideration. Heat-related illnesses commonly consist of heat stroke and heat exhaustion.

The symptoms of heat stroke include: sudden onset; change in behavior; confusion; dry, hot and flushed skin; dilated pupils; fast pulse rate; body temperature reaching 105° or more; and/or, deep breathing later followed by shallow breathing.

The symptoms of heat exhaustion include: weak pulse; general weakness and fatigue; rapid shallow breathing; cold, pale and clammy skin; nausea or headache; profuse perspiration; unconsciousness; and/or, appearance of having fainted.

Heat-stress monitoring will be conducted if air temperatures exceed 70 degrees Fahrenheit. The initial work period will be set at 2 hours. Each worker will check his/her pulse at the wrist for 30 seconds early in each rest period. If the pulse rate exceeds 110 beats per minute, the next work period will be shortened by one-third.

One or more of the following precautions will reduce the risk of heat stress on the Site:

- Provide plenty of liquids to replace lost body fluids; water, electrolytic drinks, or both will be made available to minimize the risk of dehydration and heat stress
- Establish a work schedule that will provide appropriate rest periods
- Establish work regimens consistent with the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
- Provide adequate employee training on the causes of heat stress and preventive measures

In the highly unlikely event of extreme low temperatures, reasonable precautions will be made to avoid risks associated with low temperature exposure.

Traffic

Field activities will occur near public roadways. As a result, vehicular traffic will be a potential hazard during these activities and control of these areas will be established using barricades or traffic cones. Additional staff will be assigned, as warranted, for the sole purpose of coordinating traffic. Personnel will also be required to wear high-visibility traffic vests while working in the vicinity of the public roadways and local requirements for lane closure will be observed as needed. All work in public rights-of-way will be coordinated with local authorities and will adhere to their requirements for working in traffic zones.

Hazardous Weather Conditions

All Site workers will be made aware of hazardous weather conditions, specifically including extreme heat, and will be requested to take the precautions described herein to avoid adverse health risks. All workers are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain or high wind. Conditions of sleet, snow or freezing

are extremely unlikely.

Slip, Trip and Fall

Areas at the Site may be slippery from mud or water. Great care should be taken by all Site workers to avoid slip, trip and fall hazards. Workers shall not enter areas that not have adequate lighting. Additional portable lighting will be provided at the discretion of the HSO.

Biological Hazards

Drugs and alcohol are prohibited from the Site. Any on-site personnel violating this requirement will be immediately expelled from the Site.

It is the responsibility of any worker or oversight personnel with a medical condition that may require attention should inform the HSO of such condition. The HSO will describe appropriate measures to be taken if the individual should become symptomatic.

Due to the Site location in an urban area, it is highly unlikely that poisonous snakes, spiders, plants, and insects will be encountered. However, other animals (dogs, cats, etc.) may be encountered, and care should be taken to avoid contact.

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#### 4.0 AIR MONITORING

The NYSDOH Generic Community Air Monitoring Plan (CAMP), included as Appendix 1A of DER-10, will be implemented during all ground-intrusive sampling and remedial activities. Continuous monitoring will be implemented during all soil handling activities and periodic monitoring will be implemented during endpoint sampling.

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

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

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.
4. All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

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

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

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

## 5.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protection equipment required for various kinds of site investigation tasks is based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, “General Description and Discussion of the Levels of Protection and Protective Gear.”

Tenen field personnel and other site personnel will wear Level D personal protective equipment. During activities such as drilling, well installation, or sampling, where there is a chance of contact with contaminated materials, modified Level D equipment will be worn. The protection will be upgraded to Level C if warranted by the results of the air monitoring. A description of the personnel protective equipment for Levels D and C is provided below.

### **Level D**

Respiratory Protection: None  
Protective Clothing: Hard hat, steel-toed shoes, long pants, nitrile gloves

### **Modified Level D**

Respiratory Protection: None  
Protective Clothing: Hard hat, steel-toed shoes, coveralls/tyvek, nitrile gloves

### **Level C**

Respiratory Protection: Air purifying respirator with organic vapor cartridges and filters.  
Protective Clothing: Same as modified Level D

## **6.0 EXPOSURE MONITORING**

Selective monitoring of workers in the exclusion area may be conducted, as determined by the HSO, if sources of hazardous materials are identified. Personal monitoring may be conducted in the breathing zone at the discretion of the Project Manager or HSO and, if workers are wearing respiratory protective equipment, outside the face-piece.

**7.0 SITE ACCESS**

Access to the Site during the investigation will be controlled by the Project Manager or HSO. Unauthorized personnel will not be allowed access to the Site.

## **8.0 WORK AREAS**

During any activities involving sampling or other subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, clarify the type of protective equipment needed, and provide an area for decontamination.

The Exclusion Zone is defined as the area where potentially contaminated materials are generated as the result of drilling, sampling, or similar activities. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located adjacent to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a field phone, fire extinguisher and/or first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all Site workers will assemble in the event of an emergency. These zones shall be designated daily, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Control measures such as "Caution" tape and traffic cones will be placed around the perimeter of the work area when work is being done in the areas of concern (i.e., areas with exposed soil) to prevent unnecessary access.

## 9.0 DECONTAMINATION PROCEDURES

### Personnel Decontamination

Personnel decontamination (decon), if deemed necessary by the HSO, will take place in the designated decontamination area delineated for each sampling location. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

### Equipment Decontamination

Sampling equipment will be decontaminated in accordance with U.S. Environmental Protection Agency methodologies, as described in the work plan. Because site soil is considered essentially non-hazardous, there is no need to decontaminate vehicles used for transporting equipment and personnel over the Site.

### Disposal of Materials

Purged well water, water used to decontaminate any equipment and sampling tools will be containerized and disposed off-site in accordance with federal, state and local regulations.

## **10.0 GENERAL SAFE WORK PRACTICES**

To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance.

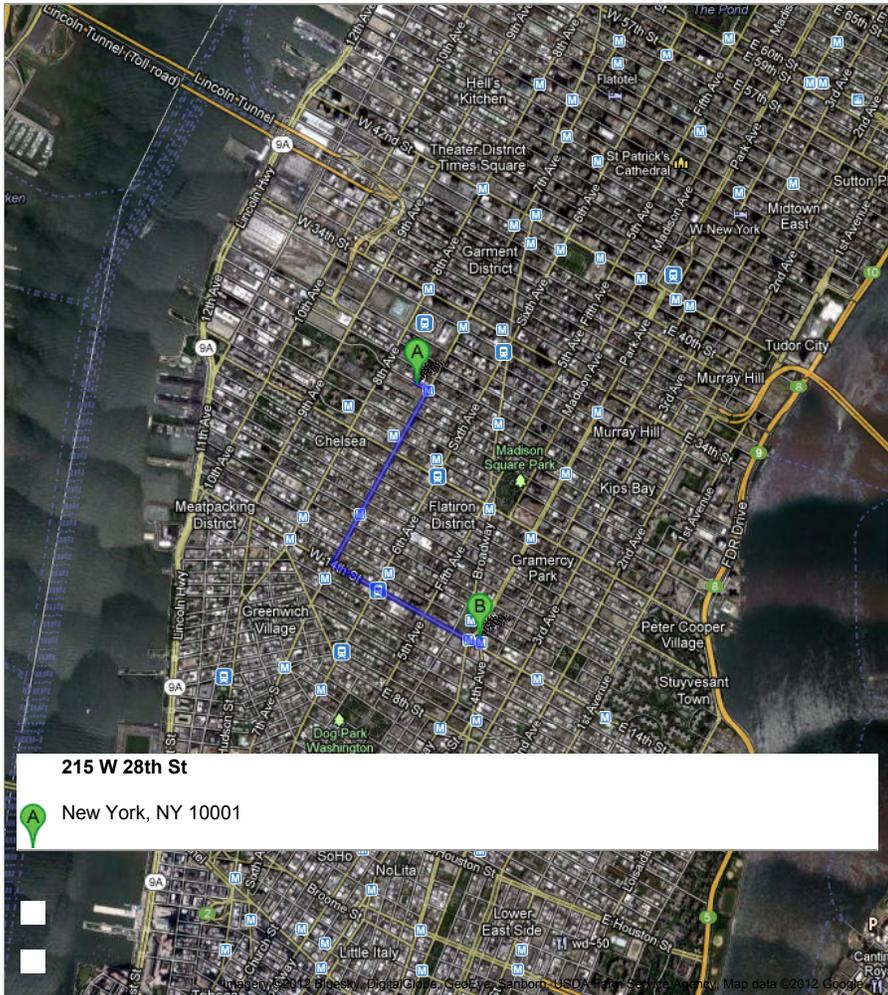
- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the HSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the site.
- Removal of potential contamination from PPE and equipment by blowing, shaking or any means that may disperse materials into the air is prohibited.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.
- Personnel will be cautioned to inform each other of symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- No excessive facial hair that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

## 11.0 EMERGENCY PROCEDURES

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the HSO will determine the nature of the emergency and will have someone call for an ambulance, if needed. If the nature of the injury is not serious—i.e., the person can be moved without expert emergency medical personnel—on-site personnel should drive him to a hospital. **The nearest hospital is Beth Israel Medical Center (10 Union Square East at 14<sup>th</sup> Street).** The route to the hospital is shown and detailed on the next page.

11.1 Route to Hospital

To see all the details that are visible on the screen, use the "Print" link next to the map.



**215 W 28th St**  
New York, NY 10001

**Driving directions to 10 Union Square E, New York, NY 10003**

**10 Union Square E**  
New York, NY 10003

1. Head southeast on West 28<sup>th</sup> St. toward 7<sup>th</sup> Avenue
2. Take the first right onto 7<sup>th</sup> Avenue
3. Turn left onto West 14<sup>th</sup> Street
4. Turn left onto Union Square East

Emergency room entrance is (212) 420-2000 at 1<sup>st</sup> Avenue at 16<sup>th</sup> Street.

### **11.2 Emergency Contacts**

There will be an on-site field phone. Emergency and contact telephone numbers are listed below:

Table 1 – Emergency Contacts

Ambulance	911
Emergency Room	(212) 420-2000
NYSDEC Spill Hotline	(800) 457-7362
Tenen QEP, Mohamed Ahmed	(917) 612-6018
On-site Field Phone, Mark Accetturi	(917) 612-6276
Client, Phil Stevanovic	(347) 703-6776
NYCOER, Eric Ilijevich	(212) 341-2034

## **12.0 TRAINING**

All personnel performing the field activities described in this CHASP will have received the initial safety training required by 29 CFR, 1910.120. Current refresher training status also will be required for all personnel engaged in field activities.

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All field personnel must attend a training program covering the following areas:

- potential hazards that may be encountered;
- the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- the purpose and limitations of safety equipment; and
- protocols to enable field personnel to safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. The HSO will be responsible for conducting the training program.

### **13.0 MEDICAL SURVEILLANCE**

All Tenen and subcontractor personnel performing field work involving soil sampling or other subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). The medical examination for Tenen employees will, at a minimum, be provided annually and upon termination of hazardous waste site work.

**Appendix A**

Acknowledgement of CHASP

**ACKNOWLEDGMENT OF CHASP**

Below is an affidavit that must be signed by all Tenen Environmental employees who enter the site. A copy of the CHASP must be on-site at all times and will be kept by the HSO.

**AFFIDAVIT**

I, \_\_\_\_\_ (name), of  
(company name), have read the Construction Health and Safety Plan (CHASP) for the 215-219 West 28<sup>th</sup> Street Site. I agree to conduct all on-site work in accordance with the requirements set forth in this CHASP and understand that failure to comply with this CHASP could lead to my removal from the site.

Signature: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Signature: \_\_\_\_\_

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

**Appendix B**

Injury Reporting Form (OSHA Form 300)



**Appendix C**

Material Safety Data Sheets (MSDS)

## ZINC METAL MATERIAL SAFETY DATA SHEET

### SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Identity:** Zinc Metal

*NOTE: In the form in which it is sold this product is not regulated. This Material Safety Data Sheet is provided for information purposes only.*

**Manufacturer:**

Teck Metals Ltd.  
Trail Operations  
Trail, British Columbia  
V1R 4L8

Emergency Telephone: 250-364-4214

**Supplier:**

Teck Metals Ltd.  
1500-120 Adelaide Street, W.  
Toronto, Ontario  
M5H 1T1

**MSDS Preparer:**

Teck Metals Ltd.  
3300 – 550 Burrard Street  
Vancouver, British Columbia  
V6C 0B3

**Date of Last Revision/Edit:** June 1, 2009.

**Product Use:** Zinc metal is used to coat steel for corrosion protection (galvanizing, electroplating, electrogalvanizing), as an alloying element in bronze, brass, aluminum and other metal alloys, for zinc die casting alloys, for zinc dry cell and zinc/air batteries, for the production of zinc sheet for architectural and coinage applications, as a reducing agent in organic chemistry and for other chemical applications.

### SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)		LD <sub>50</sub> / LC <sub>50</sub> Species and Route
Zinc	99+%	7440-66-6	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	No Data

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration. ACGIH - American Conference of Governmental Industrial Hygienists. NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit. PEL – Permissible Exposure Limit. TLV – Threshold Limit Value. REL – Recommended Exposure Limit.

NOTE: While there is no established OEL for zinc as such, there are OELs for zinc oxide which may be formed during burning, welding or other fuming processes.

The OSHA PEL final rule limits for zinc oxide dust are 10 mg/m<sup>3</sup> (total) and 5 mg/m<sup>3</sup> (respirable); the OSHA PEL final rule limit for zinc oxide fume is 5 mg/m<sup>3</sup>. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. They are 15 mg/m<sup>3</sup> (total) and 5 mg/m<sup>3</sup> (respirable) while the transitional PEL for zinc oxide fume is 5 mg/m<sup>3</sup>. The ACGIH TLV for zinc oxide is 2 mg/m<sup>3</sup> (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m<sup>3</sup> (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m<sup>3</sup> 10 hr TWA with a 15 mg/m<sup>3</sup> ceiling limit (15 minute sample) for zinc oxide dust and a 10 mg/m<sup>3</sup> STEL for zinc oxide fume (15 minute sample).

**Trade Names and Synonyms:** High Grade Zinc; Special High Grade Zinc; TADANAC® Zinc; C-CAST® Zinc; Zn

### SECTION 3. HAZARDS IDENTIFICATION

**Emergency Overview:** A lustrous bluish-silver metal that does not burn but may form explosive mixtures if dispersed in air as a fine powder. Contact with acids or alkalis generates flammable hydrogen gas which can accumulate in poorly-ventilated areas. Do NOT use water or foam in fire fighting. Apply dry chemical, sand or special powder extinguishing media. Zinc is relatively non-toxic and poses little immediate health hazard to personnel or the environment in an emergency situation.

**Potential Health Effects:** Pure zinc dust is relatively non-toxic to humans by inhalation. However, acute over-exposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting. Ingestion of soluble salts may cause abdominal irritation resulting in nausea and vomiting. In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. (see Toxicological Information, Section 11)

**Potential Environmental Effects:** In the form in which the product is sold, zinc metal does not represent a significant threat to the environment. However, extended exposure in the aquatic or terrestrial environments may lead to the release of zinc in a bioavailable form. (see Ecological Information, Section 12)

**EU Risk Phrase(s):** Not applicable - zinc is not listed as a dangerous substance.

#### SECTION 4. FIRST AID MEASURES

**Eye Contact:** Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

**Skin Contact:** No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

**Inhalation:** If symptoms are experienced remove source of contamination or move victim to fresh air. Obtain medical advice. NOTE: Metal fume fever may develop 3-10 hours after exposure. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

**Ingestion:** If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if irritation or discomfort occurs, obtain medical advice.

#### SECTION 5. FIRE FIGHTING MEASURES

**Fire and Explosion Hazards:** Massive metal is not considered a fire or explosion hazard. However, finely divided metallic dust or powder may form flammable or explosive dust clouds when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Bulk dust in a damp state may heat spontaneously and ignite on exposure to air. Contact with acids and alkali hydroxides results in evolution of hydrogen gas which is potentially explosive. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

**Extinguishing Media:** Apply dry chemical, dry sand, or special powder extinguishing media. Do NOT use water, carbon dioxide or foam on molten metals. Water may be ineffective for extinguishing a fire but should be used to keep fire-exposed containers cool.

**Fire Fighting:** If possible, move material from fire area and cool material exposed to flame. Apply dry chemical, sand, or special powder extinguishing media. Zinc oxide fumes may evolve in fires. Fire fighters should be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

**Flashpoint and Method:** Not Applicable.

**Upper and Lower Flammable Limit:** Lower Flammable Limit (Zinc Dust): 500 g/m<sup>3</sup>; Upper Flammable Limit: Not Applicable.

**Autoignition Temperature:** Approximately 680°C (dust cloud in air), 460°C (dust layer).

#### SECTION 6. ACCIDENTAL RELEASE MEASURES

**Procedures for Cleanup:** Solid metal is recyclable. Vacuuming recommended for accumulated metal dust. Molten metal should be allowed to solidify prior to clean-up. Return uncontaminated spilled material to the process if possible. Place contaminated and non-recyclable material in suitable labeled containers for later disposal. Treat or dispose of waste material in accordance with all local, regional and national requirements, as applicable.

**Personal Precautions:** Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with zinc dust or powder. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash.

**Environmental Precautions:** Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, contamination of water and soil should be prevented.

## SECTION 7. HANDLING AND STORAGE

Store zinc in a DRY covered area, separate from incompatible materials. Zinc ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Ingots may contain cavities that collect moisture. Entrained moisture will expand explosively when immersed in a molten bath. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate designated areas. No special packaging materials are required.

**EU Safety Phrase(s):** Not applicable - zinc in ingot form is not listed as a dangerous substance.

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Protective Clothing:** Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when zinc is processed. Eye protection should be worn where fume or dust is generated. Respiratory protection may be required where zinc oxide fume is generated. Where hot or molten metal is handled, heat resistant gloves, face shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

**Ventilation:** Use adequate local or general ventilation to maintain the concentration of zinc oxide fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Where metallic dust particles of zinc metal are being collected and transported by a ventilation system, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Locate dust collectors and fans outdoors if possible and provide dust collectors with explosion vents or blow out panels.

**Respirators:** Where zinc oxide dust or fumes are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge).

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance:</b> Bluish-silver lustrous metal	<b>Odour:</b> None	<b>Physical State:</b> Solid	<b>pH:</b> Not Applicable
<b>Vapour Pressure:</b> 1 mm at 487°C Negligible at 20°C	<b>Vapour Density:</b> Not Applicable	<b>Boiling Point/Range:</b> 908° C	<b>Freezing/Melting Point/Range:</b> 420° C
<b>Specific Gravity:</b> 7.1	<b>Evaporation Rate:</b> Not Applicable	<b>Coefficient of Water/Oil Distribution:</b> Not Applicable	<b>Odour Threshold:</b> None
<b>Solubility:</b> Insoluble in Water			

## SECTION 10. STABILITY AND REACTIVITY

**Stability & Reactivity:** Massive metal is stable under normal temperatures and pressures. It slowly becomes covered with a white coating of a hydrated basic zinc carbonate on exposure to moist air. Fine, condensed zinc dust or powder may heat spontaneously and ignite on exposure to air when damp. Zinc metal will react with acids and strong alkalis to generate hydrogen gas. A violent, explosive reaction may occur when powdered zinc is heated with sulphur. Powdered zinc will become incandescent or ignite in the presence of fluorine, chlorine or bromine. Powdered zinc can also react explosively with halogenated hydrocarbons if heated. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

**Incompatibilities:** Contact with acids and alkalis will generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic and antimony compounds may evolve highly toxic ARSINE or STIBINE gas. Incompatible with strong oxidizing agents such as chlorine, fluorine, bromine, sodium potassium or barium peroxide, sodium or potassium chlorate, chromium trioxide and fused ammonium nitrate. Also incompatible with elemental sulphur dust, halogenated hydrocarbons or chlorinated solvents and chlorinated rubber.

**Hazardous Decomposition Products:** High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate zinc oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever, a transient influenza-like illness.

## SECTION 11. TOXICOLOGICAL INFORMATION

**General:** Zinc, especially in the metal form, is relatively non-toxic. However, it can react with other materials, such as oxygen or acids, to form compounds that can be potentially toxic. The primary route of exposure would be through the generation and inhalation of zinc oxide fume from welding or burning or overheated melting pots.

**Acute:**

**Skin/Eye:** In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc metal is not chemically irritating to the eyes.

**Inhalation:** If excessive quantities of zinc oxide fume are inhaled, it can result in the condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest and coughing, which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after effects, or chronic effects that result from this condition.

**Ingestion:** When ingested in excessive quantities, zinc can irritate the stomach resulting in nausea and vomiting.

**Chronic:** There is no chronic form of metal fume fever but in rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia. Some workers may develop a short-term immunity (resistance) so that repeated exposure to zinc oxide fumes does not cause metal fume fever. This immunity (resistance) however is quickly lost after short absences from work (weekends or vacations). Workers exposed to finely-divided metallic zinc for up to 35 years revealed no acute or chronic illnesses attributable to zinc. Prolonged or repeated skin contact with zinc dust or powder may cause dryness, irritation and cracking (dermatitis) since zinc is astringent and may tend to draw moisture from the skin. Zinc dust is not listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

## SECTION 12. ECOLOGICAL INFORMATION

Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, its processing or extended exposure in the environment may result in the formation of bioavailable zinc compounds. In aquatic systems, zinc bioaccumulates in both plants and animals. In terrestrial systems, the mobility of zinc in soil is dependent on soil conditions, such as cation exchange capacity, pH, redox potential, and chemical species present in the soil. Zinc also bioaccumulates in terrestrial plants, vertebrates, and mammals, with plant uptake from soil dependent on the plant species, soil pH, and soil composition.

## SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

## SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not applicable – not regulated.  
U.S. DOT AND TRANSPORT CANADA HAZARD CLASSIFICATION .... Not applicable  
U.S. DOT AND TRANSPORT CANADA PID..... Not applicable  
MARINE POLLUTANT ..... No  
IMO CLASSIFICATION ..... Not regulated

## SECTION 15. REGULATORY INFORMATION

**U.S.**

INGREDIENT LISTED ON TSCA INVENTORY ..... Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD ..... No

CERCLA SECTION 103 HAZARDOUS SUBSTANCES ..... Zinc ..... Yes.....RQ: 1,000 lb. (454 kg,)\*

\* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE ..... No

EPCRA SECTION 311/312 HAZARD CATEGORIES ..... No Hazard Categories Apply

EPCRA SECTION 313 Toxic Release Inventory: ..... This product does not contain any toxic chemicals subject to the Toxic Release reporting requirements. However, potential by-products from working with this product - "Zinc (Fume or Dust)" CAS 7440-66-6 are reportable.

**CANADIAN:**

INGREDIENTS LISTED ON DOMESTIC SUBSTANCES LIST..... Yes

WHMIS CLASSIFICATION:..... Not applicable. Zinc is not a Controlled Product under CPR.

**EUROPEAN UNION:**

LISTED ON THE EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS)..... Yes

EU CLASSIFICATION: ..... Not applicable. Zinc in ingot form is not listed as a dangerous substance.

**SECTION 16. OTHER INFORMATION**

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition.
- American Conference of Governmental Industrial Hygienists, 2006, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2005, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urban, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, Ontario, CHEMINFO Record No. 239 – Zinc (Last Revision 2006-01).
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, 2003, Hazardous Substance Data Bank. (on-line version).
- Oak Ridge National Laboratory, Oak Ridge, Tennessee – Toxicity Summary for Zinc and Zinc Compounds, April 1992.
- Patty's Toxicology, Fifth Edition, 2001 E. Bingham, B. Cohnsen & CH Powell (Eds.).
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition (September 2005).
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, August 2005, Toxicological Profile for Zinc.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

**Notice to Reader**

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# Material Safety Data Sheet

Revision Issued: 6/09/98

Supersedes: 9/17/97

First Issued: 4/10/89

## Section I - Chemical Product And Company Identification

**Product Name: Xylene**

CAS Number: 1330-20-7

HBCC MSDS No. CX01000



**HILL BROTHERS** *Chemical Co.*

1675 NORTHMAIN STREET • ORANGE, CALIFORNIA 92867-3499  
(714) 998-8800 • FAX: (714) 998-6310  
<http://hillbrothers.com>

1675 No. Main Street, Orange, California 92867

Telephone No: 714-998-8800 | Outside Calif: 800-821-7234 | Chemtrec: 800-424-9300

## Section II - Composition/Information On Ingredients

			Exposure Limits (TWAs) in Air		
Chemical Name	CAS Number	%	ACGIH TLV	OSHA PEL	STEL
Xylene	1330-20-7	79-82	100 ppm	100 ppm	150 ppm
			435 mg/m <sup>3</sup>	435 mg/m <sup>3</sup>	
Ethylbenzene	100-41-4	18-20	100 ppm	100 ppm	125 ppm
			435 mg/m <sup>3</sup>	435 mg/m <sup>3</sup>	
Toluene	108-88-3	< 1	50 ppm	50 ppm	150 ppm

## Section III - Hazard Identification

**Ingestion:** Liquid ingestion may result in vomiting; aspiration (breathing) of vomitus into the lungs must be avoided as even small quantities in the lungs may result in chemical pneumonitis and pulmonary edema/hemorrhage.

**Inhalation:** High vapor/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death. Negligible hazard at ambient temperature (-18 to 38 Deg C; 0 to 100 Deg F)

**Skin:** Prolonged and repeated liquid contact can cause defatting and drying of the skin which may result in skin irritation and dermatitis.

**Eyes:** Short-term liquid or vapor contact may result in slight eye irritation. Prolonged and repeated contact may be more irritating. High vapor/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the eyes.

**Summary of Chronic Health Hazards:** N/A

**Signs and Symptoms of Exposure:** Prolonged or repeated skin contact with this product tends to remove oils possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

**Effects of Overexposure:** High vapor concentration (greater than approximately 1000 ppm) are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic, and may have other central nervous system effects including death.

**Medical Conditions Generally Aggravated by Exposure:** Petroleum Solvents/Petroleum Hydrocarbons - Skin contact may aggravate an existing dermatitis.

**Note to Physicians:** If more than 2.0 ml per kg has been ingested and vomiting has not occurred, emesis should be induced with supervision. Keep victim's head below hips to prevent aspiration. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before emesis, gastric lavage using a cuffed endotracheal tube should be considered. Inhalation of high concentrations of this material, as could incur in enclosed spaces or during deliberate abuse, may be associated with

cardiac arrhythmias. Sympathomimetic may initiate cardiac arrhythmias in persons exposed to this material. This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity when deciding whether to induce vomiting. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions), kidney, auditory system. Individuals with preexisting heart disorders may be more susceptible to arrhythmias (irregular heartbeats) if exposed to high concentrations of this material.

#### Section IV - First Aid Measures

**Ingestion:** If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended. GET MEDICAL ATTENTION IMMEDIATELY.

**Inhalation:** Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. GET MEDICAL ATTENTION IMMEDIATELY.

**Skin:** Wash with soap and water. Remove contaminated clothing and shoes; do not reuse until cleaned. If persistent irritation occurs, GET MEDICAL ATTENTION IMMEDIATELY.

**Eyes:** If splashed into eyes, flush with water for 15 minutes while holding eyelids open or until irritation subsides. If irritation persists, GET MEDICAL ATTENTION IMMEDIATELY.

#### Section V - Fire Fighting Measures

**Flash Point:** 80°F (26.6°C)

**Autoignition Temperature:** 980°F (526.6°C)

**Lower Explosive Limit:** 1%

**Upper Explosive Limit:** 6.6%

**Unusual Fire and Explosion Hazards:** Vapors are heavier than air and may accumulate in low areas and may travel along the ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from handling point. Flashback of flame to the handling site may occur. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. The following may form: carbon dioxide, and carbon monoxide, and various hydrocarbons.

**Extinguishing Media:** Use water fog, foam, dry chemical or CO<sub>2</sub>. Do not use a direct stream of water. Product will float and can be reignited on surface of water.

**Special Firefighting Procedures:** Evacuate hazard area of unprotected personnel. Wear proper protective clothing including a NIOSH approved self-contained breathing apparatus. Cool fire-exposed containers with water. In the case of large fires, also cool surrounding equipment and structures with water. If a leak or spill has not ignited, use water spray to disperse the vapors.

#### Section VI - Accidental Release Measures

[Spills may need to be reported to the National Response Center (800/424-8802) CERCLA Reportable Quantity (RQ) is 1000 pounds]. Shut off and eliminate all ignition sources. Keep people away. Recover by pumping (use an explosion proof or hand pump) or with a suitable absorbent such as sand, earth or other suitable absorbent to spill area. Do not use combustible materials such as sawdust. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.

#### Section VII - Handling and Storage

Keep away from heat, sparks and open flames. Keep containers tightly closed. Store away from strong oxidizing agents in a cool, dry place with adequate explosion-proof ventilation. Ground equipment to prevent accumulation of static charge. If pouring or transferring materials, containers must be bonded and grounded.

**Other Precautions:** Do Not weld, heat or drill on or near container; even emptied containers can contain explosive vapors.

#### Section VIII - Exposure Controls/Personal Protection

**Respiratory Protection:** Use either an atmosphere-supplying respirator or an air-purifying respirator in confined or enclosed spaces for organic vapors, if needed.

**Ventilation:** Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. Use explosion-proof equipment.

**Protective Clothing:** Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular

clothing which could result in prolonged or repeated skin contact.

**Eye Protection:** Use chemical splash goggles or face shield when eye contact may occur.

**Other Protective Clothing or Equipment:** Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

**Work/Hygienic Practices:** Minimize breathing vapor or mist. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean and dry before reuse. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

### Section IX - Physical and Chemical Properties

**Physical State:** Liquid

**pH:** N/A

**Melting Point/Range:** N/A

**Boiling Point/Range:** 279°F (137.2°C)

**Appearance/Color/Odor:** Colorless, light aromatic odor

**Solubility in Water:** Less than 0.08%

**Vapor Pressure(mmHg):** 2.4 @ 68°F

**Specific Gravity(Water=1):** 0.87

**Molecular Weight:** 106

**Vapor Density(Air=1):** 3.7

**% Volatiles:** 100

**How to detect this compound :** N/A

**Evaporation Rate, n-BuAcetate=1:** 0.86

**Odor Threshold:** 0.5 ppm

**Freezing Point:** -54.0°F (-47.7°C)

### Section X - Stability and Reactivity

**Stability:** Stable

**Hazardous Polymerization:** Will Not Occur

**Conditions to Avoid:** Avoid heat, sparks, and open flames.

**Materials to Avoid:** Strong oxidizing agents, concentrated nitric and sulfuric acids, and molten sulphur. Temperatures above ambient.

**Hazardous Decomposition Products:** Fumes, smoke, carbon monoxide, aldehydes, various hydrocarbons, and other organic compounds may be formed during combustion.

### Section XI - Toxicological Information

N/A

### Section XII - Ecological Information

N/A

### Section XIII - Disposal Considerations

Use non-leaking containers, seal tightly and label properly. Dispose of in accordance with applicable local, county, state and federal regulations.

### Section XIV - Transport Information

**DOT Proper Shipping Name:** Xylene

**DOT Hazard Class/ I.D. No.:** 3, UN1307, III

### Section XV - Regulatory Information

#### CALIFORNIA PROPOSITION 65: WARNING

**This product contains the following substance known to the state of California to cause cancer: Benzene**

**This product contains the following substance known to the state of California to cause birth defects: Toluene**

**Reportable Quantity:** 1000 Pounds (454 Kilograms) (139.50 Gals)

**NFPA Rating:** Health - 2; Fire - 3; Reactivity - 0

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

**Carcinogenicity Lists:** No **NTP:** No **IARC Monograph:** No **OSHA Regulated:** Yes

**Section 313 Supplier Notification:** This product contains the following toxic chemical(s) subject to the reporting requirements of SARA TITLE III Section 313 of the Emergency Planning and Community Right-To Know Act of 1986 and of 40 CFR 372:

<u>CAS #</u>	<u>Chemical Name</u>	<u>% By Weight</u>
1330-20-7	Xylene	79-82%
100-41-1	Ethylbenzene	18-20%
108-88-3	Toluene	< 1%

#### Section XVI - Other Information

**Synonyms/Common Names:** Xylol; Dimethyl Benzene; Methyl Toluene

**Chemical Family/Type:** Aromatic Hydrocarbon

**IMPORTANT!** Read this MSDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This MSDS has been prepared according to the OSHA Hazard Communication Standard [29 CFR 1910.1200]. The MSDS information is based on sources believed to be reliable. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control, **Hill Brothers Chemical Company** makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Also, additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks prior to use, and then to exercise appropriate precautions for protection of employees and others.

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# Material Safety Data Sheet

## Trichloroethylene, stabilized

ACC# 23850

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Trichloroethylene, stabilized**Catalog Numbers:** AC158310000, AC158310010, AC158310025, AC421520000, AC421520040, AC421520200, AC421525000, S80327ACS-1, S80327ACS-2, NC9494591, T340-4, T341-20, T341-4, T341-500, T341J4, T403-4**Synonyms:** Ethylene trichloride; Trichloroethene; 1,1,2-Trichloroethylene; TCE.**Company Identification:**

Fisher Scientific

1 Reagent Lane

Fair Lawn, NJ 07410

**For information, call:** 201-796-7100**Emergency Number:** 201-796-7100**For CHEMTREC assistance, call:** 800-424-9300**For International CHEMTREC assistance, call:** 703-527-3887

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
79-01-6	Trichloroethylene	>99	201-167-4

### Section 3 - Hazards Identification

#### EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.

**Warning!** Breathing vapors may cause drowsiness and dizziness. Causes eye and skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause cancer based on animal studies. May cause liver damage.**Target Organs:** Central nervous system, liver, eyes, skin.**Potential Health Effects****Eye:** Causes moderate eye irritation. May result in corneal injury. Contact produces irritation, tearing, and burning pain. Contact with trichloroethylene causes pain but no permanent injury to the eyes. (Doc of TLV)**Skin:** Causes mild skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.**Ingestion:** May cause irritation of the digestive tract. Aspiration of material into the lungs may

cause chemical pneumonitis, which may be fatal.

**Inhalation:** May cause respiratory tract irritation. May cause liver abnormalities. May cause cardiac abnormalities. May cause peripheral nervous system effects. Inhalation overexposure may lead to central nervous system depression, producing effects such as dizziness, headache, confusion, incoordination, nausea, weakness, and loss of consciousness. Extreme exposures may cause other CNS effects including death. The chief symptoms of TCE exposure were found to be abnormal fatigue, irritability, headache, gastric disturbances, and intolerance to alcohol. (Doc to TLV)

**Chronic:** Possible cancer hazard based on tests with laboratory animals. Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.

## Section 4 - First Aid Measures

**Eyes:** Immediately 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 if irritation develops or persists. Flush skin with plenty of soap and water.

**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

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

**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. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.

**Flash Point:** None

**Autoignition Temperature:** 420 deg C ( 788.00 deg F)

**Explosion Limits, Lower:**8

**Upper:** 10.5

**NFPA Rating:** (estimated) Health: 2; Flammability: 1; 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. Provide ventilation. Approach spill from upwind. Control runoff and isolate discharged material for proper disposal.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor.

**Storage:** 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 general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Exposure Limits**

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Trichloroethylene	50 ppm TWA; 100 ppm STEL	1000 ppm IDLH	100 ppm TWA; 200 ppm Ceiling

**OSHA Vacated PELs:** Trichloroethylene: 50 ppm TWA; 270 mg/m<sup>3</sup> TWA

**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, colorless

**Odor:** chloroform-like

**pH:** Not available.

**Vapor Pressure:** 58 mm Hg @ 20 deg C

**Vapor Density:** 4.5 (air=1)

**Evaporation Rate:** 0.69 (CCl<sub>4</sub>=1)

**Viscosity:** 0.0055 poise

**Boiling Point:** 87 deg C

**Freezing/Melting Point:** -86 deg C

**Decomposition Temperature:** Not available.

**Solubility:** Slightly soluble.

**Specific Gravity/Density:** 1.46

**Molecular Formula:** C<sub>2</sub>HCl<sub>3</sub>

**Molecular Weight:** 131.39

## Section 10 - Stability and Reactivity

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

**Conditions to Avoid:** Light, confined spaces.

**Incompatibilities with Other Materials:** Active metals.

**Hazardous Decomposition Products:** Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** May occur.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 79-01-6: KX4550000

**LD50/LC50:**

CAS# 79-01-6:

Draize test, rabbit, eye: 20 mg/24H Moderate;  
Draize test, rabbit, skin: 2 mg/24H Severe;  
Inhalation, mouse: LC50 = 8450 ppm/4H;  
Inhalation, mouse: LC50 = 220000 mg/m<sup>3</sup>/20M;  
Inhalation, mouse: LC50 = 262000 mg/m<sup>3</sup>/30M;  
Inhalation, mouse: LC50 = 40000 mg/m<sup>3</sup>/4H;  
Inhalation, rat: LC50 = 140700 mg/m<sup>3</sup>/1H;  
Oral, mouse: LD50 = 2402 mg/kg;  
Oral, mouse: LD50 = 2400 mg/kg;  
Oral, rat: LD50 = 4920 mg/kg;  
Skin, rabbit: LD50 = >20 gm/kg;  
Skin, rabbit: LD50 = 20 mL/kg;

**Carcinogenicity:**

CAS# 79-01-6:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2A carcinogen

**Epidemiology:** In six epidemiological studies completed, there was no evidence to suggest that trichloroethylene has increased the incidence of cancer in humans. (Documentation of the TLV, 7th edition)

**Teratogenicity:** No information available.

**Reproductive Effects:** Experimental reproductive effects have been observed.

**Mutagenicity:** Human mutation data has been reported. IARC and the National Toxicology Program (NTP) stated that variability in the mutagenicity test results with trichloroethylene may be due to the presence of various stabilizers used in TCE which are mutagens (e.g. epoxybutane, epichlorohydrin). See actual entry in RTECS for complete information. R68 Mutagen Category 3 (CHIP 2002, UK).

**Neurotoxicity:** No information available.

**Other Studies:**

**Section 12 - Ecological Information**

**Ecotoxicity:** Fish: Fathead Minnow: 41-67 mg/L; 96 hrs.; LC50Daphnia: Daphnia: 2.2-100 mg/L; 48 hrs.; LC50Mollusk Shrimp: 2 mg/L; 96 hrs.; LC50 Bluegill sunfish, LD50= 44,700 ug/L/96Hr. Fathead minnow, LC50=40.7 mg/L/96Hr.

**Environmental:** In air, substance is photooxidized and is reported to form phosgene, dichloroacetyl chloride, and formyl chloride. In water, it evaporates rapidly. Potential for mobility in soil is high.

**Physical:** No information available.

**Other:** Bioconcentration potential is low (BCF less than 100).

**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:**

CAS# 79-01-6: waste number U228.

**Section 14 - Transport Information**

	<b>US DOT</b>	<b>Canada TDG</b>
<b>Shipping Name:</b>	TRICHLOROETHYLENE	TRICHLOROETHYLENE
<b>Hazard Class:</b>	6.1	6.1
<b>UN Number:</b>	UN1710	UN1710
<b>Packing Group:</b>	III	III

**Section 15 - Regulatory Information**

**US FEDERAL**

**TSCA**

CAS# 79-01-6 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**

CAS# 79-01-6: 100 lb final RQ; 45.4 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 79-01-6: immediate, delayed, reactive.

**Section 313**

This material contains Trichloroethylene (CAS# 79-01-6, >99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

**Clean Air Act:**

CAS# 79-01-6 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

**Clean Water Act:**

CAS# 79-01-6 is listed as a Hazardous Substance under the CWA. CAS# 79-01-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 79-01-6 is listed as a Toxic Pollutant under the Clean Water Act.

**OSHA:**

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

**STATE**

CAS# 79-01-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**

**The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:**

WARNING: This product contains Trichloroethylene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 79-01-6: 50 æg/day NSRL (oral); 80 æg/day NSRL (inhalation)

**European/International Regulations**

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

T

**Risk Phrases:**

R 36/38 Irritating to eyes and skin.

R 45 May cause cancer.

R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R 67 Vapours may cause drowsiness and dizziness.

**Safety Phrases:**

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

S 53 Avoid exposure - obtain special instructions before use.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**

CAS# 79-01-6: 3

**Canada - DSL/NDSL**

CAS# 79-01-6 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of D1B, 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**

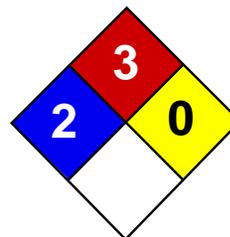
CAS# 79-01-6 is listed on the Canadian Ingredient Disclosure List.

<b>Section 16 - Additional Information</b>
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**MSDS Creation Date:** 2/01/1999

**Revision #7 Date:** 12/27/2006

*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.*



Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet Toluene MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Toluene

**Catalog Codes:** SLT2857, SLT3277

**CAS#:** 108-88-3

**RTECS:** XS5250000

**TSCA:** TSCA 8(b) inventory: Toluene

**CI#:** Not available.

**Synonym:** Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

**Chemical Name:** Toluene

**Chemical Formula:** C<sub>6</sub>H<sub>5</sub>-CH<sub>3</sub> or C<sub>7</sub>H<sub>8</sub>

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Toluene	108-88-3	100

**Toxicological Data on Ingredients:** Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 480°C (896°F)

**Flash Points:** CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

**Flammable Limits:** LOWER: 1.1% UPPER: 7.1%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:**

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:**

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N<sub>2</sub>O<sub>4</sub>; AgClO<sub>4</sub>; BrF<sub>3</sub>; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.

**Large Spill:**

Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

**Section 7: Handling and Storage****Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

**Storage:**

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

**Section 8: Exposure Controls/Personal Protection****Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m<sup>3</sup>) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid.

**Odor:** Sweet, pungent, Benzene-like.

**Taste:** Not available.

**Molecular Weight:** 92.14 g/mole

**Color:** Colorless.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 110.6°C (231.1°F)

**Melting Point:** -95°C (-139°F)

**Critical Temperature:** 318.6°C (605.5°F)

**Specific Gravity:** 0.8636 (Water = 1)

**Vapor Pressure:** 3.8 kPa (@ 25°C)

**Vapor Density:** 3.1 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 1.6 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil;  $\log(\text{oil/water}) = 2.7$

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, diethyl ether, acetone.

**Solubility:**

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources (flames, sparks, static), incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

**Other Toxic Effects on Humans:**

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

**Special Remarks on Toxicity to Animals:**

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

**Special Remarks on Chronic Effects on Humans:**

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia, ), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophosphatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

## Section 12: Ecological Information

### Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

**BOD5 and COD:** Not available.

### Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

### Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** CLASS 3: Flammable liquid.

**Identification:** : Toluene UNNA: 1294 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):**

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

**HMS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 3

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

**Section 16: Other Information**

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:30 PM

**Last Updated:** 11/01/2010 12:00 PM

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Material Safety Data Sheet

Nickel Metal

MSDS# 16240

Section 1 - Chemical Product and Company Identification

MSDS Name: Nickel Metal  
Catalog Numbers: N40-500  
Synonyms:  
Company Identification: Fisher Scientific  
One Reagent Lane  
Fair Lawn, NJ 07410  
For information in the US, call: 201-796-7100  
Emergency Number US: 201-796-7100  
CHEMTREC Phone Number, US: 800-424-9300

Section 2 - Composition, Information on Ingredients

-----  
CAS#: 7440-02-0  
Chemical Name: NICKEL  
%: 100.0  
EINECS#: 231-111-4  
-----

Hazard Symbols: XN



Risk Phrases: 40 43

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Caution! May cause respiratory tract irritation. May cause eye irritation. May cause allergic skin reaction. May cause liver and kidney damage. May cause cancer in humans. Target Organs: Kidneys, liver, respiratory system.

Potential Health Effects

Eye: May cause eye irritation.  
Skin: May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May cause severe irritation and possible burns. May cause dermatitis.  
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea.  
Inhalation: Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. Inhalation of a mist of this material may cause respiratory tract irritation. Breathing Nickel (Dust and Fume) can cause a sore or hole in the "bone" (septum) dividing the inner nose.  
Chronic: Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration. May cause respiratory tract cancer.

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 if irritation develops or persists. Wash clothing before reuse. Flush skin with plenty of soap and water.  
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an

Ingestion: 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 if cough or other symptoms appear.

Notes to Physician:

Antidote: There exists several chelation agents. The determination of there use should be made only by qualified medical personnel.

#### 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. Dusts at sufficient concentrations can form explosive mixtures with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Dust can be an explosion hazard when exposed to heat or flame.

Extinguishing Media: Confining and smothering is preferable to applying water. **DO NOT USE WATER, CO2, OR FOAM DIRECTLY ON FIRE ITSELF.** Use DRY sand, sodium chloride powder, graphite powder, copper powder or Lith-X powder. Dousing metallic fires with water may generate hydrogen gas, an extremely dangerous explosion hazard, particularly if fire is in a confined environment.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 3; flammability: 1; instability: 0;

#### Section 6 - Accidental Release Measures

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

Spills/Leaks: Very fine particles can cause a fire or explosion. Eliminate all ignition sources. Reduce airborne dust and prevent scattering by moistening with water. Sweep up, then place into a suitable container for disposal. Carefully scoop up and place into appropriate disposal container. Provide ventilation.

#### Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with skin and eyes. Avoid ingestion and inhalation.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep containers tightly closed.

#### Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
NICKEL	1.5 mg/m3 (inhalable fraction)	0.015 mg/m3 TWA 10 mg/m3 IDLH	1 mg/m3 TWA

OSHA Vacated PELs: NICKEL: 1 mg/m3 TWA

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

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 gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

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: Solid

Color: white to gray white

Odor: none reported

pH: Not available

Vapor Pressure: 1 mm Hg @ 1810 C

Vapor Density: Not available

Evaporation Rate: Not available

Viscosity: Not applicable.

Boiling Point: 2730 deg C ( 4,946.00°F)

Freezing/Melting Point: 1455 deg C ( 2,651.00°F)

Decomposition Temperature: Not available

Solubility in water: Insoluble in water.

Specific Gravity/Density: 8.90

Molecular Formula: Ni

Molecular Weight: 58.69

#### Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Incompatible materials, dust generation.

Incompatibilities with Other Materials: Not available

Hazardous Decomposition Products: Toxic and highly flammable nickel carbonyl.

Hazardous Polymerization: Has not been reported.

#### Section 11 - Toxicological Information

RTECS#: CAS# 7440-02-0: QR5950000 QR6126100 QR6555000 QR7120000

LD50/LC50: RTECS: Not available.

Carcinogenicity: NICKEL - California: carcinogen, initial date 10/1/89 NTP: Suspect carcinogen IARC: Group 1 carcinogen (Nickel compounds).

Other: See actual entry in RTECS for complete information.

#### Section 12 - Ecological Information

Other: No information available.

#### Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

#### Section 14 - Transport Information

##### US DOT

Shipping Name: Not regulated as a hazardous material

Hazard Class:

UN Number:

Packing Group:

Canada TDG

Shipping Name: Not available

Hazard Class:

UN Number:

Packing Group:

USA RQ: CAS# 7440-02-0: 100 lb final RQ (no reporting of releases of this hazardous substan

#### Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN

Risk Phrases:

R 40 Limited evidence of a carcinogenic effect.

R 43 May cause sensitization by skin contact.

Safety Phrases:

S 22 Do not breathe dust.

S 36 Wear suitable protective clothing.

WGK (Water Danger/Protection)

CAS# 7440-02-0: Not available

Canada

CAS# 7440-02-0 is listed on Canada's DSL List

Canadian WHMIS Classifications: D2A

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.

CAS# 7440-02-0 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 7440-02-0 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 3/19/1998

Revision #6 Date 7/20/2009

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 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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MSDS# 14020

Section 1 - Chemical Product and Company Identification

MSDS Name: Mercury

Catalog Numbers: 13-410, 13-411, 13-480, 13-481, 13-482, 13-485, 13501, M139-1LB, M139-5LB, M140-14LB, M140-1LB, M140-5LB, M141-1LB, M141-6LB

Synonyms: Colloidal mercury; Hydrargyrum; Metallic mercury; Quick silver; Liquid silver.

Company Identification: Fisher Scientific  
One Reagent Lane  
Fair Lawn, NJ 07410

For information in the US, call: 201-796-7100

Emergency Number US: 201-796-7100

CHEMTREC Phone Number, US: 800-424-9300

Section 2 - Composition, Information on Ingredients

-----  
CAS#: 7439-97-6  
Chemical Name: Mercury  
%: 100  
EINECS#: 231-106-7  
-----

Hazard Symbols:

T+ N



Risk Phrases:

61 26 48/23 50/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! Corrosive. This substance has caused adverse reproductive and fetal effects in animals. May be absorbed through intact skin. May cause central nervous system effects. May cause liver and kidney damage. Inhalation of fumes may cause metal-fume fever. Possible sensitizer. Toxic if inhaled. Causes irritation and possible burns by all routes of exposure. Target Organs: Blood, kidneys, central nervous system, liver, brain.

Potential Health Effects

- Eye: Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.
- Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes skin irritation and possible burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
- Ingestion: May cause severe and permanent damage to the digestive tract. May cause perforation of the digestive tract. May cause effects similar to those for inhalation exposure. May cause systemic effects.
- Inhalation: Causes chemical burns to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause respiratory sensitization.
- May cause liver and kidney damage. May cause reproductive and fetal effects. Effects may be delayed. Chronic

Chronic: exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, personality changes. Chronic ingestion may cause accumulation of mercury in body tissues. Prolonged or repeated exposure may cause inflammation of the mouth and gums, excessive salivation, and loosening of the teeth.

#### Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

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

Ingestion: Do not induce vomiting. 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. Wash mouth out with water.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Treat symptomatically and supportively. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.

Antidote: The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

#### 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.

Extinguishing Media: Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 3; flammability: 0; 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. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

#### Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes. Do not breathe vapor.

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. Keep away from metals. Store protected from azides.

#### Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Mercury	0.025 mg/m <sup>3</sup> ; Skin - potential significant contribution to	0.05 mg/m <sup>3</sup> TWA (vapor) 10 mg/m <sup>3</sup> IDLH	0.1 mg/m <sup>3</sup> Ceiling

	overall exposure		
	by the cutaneous		
	route		

OSHA Vacated PELs: Mercury: 0.05 mg/m3 TWA (vapor)

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

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: Liquid

Color: silver

Odor: odorless

pH: Not available

Vapor Pressure: 0.002 mm Hg @ 25C

Vapor Density: 7.0

Evaporation Rate: Not available

Viscosity: 15.5 mP @ 25 deg C

Boiling Point: 356.72 deg C ( 674.10°F)

Freezing/Melting Point: -38.87 deg C ( -37.97°F)

Decomposition Temperature: Not available

Solubility in water: Insoluble

Specific Gravity/Density: 13.59 (water=1)

Molecular Formula: Hg

Molecular Weight: 200.59

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: High temperatures, incompatible materials.

Incompatibilities with Other Materials: Metals, aluminum, ammonia, chlorates, copper, copper alloys, ethylene oxide, halogens, iron, nitrates, sulfur, sulfuric acid, oxygen, acetylene, lithium, rubidium, sodium carbide, lead, nitromethane, peroxyformic acid, calcium, chlorine dioxide, metal oxides, azides, 3-bromopropyne, methylsilane + oxygen, tetracarbonylnickel + oxygen, boron diiodophosphide.

Hazardous

Decomposition Products: Mercury/mercury oxides.

Hazardous

Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 7439-97-6: OV4550000

LD50/LC50: RTECS: Not available. Other:

Carcinogenicity: Mercury - IARC: Group 3 (not classifiable)

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.16-0.90 mg/L; 96 Hr; Unspecified  
Fish: Bluegill/Sunfish: LC50 = 0.16-0.90 mg/L; 96 Hr; Unspecified  
Fish: Channel catfish: LC50 = 0.35 mg/L; 96 Hr; Unspecified  
Water flea Daphnia: EC50 = 0.01 mg/L; 48 Hr; Unspecified

Other: Harmful to aquatic life in very low concentrations.

#### Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

#### Section 14 - Transport Information

US DOT

Shipping Name: MERCURY

Hazard Class: 8

UN Number: UN2809

Packing Group: III

Canada TDG

Shipping Name: MERCURY

Hazard Class: 8

UN Number: UN2809

Packing Group: III

USA RQ: CAS# 7439-97-6: 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: T+ N

Risk Phrases:

R 61 May cause harm to the unborn child.

R 26 Very toxic by inhalation.

R 48/23 Toxic : danger of serious damage to health by prolonged exposure through inhalation.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

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

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 7439-97-6: 3

Canada

CAS# 7439-97-6 is listed on Canada's DSL List

Canadian WHMIS Classifications: D2A, E

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.

CAS# 7439-97-6 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 7439-97-6 is listed on the TSCA Inventory.

#### Section 16 - Other Information

MSDS Creation Date: 6/15/1999

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 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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**MATERIAL SAFETY DATA SHEET****MANGANESE, METAL**

PRODUCT CODE NUMBER(S): 4940-1

**PRODUCT IDENTIFICATION**

**Chemical Name and Synonyms:** *Manganese, metal*  
**Chemical Family:** *Metal*  
**Chemical Formula:** *Mn*  
**Product Use:** *Laboratory reagent*  
**Manufacturer's Name and Address:**  
*Caledon Laboratories Ltd.*  
*40 Armstrong Avenue*  
*Georgetown, Ontario L7G 4R9*  
**Telephone No:** *(905) 877-0101*  
**Fax No:** *(905) 877-6666*  
**Emergency Telephone No:** *CANUTEC (613) 996-6666*

**HAZARDOUS INGREDIENTS OF MATERIALS**

<i>Ingredients</i>	<i>%</i>	<i>TLV Units</i>	<i>CAS No.</i>
<i>Manganese</i>	<i>&gt;99</i>	<i>0.2 mg/m<sup>3</sup></i>	<i>7439-96-5</i>

**PHYSICAL DATA**

**Physical State:** *Solid*  
**Odour and Appearance:** *Metallic-grey chunks or black, shiny powder, odourless*  
**Odour Threshold (ppm):** *Not applicable*  
**Vapour Pressure (mm Hg):** *~0*  
**Vapour Density (Air = 1):** *Not applicable*  
**Evaporation Rate:** *Not applicable*  
**Boiling Point (degrees C):** *1962°C*  
**Melting Point (degrees C):** *1244°C*  
**pH:** *Not applicable*  
**Specific Gravity:** *0.72 @ 20°C*  
**Coefficient of Water/Oil distribution:** *Not applicable*

**SHIPPING DESCRIPTION**

**UN:** *Not regulated*  
**T.D.G. Class:** *Not regulated*  
**Pkg. Group:** *Not regulated*

**REACTIVITY DATA**

**Chemical Stability:** *Stable*  
**Incompatibility with other substances:** *May react vigorously or violently with acids, bases, halogens, phosphorus, sulfur oxides. Reacts slowly with water, more rapidly with steam, and with acids or alkalis, to release flammable/explosive hydrogen gas. Reacts violently with halogenated products. As powder, can ignite spontaneously under certain conditions.*  
**Reactivity:** *Avoid generation of dust, excessive heat and ignition sources, and all incompatible materials.*  
**Hazardous Decomposition Products:** *Flammable/explosive hydrogen gas.*

**FIRE AND EXPLOSION DATA**

**Flammability:** *Solid not combustible. Dust or powder is flammable in contact with an ignition source. Dust can form explosive mixtures with air.*  
**Extinguishing Media:** *Dry chemical powder, class "D" extinguisher, dry sand. Water may be used as a spray or fog, liberally applied. Fight fire from upwind, from a safe distance. Firefighters must wear protective equipment and clothing sufficient to prevent inhalation of dust or fumes, and contact with skin and eyes.*  
**Flash Point (Method Used):** *Not available*  
**Autoignition Temperature:** *Not available*  
**Upper Flammable Limit (% by volume):** *Not available*  
**Lower Flammable Limit (% by volume):** *Not available*  
**Hazardous Combustion Products:** *Emits toxic fumes under fire conditions.*  
**Sensitivity to Impact:** *None*  
**Sensitivity to Static discharge:** *Mixtures of dust with air may be sensitive under certain conditions, when ignited by an electrostatic or other high-voltage spark, or other ignition source.*

**TOXICOLOGICAL PROPERTIES AND HEALTH DATA****Toxicological Data:**

**LD<sub>50</sub>:** *(oral, rat) 9 gm/kg*  
**LC<sub>50</sub>:** *Not available*

**Effects of Acute Exposure to Product:**

**Inhaled:** *Inhalation of dust or vapour may cause irritation, shortness of breath, coughing. Inhalation of high concentrations can cause "metal fume fever" with headache, metallic taste in the mouth, cough, thirst, shortness of breath, fever, pains in the legs and chest. Recovery occurs within two days after exposure is terminated, and there are no known permanent effects.*

**In contact with skin:** *May cause mechanical irritation with redness and itching.*

**In contact with eyes:** *May cause mechanical irritation, with redness, tearing, itching. May cause mild abrasion of cornea.*

**Ingested:** *Not generally considered toxic by ingestion, but large amounts may cause gastrointestinal disturbances, with metallic taste in mouth, nausea, vomiting and diarrhea, abdominal pain.*

**Effects of Chronic Exposure to Product:**

*Chronic manganese poisoning involves the central nervous system with languor, sleepiness, weakness in the legs, a spastic gait and tendency to fall, mask-like appearance of the face, and emotional disturbances such as uncontrollable laughter.*

**Carcinogenicity:** *Not listed as a carcinogen by NTP, IARC, OSHA.*

CODE: 4940-1

**Teratogenicity:** Prolonged oral administration to rats produced fetotoxicity.

**Reproductive Effects:** Men exposed to manganese dust showed decreased fertility (RTECS No. OO9275000).

**Mutagenicity:** Prolonged oral administration to rats produced mutagenic effects.

**Synergistic Products:** None known

## PREVENTIVE MEASURES

**Engineering Controls:** Local explosion-proof exhaust system.

**Respiratory Protection:** Dust mask. Up to 10 mg/m<sup>3</sup> (dust, not fume): NIOSH approved dust and mist respirator. Up to 25 mg/m<sup>3</sup> (dust, not fume): continuous-flow supplied-air respirator. Up to 50 mg/m<sup>3</sup>: full face-piece respirator with high-efficiency particulate filters, or continuous-flow or powered supplied-air respirator with tight-fitting face-piece. Up to 500 mg/m<sup>3</sup>: positive-pressure supplied-air respirator. For higher or unknown concentrations, as in fire or spill conditions, positive pressure, full face-piece self-contained breathing apparatus, or positive pressure, full face-piece supplied-air respirator, with an auxiliary positive pressure self-contained breathing apparatus.

**Eye Protection:** Chemical safety glasses. Do not wear contact lenses when working with chemicals.

**Skin Protection:** Rubber or plastic gloves. Other protective clothing, labcoat, sleeves sufficient to limit contact

**Other Personal Protective Equipment:** Safety shower and eye-wash fountain in work area.

**Leak and Spill Procedure:** Eliminate ignition sources if dust is present. Cleanup personnel must be thoroughly trained in the hazards of this material and its safe handling, and must wear protective equipment and clothing sufficient to prevent inhalation of dust or fumes, and contact with skin and eyes. Use non-sparking tools. Gather up in a manner that does not raise dust. Recycle if possible. Transfer what cannot be recycled into container and arrange removal by disposal company. After thorough clean up, wash site of spillage thoroughly with water and detergent.

**Waste Disposal:** Follow all federal, provincial and local regulations for disposal.

**Handling Procedures and Equipment:** Workers using this chemical must be properly trained in its hazards and its safe use, and must wear appropriate protective equipment and clothing. Avoid generating dust. If there is dust, keep away from heat, sparks, and all sources of ignition; avoid the accumulation of static charge, use anti-sparking tools and ground and bond equipment and containers. Use the smallest amount possible for the purpose, in a designated area with adequate ventilation. Use good housekeeping to prevent accumulations of dust. Avoid contact with skin and eyes. Avoid inhalation. Wash thoroughly after handling. Empty containers may contain hazardous residues, treat with caution.

**Storage Requirements:** Store in suitable, labelled containers, in a cool, dry, well-ventilated area, out of direct sunlight and away from incompatible materials. Keep away from water, and isolate from air. Keep containers tightly closed when not in use and when empty. Protect from damage.

## FIRST AID MEASURES

### Specific Measures:

**Eyes:** Flush eyes thoroughly with gently running water, holding eyelids open while flushing, for five to ten (5-10)

minutes, or until no trace of chemical remains. Get medical advice if irritation develops.

**Skin:** Remove contaminated clothing. Brush or wipe off dry material. Flush skin with plenty of running water until no evidence of chemical remains. If irritation develops get medical attention.

**Inhalation:** Remove to fresh air. Give oxygen and get medical attention for any breathing difficulty.

**Ingestion:** If victim is alert and not convulsing, give 1 to 2 glasses of water to drink to dilute material. If discomfort occurs, or if a large amount has been ingested, obtain medical attention.

## REFERENCES USED

CCINFO disc: Cheminfo, MSDS's

Budavari: The Merck Index, 12th ed., 1997

Sax, Lewis: Hawley's Condensed Chemical Dictionary, 11th ed., 1987

Sax: Dangerous Properties of Industrial Materials, 5th ed., 1979

Suppliers' Material Safety Data Sheets

## ADDITIONAL INFORMATION

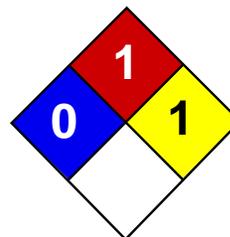
**Date Issued:** August 19, 1991

**Revision:** February 2011

**MSDS:** 4940-1

**Proposed WHMIS Designation:** B4; D2A

Prepared by: Caledon Laboratories Ltd. (905) 877-0101  
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Health	1
Fire	3
Reactivity	2
Personal Protection	E

# Material Safety Data Sheet

## Magnesium MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Magnesium

**Catalog Codes:** SLM4408, SLM2263, SLM3637

**CAS#:** 7439-95-4

**RTECS:** OM2100000

**TSCA:** TSCA 8(b) inventory: Magnesium

**CI#:** Not applicable.

**Synonym:** Magnesium ribbons, turnings or sticks

**Chemical Name:** Magnesium

**Chemical Formula:** Mg

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Magnesium	7439-95-4	100

**Toxicological Data on Ingredients:** Magnesium LD50: Not available. LC50: Not available.

### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

### Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:**

Highly flammable in presence of open flames and sparks, of heat. Flammable in presence of acids, of moisture. Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of acids, of moisture.

**Fire Fighting Media and Instructions:**

Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:**

Magnesium turnings, chips or granules, ribbons, are flammable. They can be easily ignited. They may reignite after fire is extinguished. Produces flammable gases on contact with water and acid. May ignite on contact with water or moist air. Magnesium fires do not flare up violently unless moisture is present.

**Special Remarks on Explosion Hazards:** Reacts with acids and water to form hydrogen gas which is highly flammable and explosive

### Section 6: Accidental Release Measures

**Small Spill:** Use appropriate tools to put the spilled solid in a convenient waste disposal container.

**Large Spill:**

Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

### Section 7: Handling and Storage

**Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, moisture.

**Storage:**

Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Moisture sensitive. Dangerous when wet.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid)

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 24.31 g/mole

**Color:** Silver-white

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 1100°C (2012°F)

**Melting Point:** 651°C (1203.8°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.74 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:**

Very slightly soluble in hot water. Insoluble in cold water. Insoluble in chromium trioxides, and mineral acids, alkalies. Slightly soluble with decomposition in hot water. Soluble in concentrated hydrogen fluoride, and ammonium salts.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, incompatible materials, water or moisture, moist air.

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, moisture.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Violent chemical reaction with oxidizing agents. Reacts with water to create hydrogen gas and heat. Must be kept dry. Reacts with acids to form hydrogen gas which is highly flammable and explosive. Magnesium forms hazardous or explosive mixtures with aluminum and potassium perchlorate; ammonium nitrate; barium nitrate, barium dioxide and zinc; beryllium oxide; boron phosphodiiodide; bromobenzyl trifluoride; cadmium cyanide; cadmium oxide; calcium carbide; carbonates; carbon tetrachloride; chlorine; chlorine trifluoride; chloroform; cobalt cyanide; copper cyanide; copper sulfate(anhydrous), ammonium nitrate, potassium chlorate and water; cupric oxide; cupric sulfate; fluorine; gold cyanide; hydrogen and calcium carbonate; hydrogen iodide; hydrogen peroxide; iodine; lead cyanide; mercuric oxide; mercury cyanide; methyl chloride; molybdenum trioxide; nickel cyanide; nitric acid; nitrogen dioxide; oxygen (liquid); performic acid; phosphates; potassium chlorate; potassium perchlorate; silver nitrate; silver oxide; sodium perchlorate; sodium peroxide; sodium peroxide and carbon dioxide; stannic oxide; sulfates; trichloroethylene; zinc cyanide; zinc oxide.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:** Not available.

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: May cause skin irritation by mechanical action. May get mechanical injury or embedding of chips/particles in skin. The particles that are embedded in the wounds may retard healing. Eyes: May cause eye irritation by mechanical action. Mechanical injury may occur. Particles or chips may embed in eye and retard healing. Inhalation: Low hazard for usual industrial handling. It may cause respiratory tract irritation. However, it is unlikely due to physical form. When Magnesium metal is heated during welding or smelting process, Metal Fume Fever may result from inhalation of magnesium fumes. Metal Fume Fever is a flu-like condition consisting of fever, chills, sweating, aches, pains, cough, weakness, headache, nausea, vomiting, and breathing difficulty. Other symptoms may include metallic taste, increased white blood cell count. There is no permanent ill-effect. Ingestion: Low hazard for usual industrial handling. There are no known reports of serious industrial poisonings with Magnesium. Ingestion of large amounts of chips, turnings or ribbons may cause gastrointestinal tract irritation with nausea, vomiting, and diarrhea. Acute ingestion may also result in Hypermagnesia. Hypermagnesia may cause hypotension, bradycardia, CNS depression, respiratory depression, and impairment of neuromuscular transmission (hyporeflexia, paralysis).

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

### Section 14: Transport Information

**DOT Classification:** CLASS 4.1: Flammable solid.

**Identification:** : Magnesium UNNA: 1869 PG: III

**Special Provisions for Transport:** Not available.

### Section 15: Other Regulatory Information

**Federal and State Regulations:**

Connecticut hazardous material survey.: Magnesium Rhode Island RTK hazardous substances: Magnesium Pennsylvania RTK: Magnesium Massachusetts RTK: Magnesium Massachusetts spill list: Magnesium New Jersey: Magnesium TSCA 8(b) inventory: Magnesium

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):**

CLASS B-4: Flammable solid. CLASS B-6: Reactive and very flammable material.

**DSCL (EEC):**

R11- Highly flammable. R15- Contact with water liberates extremely flammable gases. S7/8- Keep container tightly closed and dry. S43- In case of fire, use dry chemical. Never use water.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 3

**Reactivity:** 2

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 0

**Flammability:** 1

**Reactivity:** 1

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

## Section 16: Other Information

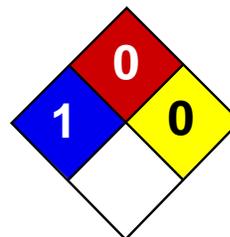
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:00 PM

**Last Updated:** 11/01/2010 12:00 PM

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Health	1
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Lead MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Lead

**Catalog Codes:** SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

**CAS#:** 7439-92-1

**RTECS:** OF7525000

**TSCA:** TSCA 8(b) inventory: Lead

**CI#:** Not available.

**Synonym:** Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

**Chemical Name:** Lead

**Chemical Formula:** Pb

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Lead	7439-92-1	100

**Toxicological Data on Ingredients:** Lead LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

**Potential Chronic Health Effects:**

Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Non-flammable in presence of open flames and sparks, of shocks, of heat.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** When heated to decomposition it emits highly toxic fumes of lead.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.05 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 0.03 (mg/m<sup>3</sup>) from NIOSH [United States] TWA: 0.05 (mg/m<sup>3</sup>) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 207.21 g/mole

**Color:** Bluish-white. Silvery. Gray

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 1740°C (3164°F)

**Melting Point:** 327.43°C (621.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 11.3 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, excess heat

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungs by mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually absorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, delirium, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead colic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

**Section 13: Disposal Considerations****Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

**Section 14: Transport Information**

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

**Section 15: Other Regulatory Information****Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 1

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:21 PM

**Last Updated:** 11/01/2010 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet Cumene MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Cumene

**Catalog Codes:** SLC3052

**CAS#:** 98-82-8

**RTECS:** GR8575000

**TSCA:** TSCA 8(b) inventory: Cumene

**CI#:** Not available.

**Synonym:** Isopropyl benzene; Cumol; 2-Phenyl propane; (1-Methylethyl)benzene

**Chemical Name:** Isopropylbenzene

**Chemical Formula:** C<sub>6</sub>H<sub>5</sub>CH(CH<sub>3</sub>)<sub>2</sub>

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Cumene	98-82-8	100

**Toxicological Data on Ingredients:** Cumene: ORAL (LD50): Acute: 1400 mg/kg [Rat]. 12750 mg/kg [Mouse]. DERMAL (LD50): Acute: 12300 mg/kg [Rabbit].

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Very hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

**Potential Chronic Health Effects:**

Very hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

**Skin Contact:**

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 424°C (795.2°F)

**Flash Points:** CLOSED CUP: 36°C (96.8°F). OPEN CUP: 44°C (111.2°F).

**Flammable Limits:** LOWER: 0.9% UPPER: 6.5%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:** Flammable in presence of open flames and sparks.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.

**Large Spill:**

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

### Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

### Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 50 CEIL: 75 (ppm) TWA: 245 CEIL: 365 (mg/m<sup>3</sup>) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 120.2 g/mole

**Color:** Clear Colorless.

**pH (1% soln/water):** Not available.

**Boiling Point:** 152.4°C (306.3°F)

**Melting Point:** -96°C (-140.8°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.862 (Water = 1)

**Vapor Pressure:** 8 mm of Hg (@ 20°C)

**Vapor Density:** 4.14 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 1.2 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 3.7

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Very slightly soluble in cold water.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:**

Acute oral toxicity (LD50): 1400 mg/kg [Rat]. Acute dermal toxicity (LD50): 12300 mg/kg [Rabbit].

**Chronic Effects on Humans:** The substance is toxic to lungs, the nervous system, mucous membranes.

**Other Toxic Effects on Humans:** Very hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

### Section 14: Transport Information

**DOT Classification:** Class 3: Flammable liquid.

**Identification:** : Isopropylbenzene : UN1918 PG: III

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: Cumene Massachusetts RTK: Cumene TSCA 8(b) inventory: Cumene SARA 313 toxic chemical notification and release reporting: Cumene CERCLA: Hazardous substances.: Cumene

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

#### WHMIS (Canada):

CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

#### DSCL (EEC):

R10- Flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes.

#### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

#### National Fire Protection Association (U.S.A.):

**Health:** 2

**Flammability:** 3

**Reactivity:** 1

**Specific hazard:**

#### Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

## Section 16: Other Information

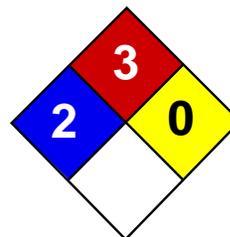
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/11/2005 11:43 AM

**Last Updated:** 06/09/2012 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet Ethylbenzene MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Ethylbenzene

**Catalog Codes:** SLE2044

**CAS#:** 100-41-4

**RTECS:** DA0700000

**TSCA:** TSCA 8(b) inventory: Ethylbenzene

**CI#:** Not available.

**Synonym:** Ethyl Benzene; Ethylbenzol; Phenylethane

**Chemical Name:** Ethylbenzene

**Chemical Formula:** C<sub>8</sub>H<sub>10</sub>

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

**Toxicological Data on Ingredients:** Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

**Potential Chronic Health Effects:**

Slightly hazardous in case of skin contact (irritant, sensitizer). **CARCINOGENIC EFFECTS:** Classified 2B (Possible for human.) by IARC. **MUTAGENIC EFFECTS:** Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 432°C (809.6°F)

**Flash Points:**

CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

**Flammable Limits:** LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

**Products of Combustion:** These products are carbon oxides (CO, CO2).

**Fire Hazards in Presence of Various Substances:** Highly flammable in presence of open flames and sparks, of heat.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

**Fire Fighting Media and Instructions:**

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

**Special Remarks on Fire Hazards:**

Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

**Special Remarks on Explosion Hazards:** Vapors may form explosive mixtures in air.

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.

**Large Spill:**

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

### Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

### Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m<sup>3</sup>) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Sweetish. Gasoline-like. Aromatic.

**Taste:** Not available.

**Molecular Weight:** 106.16 g/mole

**Color:** Colorless.

**pH (1% soln/water):** Not available.

**Boiling Point:** 136°C (276.8°F)

**Melting Point:** -94.9 (-138.8°F)

**Critical Temperature:** 617.15°C (1142.9°F)

**Specific Gravity:** 0.867 (Water = 1)

**Vapor Pressure:** 0.9 kPa (@ 20°C)

**Vapor Density:** 3.66 (Air = 1)

**Volatility:** 100% (v/v).

**Odor Threshold:** 140 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil;  $\log(\text{oil/water}) = 3.1$

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, diethyl ether.

**Solubility:**

Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources (flames, sparks, static), incompatible materials, light

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Not considered to be corrosive for metals and glass.

**Special Remarks on Reactivity:**

Can react vigorously with oxidizing materials. Sensitive to light.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation.

**Toxicity to Animals:** Acute oral toxicity (LD50): 3500 mg/kg [Rat].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

**Other Toxic Effects on Humans:**

Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

**Special Remarks on Toxicity to Animals:**

Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

**Special Remarks on Chronic Effects on Humans:**

May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm, it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and consciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastrointestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

## Section 12: Ecological Information

### Ecotoxicity:

Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

**BOD5 and COD:** Not available.

### Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

### Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** CLASS 3: Flammable liquid.

**Identification:** : Ethylbenzene UNNA: 1175 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

### Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

### Other Classifications:

### WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

**DSCL (EEC):**

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 3

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

**Section 16: Other Information****References:**

-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:28 PM

**Last Updated:** 11/01/2010 12:00 PM

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1 - PRODUCT IDENTIFICATION  
-----

PRODUCT NAME: COPPER  
FORMULA: CU  
FORMULA WT: 63.55  
CAS NO.: 07440-50-8  
NIOSH/RTECS NO.: GL5325000  
COMMON SYNONYMS: BRONZE POWDER; C.I. 77400; ARWOOD COPPER  
PRODUCT CODES: 1732,1736,1720,1714,1728  
EFFECTIVE: 06/25/86  
REVISION #02

## PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	0	NONE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

## CAUTION

MAY CAUSE IRRITATION

DURING USE AVOID CONTACT WITH EYES, SKIN, CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN NOT IN USE KEEP IN TIGHTLY CLOSED CONTAINER.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

-----  
2 - HAZARDOUS COMPONENTS  
-----

COMPONENT	%	CAS NO.
COPPER	90-100	07440-50-8

-----  
3 - PHYSICAL DATA  
-----

BOILING POINT: 2595 C ( 4703 F) VAPOR PRESSURE(MM HG): N/A  
MELTING POINT: 1083 C ( 1981 F) VAPOR DENSITY(AIR=1): N/A  
SPECIFIC GRAVITY: 8.92 EVAPORATION RATE: N/A  
(H2O=1) (BUTYL ACETATE=1)  
SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 0  
APPEARANCE & ODOR: REDDISH, LUSTROUS, MALLEABLE METAL.

-----

4 - FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT (CLOSED CUP) N/A

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA

USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

TOXIC GASES PRODUCED

COPPER FUMES

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5 - HEALTH HAZARD DATA

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THRESHOLD LIMIT VALUE (TLV/TWA): 1.0 MG/M3 ( PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE

DUST MAY CAUSE SNEEZING AND COUGHING.

DUST MAY IRRITATE SKIN OR EYES.

PROLONGED EXPOSURE MAY CAUSE DERMATITIS.

INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS,  
GASTROINTESTINAL IRRITATION.

NOTE: PRODUCT IS A SOLID MASS; HOWEVER, WARNINGS ARE BASED ON INHALATION  
DUST, MIST OR FUME EMISSIONS THAT ARE POSSIBLE DURING MANUFACTURING OR  
CHEMICAL REACTIONS.

TARGET ORGANS

NONE IDENTIFIED

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

NONE IDENTIFIED

ROUTES OF ENTRY

NONE INDICATED

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: IF SWALLOWED AND THE PERSON IS CONSCIOUS, IMMEDIATELY GIVE  
LARGE AMOUNTS OF WATER. GET MEDICAL ATTENTION.

INHALATION: IF A PERSON BREATHES IN LARGE AMOUNTS, MOVE THE EXPOSED  
PERSON TO FRESH AIR. GET MEDICAL ATTENTION.

EYE CONTACT: IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15  
MINUTES. GET MEDICAL ATTENTION.

SKIN CONTACT: IMMEDIATELY WASH WITH PLENTY OF SOAP AND WATER FOR AT LEAST  
15 MINUTES.

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6 - REACTIVITY DATA

---

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: STRONG ACIDS, ACTIVE HALOGEN COMPOUNDS, CHLORINE,  
FLUORINE, IODINE, BROMINE, AMMONIA

DECOMPOSITION PRODUCTS: COPPER FUMES

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7 - SPILL AND DISPOSAL PROCEDURES  
-----

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SUITABLE PROTECTIVE CLOTHING. CAREFULLY SWEEP UP AND REMOVE.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

-----  
8 - PROTECTIVE EQUIPMENT  
-----

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A DUST/MIST RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, PROPER GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS  
-----

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS

KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

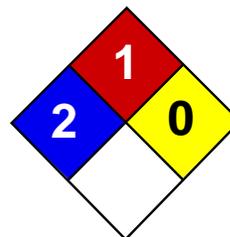
-----  
10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION  
-----

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME COPPER, HEAVY FOIL  
HAZARD CLASS ORM-E  
LABELS NONE  
REPORTABLE QUANTITY 5000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S. (NON-REGULATED)



Health	2
Fire	1
Reactivity	0
Personal Protection	E

# Material Safety Data Sheet

## Chromium MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Chromium

**Catalog Codes:** SLC4711, SLC3709

**CAS#:** 7440-47-3

**RTECS:** GB4200000

**TSCA:** TSCA 8(b) inventory: Chromium

**CI#:** Not applicable.

**Synonym:** Chromium metal; Chrome; Chromium Metal Chips 2" and finer

**Chemical Name:** Chromium

**Chemical Formula:** Cr

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Chromium	7440-47-3	100

**Toxicological Data on Ingredients:** Chromium LD50: Not available. LC50: Not available.

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

### Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 580°C (1076°F)

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:**

Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:**

Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame. Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence. Pyrophoric chromium unites with nitric oxide with incandescence. Incandescent reaction with nitrogen oxide or sulfur dioxide.

**Special Remarks on Explosion Hazards:**

Powdered Chromium metal +fused ammonium nitrate may react violently or explosively. Powdered Chromium will explode spontaneously in air.

### Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

### Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.5 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 1 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 0.5 (mg/m<sup>3</sup>) from NIOSH [United States] TWA: 0.5 (mg/m<sup>3</sup>) [United Kingdom (UK)] TWA: 0.5 (mg/m<sup>3</sup>) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid.)

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 52 g/mole

**Color:** Silver-white to Grey.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 2642°C (4787.6°F)

**Melting Point:** 1900°C (3452°F) +/- !0 deg. C

**Critical Temperature:** Not available.

**Specific Gravity:** 7.14 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:**

Insoluble in cold water, hot water. Soluble in acids (except Nitric), and strong alkalies.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, alkalis.

**Corrosivity:** Not available.

**Special Remarks on Reactivity:**

Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalies and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride. It may react violently or ignite with bromine pentafluoride. Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate. Potentially hazardous incompatibility with strong oxidizers.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

### Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

**Other Toxic Effects on Humans:**

Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: May cause skin irritation. Eyes: May cause mechanical eye irritation. Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea. Chronic Potential Health Effects: Inhalation: The effects of chronic exposure include irritation, sneezing, redness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconiosis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur. Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

**Section 13: Disposal Considerations****Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

**Section 14: Transport Information**

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

**Section 15: Other Regulatory Information****Federal and State Regulations:**

Connecticut hazardous material survey.: Chromium Illinois toxic substances disclosure to employee act: Chromium Illinois chemical safety act: Chromium New York release reporting list: Chromium Rhode Island RTK hazardous substances: Chromium Pennsylvania RTK: Chromium Minnesota: Chromium Michigan critical material: Chromium Massachusetts RTK: Chromium Massachusetts spill list: Chromium New Jersey: Chromium New Jersey spill list: Chromium Louisiana spill reporting: Chromium California Director's List of Hazardous Substances: Chromium TSCA 8(b) inventory: Chromium SARA 313 toxic chemical notification and release reporting: Chromium CERCLA: Hazardous substances.: Chromium: 5000 lbs. (2268 kg)

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** Not controlled under WHMIS (Canada).

**DSCL (EEC):**

R40- Limited evidence of carcinogenic effect S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 1

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

**Section 16: Other Information**

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:16 PM

**Last Updated:** 11/01/2010 12:00 PM

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# Material Safety Data Sheet



Methyl Chloride (R40)

## Section 1. Chemical product and company identification

<b>Product name</b>	: Methyl Chloride (R40)
<b>Supplier</b>	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
<b>Product use</b>	: Synthetic/Analytical chemistry.
<b>Synonym</b>	: Methane, chloro-; Artic; Chloromethane; Freon 40; Monochloromethane; CH <sub>3</sub> Cl; Chloor-methaan; Chlor-methan; Chlorure de methyle; Clorometano; Cloruro di metile; Methylchlorid; Metylu chlorek; R 40; Rcra waste number U045; UN 1063; Refrigerant R40
<b>MSDS #</b>	: 001036
<b>Date of Preparation/Revision</b>	: <b>4/26/2010.</b>
<b>In case of emergency</b>	: 1-866-734-3438

## Section 2. Hazards identification

<b>Physical state</b>	: Gas. [COLORLESS GAS WITH A FAINT, SWEET ODOR WHICH IS NOT NOTICED AT DANGEROUS CONCENTRATIONS [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]]
<b>Emergency overview</b>	: WARNING! FLAMMABLE GAS. MAY CAUSE FLASH FIRE. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE.  Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not ingest. May cause target organ damage, based on animal data. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed. Contact with rapidly expanding gases can cause frostbite.
<b>Target organs</b>	: May cause damage to the following organs: kidneys, the reproductive system, liver, skin, central nervous system (CNS).
<b>Routes of entry</b>	: Inhalation
<b>Potential acute health effects</b>	
<b>Eyes</b>	: Contact with rapidly expanding gas may cause burns or frostbite.
<b>Skin</b>	: Contact with rapidly expanding gas may cause burns or frostbite.
<b>Inhalation</b>	: Acts as a simple asphyxiant.
<b>Ingestion</b>	: Ingestion is not a normal route of exposure for gases
<b>Potential chronic health effects</b>	: <b>CARCINOGENIC EFFECTS:</b> Classified + (Proven.) by NIOSH. Classified 3 (Possible for humans.) by European Union. A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC. <b>MUTAGENIC EFFECTS:</b> Not available. <b>TERATOGENIC EFFECTS:</b> Not available.
<b>Medical conditions aggravated by over-exposure</b>	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

**See toxicological information (section 11)**

## Section 3. Composition, Information on Ingredients

<b>Name</b>	<b>CAS number</b>	<b>% Volume</b>	<b>Exposure limits</b>
Methyl Chloride (R40)	74-87-3	100	<b>ACGIH TLV (United States, 1/2009).</b> <b>Absorbed through skin.</b> STEL: 100 ppm 15 minute(s). STEL: 207 mg/m <sup>3</sup> 15 minute(s). TWA: 50 ppm 8 hour(s). TWA: 103 mg/m <sup>3</sup> 8 hour(s). <b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 50 ppm 8 hour(s). TWA: 105 mg/m <sup>3</sup> 8 hour(s). STEL: 100 ppm 15 minute(s). STEL: 210 mg/m <sup>3</sup> 15 minute(s). <b>OSHA PEL Z2 (United States, 11/2006).</b> TWA: 100 ppm 8 hour(s). CEIL: 200 ppm AMP: 300 ppm 5 minute(s).

## Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : As this product is a gas, refer to the inhalation section.

## Section 5. Fire-fighting measures

- Flammability of the product** : Flammable.
- Auto-ignition temperature** : 632.22°C (1170°F)
- Flash point** : Closed cup: -45.56°C (-50°F).
- Flammable limits** : Lower: 8.1% Upper: 17.2%
- Products of combustion** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
halogenated compounds  
carbonyl halides
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.
- Fire-fighting media and instructions** : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

## **Methyl Chloride (R40)**

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## **Section 6. Accidental release measures**

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

## **Section 7. Handling and storage**

- Handling** : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Do not ingest. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Storage** : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

## **Section 8. Exposure controls/personal protection**

**Engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

### **Personal protection**

- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.  
The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

### **Product name**

chloromethane

**ACGIH TLV (United States, 1/2009). Absorbed through skin.**

STEL: 100 ppm 15 minute(s).

STEL: 207 mg/m<sup>3</sup> 15 minute(s).

TWA: 50 ppm 8 hour(s).

TWA: 103 mg/m<sup>3</sup> 8 hour(s).

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 50 ppm 8 hour(s).

## Methyl Chloride (R40)

TWA: 105 mg/m<sup>3</sup> 8 hour(s).  
STEL: 100 ppm 15 minute(s).  
STEL: 210 mg/m<sup>3</sup> 15 minute(s).  
**OSHA PEL Z2 (United States, 11/2006).**  
TWA: 100 ppm 8 hour(s).  
CEIL: 200 ppm  
AMP: 300 ppm 5 minute(s).

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

<b>Molecular weight</b>	: 50.49 g/mole
<b>Molecular formula</b>	: C-H3-Cl
<b>Boiling/condensation point</b>	: -24.4°C (-11.9°F)
<b>Melting/freezing point</b>	: -97.8°C (-144°F)
<b>Critical temperature</b>	: 143.7°C (290.7°F)
<b>Vapor pressure</b>	: 58.7 (psig)
<b>Vapor density</b>	: 1.8 (Air = 1)
<b>Specific Volume (ft<sup>3</sup>/lb)</b>	: 7.5188
<b>Gas Density (lb/ft<sup>3</sup>)</b>	: 0.133

## Section 10. Stability and reactivity

<b>Stability and reactivity</b>	: The product is stable.
<b>Incompatibility with various substances</b>	: Extremely reactive or incompatible with the following materials: oxidizing materials.
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
<b>Hazardous polymerization</b>	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
chloromethane	LD50 Oral	Rat	1800 mg/kg	-
	LC50 Inhalation Vapor	Rat	5300 mg/m <sup>3</sup>	4 hours
	LC50 Inhalation Gas.	Rat	5300 mg/m <sup>3</sup>	4 hours
	LC50 Inhalation Gas.	Mouse	2200 ppm	6 hours

**IDLH** : 2000 ppm

**Chronic effects on humans** : **CARCINOGENIC EFFECTS:** Classified + (Proven.) by NIOSH. Classified 3 (Possible for humans.) by European Union. A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC.  
May cause damage to the following organs: kidneys, the reproductive system, liver, skin, central nervous system (CNS).

**Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material to humans.

### Specific effects

**Carcinogenic effects** : No known significant effects or critical hazards.

**Mutagenic effects** : No known significant effects or critical hazards.

**Reproduction toxicity** : No known significant effects or critical hazards.

## Section 12. Ecological information

### Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
chloromethane	-	Acute LC50 550000 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus - 33 to 75 mm	96 hours
	-	Acute LC50 270000 ug/L Marine water	Fish - Inland silverside - Menidia beryllina - 40 to 100 mm	96 hours

**Products of degradation** : Products of degradation: carbon oxides (CO, CO<sub>2</sub>) and water, halogenated compounds.

**Environmental fate** : Not available.

**Environmental hazards** : No known significant effects or critical hazards.

**Toxicity to the environment** : Not available.

## Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

## Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
<b>DOT Classification</b>	UN1063	METHYL CHLORIDE, OR REFRIGERANT GAS R 40	2.1	Not applicable (gas).		<p><b>Reportable quantity</b> 100 lbs. (45.4 kg)</p> <p><b>Limited quantity</b> Yes.</p> <p><b>Packaging instruction</b> <b>Passenger aircraft</b> Quantity limitation: 5 kg</p> <p><b>Cargo aircraft</b> Quantity limitation: 100 kg</p> <p><b>Special provisions</b> T50</p>
<b>TDG Classification</b>	UN1063	METHYL CHLORIDE; OR REFRIGERANT GAS R 40	2.1	Not applicable (gas).		<p><b>Explosive Limit and Limited Quantity Index</b> 0.125</p> <p><b>ERAP Index</b> 3000</p>

**Methyl Chloride (R40)**

						<b>Passenger Carrying Ship Index</b> Forbidden  <b>Passenger Carrying Road or Rail Index</b> Forbidden
<b>Mexico Classification</b>	UN1063	METHYL CHLORIDE, OR REFRIGERANT GAS R 40	2.1	Not applicable (gas).		-

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

## Section 15. Regulatory information

### United States

- U.S. Federal regulations** :
- United States inventory (TSCA 8b):** This material is listed or exempted.
  - SARA 302/304/311/312 extremely hazardous substances:** No products were found.
  - SARA 302/304 emergency planning and notification:** No products were found.
  - SARA 302/304/311/312 hazardous chemicals:** chloromethane
  - SARA 311/312 MSDS distribution - chemical inventory - hazard identification:** chloromethane: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard
  - Clean Water Act (CWA) 307:** chloromethane
  - Clean Water Act (CWA) 311:** No products were found.
  - Clean Air Act (CAA) 112 accidental release prevention:** chloromethane
  - Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.
  - Clean Air Act (CAA) 112 regulated toxic substances:** chloromethane

### SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
<b>Form R - Reporting requirements</b>	: Methyl Chloride (R40)	74-87-3	100
<b>Supplier notification</b>	: Methyl Chloride (R40)	74-87-3	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

- State regulations** :
- Connecticut Carcinogen Reporting:** This material is not listed.
  - Connecticut Hazardous Material Survey:** This material is not listed.
  - Florida substances:** This material is not listed.
  - Illinois Chemical Safety Act:** This material is not listed.
  - Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.
  - Louisiana Reporting:** This material is not listed.
  - Louisiana Spill:** This material is not listed.
  - Massachusetts Spill:** This material is not listed.
  - Massachusetts Substances:** This material is listed.
  - Michigan Critical Material:** This material is not listed.
  - Minnesota Hazardous Substances:** This material is not listed.
  - New Jersey Hazardous Substances:** This material is listed.
  - New Jersey Spill:** This material is not listed.
  - New Jersey Toxic Catastrophe Prevention Act:** This material is listed.
  - New York Acutely Hazardous Substances:** This material is listed.
  - New York Toxic Chemical Release Reporting:** This material is not listed.
  - Pennsylvania RTK Hazardous Substances:** This material is listed.
  - Rhode Island Hazardous Substances:** This material is not listed.

## Methyl Chloride (R40)

**California Prop. 65** : **WARNING:** This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>	<u>No significant risk level</u>	<u>Maximum acceptable dosage level</u>
Methyl Chloride (R40)	No.	Yes.	No.	No.

## Canada

**WHMIS (Canada)** : Class A: Compressed gas.  
Class B-1: Flammable gas.  
Class B-6: Reactive flammable material  
Class D-2A: Material causing other toxic effects (Very toxic).  
**CEPA Toxic substances:** This material is not listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

## Section 16. Other information

### United States

**Label requirements** : FLAMMABLE GAS.  
MAY CAUSE FLASH FIRE.  
MAY BE HARMFUL IF SWALLOWED.  
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.  
CONTENTS UNDER PRESSURE.

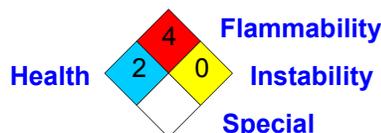
### Canada

**Label requirements** : Class A: Compressed gas.  
Class B-1: Flammable gas.  
Class B-6: Reactive flammable material  
Class D-2A: Material causing other toxic effects (Very toxic).

### Hazardous Material Information System (U.S.A.)

Health	* 2
Flammability	4
Physical hazards	0

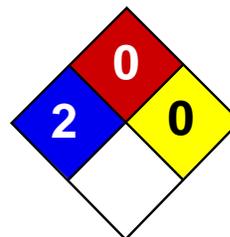
### National Fire Protection Association (U.S.A.)



### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



Health	2
Fire	0
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet Chloroform MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Chloroform

**Catalog Codes:** SLC1888, SLC5044

**CAS#:** 67-66-3

**RTECS:** FS9100000

**TSCA:** TSCA 8(b) inventory: Chloroform

**CI#:** Not available.

**Synonym:** Trichloromethane; Methane, trichlor-

**Chemical Name:** Chloroform

**Chemical Formula:** CHCl<sub>3</sub>

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Chloroform	67-66-3	100

**Toxicological Data on Ingredients:** Chloroform: ORAL (LD50): Acute: 695 mg/kg [Rat]. 36 mg/kg [Mouse]. 820 mg/kg [Guinea pig]. DERMAL (LD50): Acute: >20000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 47702 mg/m 4 hours [Rat].

### Section 3: Hazards Identification

**Potential Acute Health Effects:** Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

**Potential Chronic Health Effects:** CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, heart. Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:** Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

**Skin Contact:** In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:** Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

**Ingestion:** Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:** Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** May explode if it comes in contact with aluminum powder, lithium, perchlorate, pentoxide, bis(dimethylamino)dimethylstannane, potassium, potassium-sodium alloy, sodium (or sodium hydroxide or sodium methoxide), and methanol

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.

**Large Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:** Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as metals, alkalis.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Sensitive to light. Store in light-resistant containers.

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:** Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the workstation location.

**Personal Protection:** Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:** Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** TWA: 10 (ppm) [Australia] Inhalation TWA: 2 (ppm) from OSHA (PEL) [United States] Inhalation STEL: 9.78 (mg/m<sup>3</sup>) from NIOSH Inhalation STEL: 2 (ppm) from NIOSH Inhalation TWA: 9.78 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] Inhalation TWA: 10 (ppm) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 2 (ppm) [United Kingdom (UK)] Inhalation TWA: 9.9 (mg/m<sup>3</sup>) [United Kingdom (UK)] Inhalation Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Pleasant. Sweetish. Etheric. Non-irritating

**Taste:** Burning. Sweet.

**Molecular Weight:** 119.38 g/mole

**Color:** Colorless. Clear

**pH (1% soln/water):** Not available.

**Boiling Point:** 61°C (141.8°F)

**Melting Point:** -63.5°C (-82.3°F)

**Critical Temperature:** 263.33°C (506°F)

**Specific Gravity:** 1.484 (Water = 1)

**Vapor Pressure:** 21.1 kPa (@ 20°C)

**Vapor Density:** 4.36 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 85 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 2

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Very slightly soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, Light

**Incompatibility with various substances:** Reactive with metals, alkalis.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Light Sensitive. Incompatible with triisopropyl phosphine, acetone, disilane, fluorine, strong bases and reactive metals (aluminum, magnesium in powdered form), light.

**Special Remarks on Corrosivity:** It will attack some forms of plastics, rubber, and coatings.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact. Inhalation.

**Toxicity to Animals:** WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 36 mg/kg [Mouse]. Acute dermal toxicity (LD50): >20000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 47702 mg/m 4 hours [Rat]. 3

**Chronic Effects on Humans:** CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, heart.

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** May affect genetic material (possible mutagen) and cause adverse reproductive effects(embryotoxicity and fetotoxicity) Suspected carcinogen (tumorigenic) and teratogen based on animal data. Human: passes the placental barrier, detected in maternal milk.

**Special Remarks on other Toxic Effects on Humans:** Acute Potential Health Effects: Skin: Causes skin irritation and may cause chemical burns. Eye: Causes eye irritation, burning pain and reversible injury to corneal epithelium. Inhalation: Causes irritation of the respiratory system (mucous membranes). May affect behavior/Nervous system (CNS depressant, fatigue, dizziness, nervousness, giddiness, euphoria, loss of coordination and judgement, weakness, hallucinations, muscle contraction/spasticity, general anesthetic, spastic paralysis, headache), anorexia (neurological and gastrointestinal symptoms resembling chronic alcoholism), and possibly coma and death. May affect the liver, kidneys and gastrointestinal tract (nausea, vomiting). Ingestion: Causes gastrointestinal tract irritation (nausea, vomiting). May affect the liver, urinary system (kidneys), respiration, behavior/nervous system (symptoms similar to inhalation), and heart. Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect the liver (hepatitis, jaundice, hepatocellular necrosis), metabolism (weight loss), respiration (fibrosis, pneumoconiosis), behavior/central nervous system (symptoms similar to acute inhalation), blood, musculoskeletal system, and kidneys. Ingestion: Prolonged or repeated ingestion may affect the liver, kidneys, metabolism (weight loss), endocrine system (spleen), blood (changes in cell count).

## Section 12: Ecological Information

**Ecotoxicity:** Ecotoxicity in water (LC50): 43.8 mg/l 96 hours [Trout].

**BOD5 and COD:** Not available.

**Products of Biodegradation:** Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are as toxic as the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:** Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** : Chloroform UNNA: UN1888 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:** California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Chloroform California prop. 65 (no significant risk level): Chloroform: 0.02 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Chloroform New York release reporting list: Chloroform Rhode Island RTK hazardous substances: Chloroform Pennsylvania RTK: Chloroform Massachusetts RTK: Chloroform New Jersey: Chloroform California Director's List of Hazardous Substances (8 CCR 339): Chloroform Tennessee: Chloroform TSCA 8(b) inventory: Chloroform TSCA 8(d) H and S data reporting: Chloroform: effective: 6/1/87; sunset: 6/1/97 SARA 302/304/311/312 extremely hazardous substances: Chloroform SARA 313 toxic chemical notification and release reporting: Chloroform CERCLA: Hazardous substances.: Chloroform: 10 lbs. (4.536 kg)

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):** R20/22- Harmful by inhalation and if swallowed. R38- Irritating to skin. R40- Possible risks of irreversible effects. S36/37- Wear suitable protective clothing and gloves.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** h

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:** Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:16 PM

**Last Updated:** 06/09/2012 12:00 PM

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Health	3
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Carbon disulfide MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Carbon disulfide

**Catalog Codes:** SLC4312, SLC1522

**CAS#:** 75-15-0

**RTECS:** FF6650000

**TSCA:** TSCA 8(b) inventory: Carbon disulfide

**CI#:** Not available.

**Synonym:**

**Chemical Formula:** CS<sub>2</sub>

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Carbon disulfide	75-15-0	100

**Toxicological Data on Ingredients:** Carbon disulfide: ORAL (LD50): Acute: 3188 mg/kg [Rat]. 2780 mg/kg [Mouse]. VAPOR (LC50): Acute: 12500 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Extremely hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Very hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

**Potential Chronic Health Effects:**

Extremely hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Very hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system, liver. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

**Skin Contact:**

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 90°C (194°F)

**Flash Points:** CLOSED CUP: -30°C (-22°F). (Setaflash)

**Flammable Limits:** LOWER: 1.3% UPPER: 50%

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Flammable in presence of open flames and sparks, of oxidizing materials.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.

**Large Spill:**

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

### Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

### Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 20 CEIL: 30 (ppm) TWA: 60 CEIL: 90 (mg/m<sup>3</sup>) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 76.14 g/mole

**Color:** Clear Colorless.

**pH (1% soln/water):** 7 [Neutral.]

**Boiling Point:** 46.3°C (115.3°F)

**Melting Point:** -111.6°C (-168.9°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.2632 (Water = 1)

**Vapor Pressure:** 297.6 mm of Hg (@ 20°C)

**Vapor Density:** 2.63 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.1 ppm

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Very slightly soluble in cold water.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2780 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 12500 ppm 4 hour(s) [Rat].

**Chronic Effects on Humans:** The substance is toxic to kidneys, the nervous system, liver.

**Other Toxic Effects on Humans:**

Extremely hazardous in case of skin contact (irritant), of ingestion, of inhalation. Very hazardous in case of skin contact (permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

Embryotoxic and/or foetotoxic in animal. Human: passes through the placenta, excreted in maternal milk. Risk of spontaneous abortion in human. Causes sperm abnormalities in human. Menstrual disorders in human.

**Special Remarks on other Toxic Effects on Humans:** Not available.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

### Section 14: Transport Information

**DOT Classification:** Class 3: Flammable liquid.

**Identification:** : Carbon Disulfide : UN1131 PG: II

**Special Provisions for Transport:** Marine Pollutant

## Section 15: Other Regulatory Information

### Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Carbon disulfide California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Carbon disulfide California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Carbon disulfide California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Carbon disulfide Pennsylvania RTK: Carbon disulfide Massachusetts RTK: Carbon disulfide TSCA 8(b) inventory: Carbon disulfide SARA 302/304/311/312 extremely hazardous substances: Carbon disulfide SARA 313 toxic chemical notification and release reporting: Carbon disulfide CERCLA: Hazardous substances.: Carbon disulfide

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

#### WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

#### DSCL (EEC):

R11- Highly flammable. R38- Irritating to skin. R41- Risk of serious damage to eyes.

#### HMIS (U.S.A.):

**Health Hazard:** 3

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

#### National Fire Protection Association (U.S.A.):

**Health:** 3

**Flammability:** 4

**Reactivity:** 0

**Specific hazard:**

#### Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:16 PM

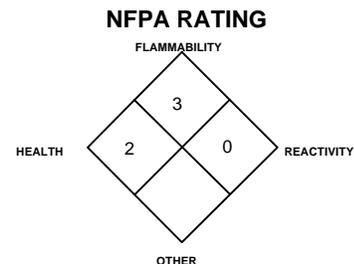
**Last Updated:** 06/09/2012 12:00 PM

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# MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards



## **PART I** *What is the material and what do I need to know in an emergency?*

### 1. PRODUCT IDENTIFICATION

**CHEMICAL NAME; CLASS:** **BENZENE - C<sub>6</sub>H<sub>6</sub>**  
 Document Number: 1062

**PRODUCT USE:** For general analytical/synthetic chemical uses.

**SUPPLIER/MANUFACTURER'S NAME:** AIRGAS INC.  
**ADDRESS:** 259 Radnor-Chester Road  
 Suite 100  
 Radnor, PA 19087-5240  
 1-610-687-5253

**BUSINESS PHONE:** CHEMTREC: 1-800-424-9300  
**EMERGENCY PHONE:** International: 202-483-7616  
 May 14, 1997

**DATE OF PREPARATION:**  
**SECOND REVISION:** January 16, 1998

### 2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH ppm	OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm		
BENZENE	71-43-2	99.9%	0.5, A1 (Confirmed Human Carcinogen)	2.5, A1 (Confirmed Human Carcinogen)	1	5	500	NIOSH REL: 0.1 ppm TWA; 1 ppm STEL  OSHA: 1 ppm TWA; 5 ppm STEL OSHA Action Level: 0.5 ppm  EPA-A; IARC-1; MAK-A1; NIOSH-X; NTP-1; OSHA-X;

NE = Not Established

C = Ceiling Limit

See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

### 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW:** Benzene is a colorless, flammable, toxic liquid with a characteristic aromatic odor. Benzene is a confirmed human carcinogen and a possible human mutagen. Inhalation of vapors of Benzene can cause serious, permanent damage to the blood system. Skin and eye contact can be irritating. This liquid is very flammable; vapors are heavier than air and may travel long distances to source of ignition and flashback. If involved in a fire Benzene will decompose to produce toxic gases (e.g., carbon monoxide, carbon dioxide, irritating aldehydes and ketones). Persons responding to fires or emergencies involving Benzene must have adequate fire protection and wear personal protective equipment to protect against the significant health hazards posed by Benzene.

**SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:** Benzene is a serious poison by all routes of exposure. The symptoms of each route of exposure are described below.

**INHALATION:** The immediate symptoms of inhalation of vapors of Benzene are due to the initial excitation, followed by depression of the central nervous system. Central nervous system symptoms include drowsiness, headache, nausea, incoordination and unconsciousness, that can lead to death in severe cases. Other symptoms of acute overexposure to vapors of Benzene can include transient euphoria, ataxia (incoordination of voluntary muscular movements), vertigo, tinnitus, substernal pain, cough, hoarseness and general irritation of the nose, throat and respiratory tract, confusion, stupefaction and coma. In cases of severe overexposure (as may occur in a confined space, or other poorly ventilated areas, or if large volumes are used or released), tremors, convulsions and death, due to respiratory paralysis or circulatory collapse can occur within minutes to several hours following exposure. Reversible liver and kidney effects have been reported after exposure to Benzene. The effects associated with various levels of Benzene vapors are as follows:

**CONCENTRATION**

Brief (10 minute) up to 25 ppm:  
50-150 ppm:

20,000 (for 5-10 min):

**SYMPTOM OF EXPOSURE**

No symptoms.  
Exhilaration, headache, tiredness, nose and throat irritation.  
Collapse and death

One of the most significant health effects associated with Benzene is the potential for blood system disorders which develop after long-term exposures to relatively low vapor concentrations. There are reports that exposure to low levels (10 ppm) over an extended time period (24 weeks) of Benzene vapors can damage the bone marrow and blood systems. This damage can result in the development of serious health disorders (including anemia and leukemia). Adverse effects on the immune system have also been reported. Refer to "Other Health Effects" in this section for further information.

**CONTACT WITH SKIN or EYES:** Contact with the skin can cause irritation and redness. Repeated or prolonged contact can also cause dermatitis, resulting in dry, itchy, cracked skin as Benzene is a defatting agent, removing oils from the skin. Contact with the vapors of Benzene and the eyes will be irritating. Direct contact of the liquid with the eyes can cause irritation, pain; prolonged contact may result in tissue damage.

**SKIN ABSORPTION:** Benzene poisoning through skin contact has been reported, although skin absorption is not considered as significant a route of exposure as via inhalation or ingestion. Symptoms of absorption may be similar to those described in "Ingestion".

**INGESTION:** Ingestion of Benzene will cause a burning sensation in the mouth and stomach, nausea, vomiting, excess salivation and vomiting of blood. Benzene is readily absorbed into the body following ingestion exposures, producing symptoms of central nervous system depression and other symptoms similar to those described in "Inhalation". If ingested, Benzene presents a potential aspiration hazard. Aspiration of even small amounts of Benzene into the lungs can result in immediate pulmonary edema (a potentially fatal accumulation of fluid in the lungs), chemical pneumonitis and hemorrhage of pulmonary tissue.

**INJECTION:** Injection is not anticipated to be a significant route of overexposure for Benzene. If Benzene is "injected" (as may occur through punctures by contaminated, sharp objects), symptoms described in "Inhalation" can occur.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
<b>HEALTH</b>			2
<b>FLAMMABILITY</b>			3
<b>REACTIVITY</b>			0
P R O T E C T I V E E Q U I P M E N T			X
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

**See Section 16 for Definition of Ratings**

### 3. HAZARD IDENTIFICATION (Continued)

**OTHER HEALTH EFFECTS:** The chief target organ affected by serious Benzene exposure is the blood and bone marrow system. Chronic Benzene exposure eventually leads to pancytopenia (abnormal decrease of all three formed elements of the blood; hemoglobin, disease-fighting leukocytes and blood-clotting thrombocytes), followed by thrombocytopenia (problems with the blood-clotting properties of the blood) and anemia. These syndromes can lead to sudden, overwhelming infections. After exposure to Benzene, bleeding from the nose, gums, or mucous membranes and development of small bruises can occur. Benzene is a confirmed human carcinogen and can produce forms of leukemia. Direct contact with the liquid with mucous membranes will result in the development of hemorrhagic lesions.

**HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms.** Overexposure to may cause the health effects described on the following page.

**ACUTE:** Acute inhalation overexposure to Benzene will initially act as a narcotic, possibly leading to coma in extreme cases. Following exposure to high concentrations, victims may be unconscious, and if exposure continues, death can follow from respiratory failure and circulatory collapse. Contact with the skin can cause irritation and dermatitis. Contact with the eyes is irritating, causing burning and watering of the eyes. Ingestion of Benzene will cause gastric distress, hemorrhage and possible severe depression of the central nervous system. Aspiration of Benzene into the lungs, following ingestion, can result in severe damage to the lungs; death may result.

**CHRONIC:** Chronic exposure to Benzene causes serious damage to the health by all routes of exposure. Chronic oral and inhalation exposure causes severe effects on the blood system, including damage to the bone marrow, leading to a decrease in production or changes to the cells of hemoglobin, hematocrit, red and white blood cells. Effects can occur with an exposure level as low as 10 ppm for 24 weeks. Benzene also causes harmful changes to the immune system, decreasing the production of mature B- and T- white blood cells. Benzene is a confirmed human carcinogen, which can produce Hodgkin's Disease, leukemia and lymphomas by inhalation. Human mutation data are reported for Benzene. See Section 11 (Toxicological Information) for further information. Symptoms of chronic exposure by most routes can be delayed for months to years after exposure has ceased.

**TARGET ORGANS:** Respiratory system, central nervous system, blood and immune systems, bone marrow, heart, liver, kidneys, skin, eyes, and reproductive system.

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## PART II *What should I do if a hazardous situation occurs?*

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### 4. FIRST-AID MEASURES

**RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO BENZENE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. If necessary, a Self-Contained Breathing Apparatus should be worn.**

**INHALATION:** If vapors, mists, or sprays of Benzene are inhaled, remove victim to fresh air. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary. Remove or cover gross contamination to avoid exposure to rescuers.

**SKIN EXPOSURE:** If Benzene contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek medical attention if any adverse reaction occurs.

**EYE EXPOSURE:** If Benzene or its vapors enter the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

**INGESTION:** If Benzene is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow.

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Physicians should refer to "Recommendations to Physicians" in Section 11 (Toxicological Information). Take copy of label and MSDS to health professional with victim.

---

## 5. FIRE-FIGHTING MEASURES

FLASH POINT, (Closed Cup): -11°C (12°F)

AUTOIGNITION TEMPERATURE: 498°C (928°F)

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 1.3%

Upper (UEL): 7.1%

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES (for cooling only)

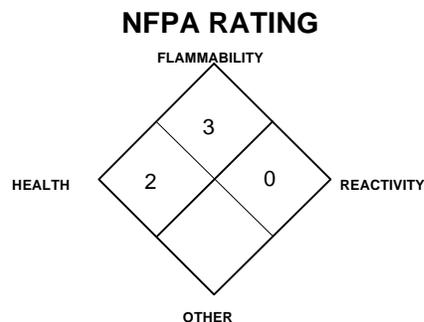
Foam: YES

Halon: YES

Carbon Dioxide: YES

Dry Chemical: YES

Other: Any "B" Class.



**See Section 16 for Definition of Ratings**

UNUSUAL FIRE AND EXPLOSION HAZARDS: Benzene is a Class IB flammable liquid and presents a serious fire hazard to firefighters. Due to the low flash point, vapors can form explosive mixtures with air, at room temperature. When involved in a fire, this material may decompose and produce toxic gases (e.g., carbon monoxide, carbon dioxide, irritating aldehydes and ketones). The vapors of Benzene are heavier than air and may spread long distances; distant ignition and flash-back are possible. Benzene can float on water; therefore, water contaminated with Benzene can spread the flammable liquid and can spread fire. Containers of Benzene, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Benzene can accumulate static charge by flow or agitation; vapors can be ignited by static discharge.

SPECIAL FIRE-FIGHTING PROCEDURES: In the event of fire, cool containers of Benzene with water to prevent failure. Use a water spray or fog to reduce or direct vapors. Water may not be effective in actually extinguishing a fire involving Benzene, due to its low flash point. Stop the leak or discharge, if possible. For small releases, if it is not possible to stop the leak, and it does not endanger personnel, let the fire burn itself out. Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment, including chemical resistant clothing. Large fires should be fought from a distance with an unmanned hose holder or monitor nozzles. If Benzene is involved in a fire, fire runoff water should be contained to prevent possible environmental damage. If necessary, decontaminate fire-response equipment with soap and water solution. For large releases, consider evacuation. Refer to the North American Emergency Response Guidebook (Guide #130) for additional guidance.

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## 6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area, protect people, and respond with trained personnel.

Minimum Personal Protective Equipment should be **Level B: triple-gloves (rubber gloves and nitrile gloves, over latex gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus.** Monitor the surrounding area for combustible vapor levels. Combustible vapor levels must be below 10% of the LEL for Benzene (LEL = 1.3%) before personnel are permitted to enter the area. If necessary, ventilate area.

Monitoring should be done for the levels of Benzene and oxygen. Colorimetric tubes are available to detect the presence of Benzene. Levels of Benzene should be below levels listed in Section 2 (Composition and Information on Ingredients) and the atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus.

Eliminate all sources of ignition before clean-up operations begin. Use non-sparking tools. Absorb spilled liquid with activated carbon, polypads or other suitable absorbent materials. Prevent material from entering sewer or confined spaces. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. If necessary, decontaminate spill-response equipment with soap and water solution. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section 13, Disposal Considerations).

**THIS IS AN EXTREMELY FLAMMABLE, TOXIC LIQUID:** Protection of all personnel and the area must be maintained. All responders must be adequately protected from exposure.

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## PART III *How can I prevent hazardous situations from occurring?*

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### 7. HANDLING and STORAGE

**WORK PRACTICES AND HYGIENE PRACTICES:** As with all chemicals, avoid getting Benzene ON YOU or IN YOU. Wash hands after handling chemicals. Do not eat or drink while handling this material. Remove contaminated clothing immediately.

**Note:** Refer to the OSHA Benzene Standard (29 CFR 1910.1028) for specific requirements associated with the use of Benzene. The Action Level for Benzene is 0.5 ppm as an 8-hour, time-weighted average. In workplaces where employees are exposed above the Action Level, the OSHA requirements for monitoring, establishment of regulated areas, methods of compliance, respiratory protection, emergency response protocol, medical surveillance, training and record keeping must be followed.

**STORAGE AND HANDLING PRACTICES:** Entrances to regulated areas (as defined by the OSHA Benzene Standard) must be posted with signs which reads as follows:

<p style="text-align: center;"><b>DANGER</b> BENZENE CANCER HAZARD FLAMMABLE- NO SMOKING AUTHORIZED PERSONNEL ONLY</p>
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All employees who handle this material should be trained to handle it safely. Avoid breathing vapors or mists generated by Benzene. Use in a well-ventilated location. Cylinders of Benzene must be properly labeled. If Benzene is used in other types of containers, only use portable containers and dispensing equipment (faucet, pump, drip can) approved for flammable liquids.

Store cylinders of Benzene in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Do not allow area where cylinders are stored to exceed 52°C (125°F). Material should be stored in secondary containers, or in a diked area, as appropriate. Store containers away from incompatible chemicals. Keep container tightly closed when not in use. Storage areas should be made of fire-resistant materials. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Refer to NFPA 30, Flammable and Combustible Liquids Code, for additional information on storage.

Empty containers may contain residual flammable liquid or vapors. Therefore, empty containers should be handled with care. Do not expose "empty" containers to welding touches, or any other source of ignition.

**SPECIAL PRECAUTIONS FOR HANDLING CYLINDERS:** Protect cylinders of Benzene against physical damage. If appropriate, cylinders should be stored in an up-right position. Cylinders should be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. Electrical equipment should be non-sparking or explosion proof. The following rules are applicable to situations in which cylinders are being used :

**Before Use:** If appropriate, move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap in-place until cylinder is ready for use.

**During Use:** Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

**After Use:** Close main cylinder valve. Replace valve protection cap. Mark empty cylinders "EMPTY".

**NOTE:** Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Benzene. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Bulletin SB-2 "Oxygen Deficient Atmospheres".

**PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:** Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use Benzene in areas where adequate ventilation is provided. Decontaminate equipment using soapy water before maintenance begins. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

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## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation. Use a mechanical fan or vent area to outside. Where appropriate, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Ensure eyewash/safety shower stations are available near areas where Benzene is used.

**RESPIRATORY PROTECTION:** Maintain exposure levels of Benzene below the levels listed in Section 2 (Composition and Information on Ingredients) and oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if Benzene levels exceed exposure limits and if oxygen level is below 19.5% or during emergency response to a release of Benzene. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards. The following NIOSH respiratory protection recommendations are for Benzene.

### **CONCENTRATION**      **RESPIRATORY EQUIPMENT**

At Concentrations Above the NIOSH REL, or Where there is no REL, at any Detectable Concentration: Positive-pressure, full facepiece SCBA or positive pressure, full-facepiece Supplied Air Respirator (SAR) with an auxiliary positive pressure SCBA.

Escape: Gas mask with organic vapor cartridge or escape-type SCBA should be used.

The IDLH concentration for Benzene is 500 ppm. The carcinogenic effects of Benzene were not considered by NIOSH in determination of the IDLH.

**NOTE:** In areas which exceed the OSHA Action Level of Benzene, the respirator selection guidelines in the Benzene Standard [29 CFR 1910.1028 (g)] apply.

**EYE PROTECTION:** Splash goggles or safety glasses. Face-shields should be worn if contact with the liquid is anticipated.

**HAND PROTECTION:** Wear leather gloves for handling of cylinders of Benzene. Wear chemically impervious gloves appropriate for Benzene for industrial use. Gloves should have a resistance to breakthrough greater than 8 hours, such as polyvinyl alcohol, Barricade™ or Responder™. **Butyl rubber, natural rubber, neoprene, nitrile rubber, or polyethylene, polyvinyl chloride, Saranex™, Chemrel™ are not recommended.** Use triple gloves for spill response (see Section 6, Accidental Release Measures).

**BODY PROTECTION:** Use body protection appropriate for task. An impervious, full-body, encapsulating suit may be necessary for some operations involving Benzene. Safety shoes are recommended when handling cylinders.

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## 9. PHYSICAL and CHEMICAL PROPERTIES

**RELATIVE VAPOR DENSITY (air = 1):** 2.7

**SPECIFIC GRAVITY(@ 68°F (20°C) (water = 1):** 0.877

**SOLUBILITY IN WATER @ 77°F (25°C):** 180 mg/mL

**EVAPORATION RATE (diethyl ether = 1):** 2.8

**ODOR THRESHOLD:** 97 ppm(detection); 97 ppm (recognition)

**LOG COEFFICIENT WATER/OIL DISTRIBUTION:** Log P (oct) = 1.18-1.9; 2.13; 2.15

**VAPOR PRESSURE @ 68°F (20°C):** 75 mm Hg; 10 kPa

**pH:** Not applicable.

**FREEZING/MELTING POINT:** 5.5°C (42°F)

**BOILING POINT:** 80°C (176°F)

**SPECIFIC VOLUME:** Not applicable.

**EXPANSION RATIO** Not applicable.

**APPEARANCE AND COLOR:** Colorless, flammable liquid, with a characteristic aromatic hydrocarbon odor.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** The odor of Benzene is not a good warning property as the odor threshold is above the TLV.

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## 10. STABILITY and REACTIVITY

**STABILITY:** Normally stable.

**DECOMPOSITION PRODUCTS:** If Benzene is involved in a fire, it may ignite to yield toxic fumes of carbon monoxide, carbon dioxide, irritating aldehydes and ketones.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Benzene becomes spontaneously flammable in the presence of sodium peroxide and potassium peroxide. Benzene can explode on contact with chromic anhydride, permanganic acid and chlorine.

## 10. STABILITY and REACTIVITY (Continued)

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE (Continued):** Benzene can react vigorously with oxidizing materials. Benzene may react violently or explosively with risk of fire with nitric acid, ozone, diborane, interhalogens (e.g., bromine trifluoride, bromine pentafluoride, chloride trifluoride, iodine pentafluoride, iodine heptafluoride), dioxygen difluoride, dioxygenyl tetrafluoroborate, permanganic acid, peroxodisulfuric acid, peroxomonosulfuric acid. Benzene will react with nitril perchlorate, causing a slight explosion and flash. Benzene will react vigorously with uranium hexafluoride. Benzene will attack rubber and plastics.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** Avoid contact with incompatible materials, sparks, flame static discharge and other sources of ignition. Avoid exposing cylinders to extremely high temperatures, which could cause the cylinders to rupture or burst.

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## PART III *How can I prevent hazardous situations from occurring?*

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### 11. TOXICOLOGICAL INFORMATION

**TOXICITY DATA:** The following information is available for Benzene.

Skin-Rabbit, adult 15 mg/24 hours open Mild irritation effects

Skin-Rabbit, adult 20 mg/24 hours Moderate irritation effects

Eye effects-Rabbit, adult 88 mg Moderate irritation effects

Eye effects-Rabbit, adult 2 mg/24H Severe irritation effects

oms-Human: lymphocyte 5  $\mu\text{mol/L}$

Microsomal Mutagenicity Assay-Mouse: embryo 2500 mg/L

Oral-Mouse TDLo: 6500 mg/kg (female 8-12 days post): Reproductive effects Teratogenesis, Carcinogenesis, and Mutagenesis

Inhalation-Mouse TCLo: 5 ppm (female 6-15 days post): Teratogenic effects

Inhalation-Man TCLo: 200 mg/m<sup>3</sup>/78 weeks -intermittent: Carcinogenic effects, Blood effects

Inhalation-Human TCLo: 10 ppm/8 hours /10 years-intermittent: Carcinogenic effects, Blood effects

Oral-Rat TDLo: 52 g/kg/52 weeks - intermittent: Carcinogenic effects

Inhalation-Rat TCLo: 1200 ppm/6 hours/10 weeks - intermittent: Equivocal tumorigenic agent

Oral-Mouse TDLo :18,250 mg/kg/2 years - continuous: Carcinogenic effects

Inhalation-Human TC :8 ppb/4 weeks- intermittent: Carcinogenic effects, Blood effects

Inhalation-Dog, adult LCLo: 146,000 mg/

Inhalation-Cat, adult LCLo: 170,000 mg/m<sup>3</sup>

Inhalation-Human TC: 10 mg/m<sup>3</sup>/11 years- intermittent: Carcinogenic effects, Blood effects

Inhalation-Mouse TCLo: 300 ppm/6 hours/16 weeks-intermittent: Equivocal tumorigenic agent

Skin-Mouse TDLo: 1200 g/kg/49 weeks - intermittent: Neoplastic effects

Intraperitoneal-Mouse TDLo: 1200 mg/kg/8 weeks - intermittent: Neoplastic effects

Inhalation-Man TC: 150 ppm/11 years - intermittent: Carcinogenic effects, Blood effects

Inhalation-Mouse TC :1200 ppm/6 hours/10 weeks - intermittent: Equivocal tumorigenic agent

Oral-Mouse TD: 2400 mg/kg/8 weeks - intermittent: Neoplastic effects

Inhalation-Mouse TC: 300 ppm/6 hours/16 weeks intermittent: Carcinogenic effects

Inhalation-Human LCLo :2 pph/5 minutes

Oral-Man LDLo: 50 mg/kg

Inhalation-Human LCLo: 20,000 ppm/5

Inhalation-Man TCLo: 150 ppm/1 year - intermittent: Blood effects

Inhalation-Human TCLo: 100 ppm

Intravenous-Rabbit, adult LDLo :88 mg/kg

Inhalation-Human LCLo: 65 mg/m<sup>3</sup>/5 years: Blood effects

Oral-Rat LD50: 3306 mg/kg

Inhalation-Rat LC50: 10,000 ppm/7 hours

Intraperitoneal-Rat LD50 :2890  $\mu\text{g/kg}$

Oral-Mouse LD50: 4700 mg/kg

Inhalation-Mouse LC50: 9980 ppm

Intraperitoneal-Mouse LD50: 340 mg/kg

Oral-Dog, adult LDLo: 2000 mg/kg

Subcutaneous-Mouse TDLo 600 mg/kg/17 weeks - intermittent: Equivocal tumorigenic agent

Parenteral-Mouse TDLo: 670 mg/kg/19 weeks - intermittent: Equivocal tumorigenic agent

Inhalation-Human TC: 150 ppm/15 minutes /8 years - intermittent: Carcinogenic effects, Blood effects

Oral-Rat TD: 52 g/kg/1 years - intermittent: Carcinogenic effects

Oral-Rat TD: 10 g/kg/52 weeks - intermittent: Carcinogenic effects

Inhalation-Man TC :600 mg/m<sup>3</sup>/4 years - intermittent: Carcinogenic effects, Blood effects

**Additional Information on Benzene:** Because of the chronic toxicity effects associated with Benzene, additional information is provided, as follows:

**EFFECTS ON THE BLOOD AND BLOOD-FORMING ORGANS:** Extensive studies have conclusively proven that oral and inhalation exposure to benzene causes severe effects on the blood system, including damaging the bone marrow where new blood cells are formed. Most studies report a decrease in hemoglobin, hematocrit, red and white blood cells, platelets and/or changes in the cells. Effects of varying severity have been demonstrated with both intermittent and continuous exposures to concentrations as low as 10 ppm for 24 weeks.

**EFFECTS ON THE IMMUNE SYSTEM:** Studies have also conclusively shown that benzene causes harmful changes to the immune system which protects the body from disease. Benzene has decreased the number of mature B- and T-lymphocytes (white blood cells which produce disease-fighting antibodies). Exposure of mice to 300 ppm for 6 to 23 weeks resulted in a decrease in the number of mature B- and T-lymphocytes. Rats and mice exposed orally to 25 to 200 mg/kg/day for 2 years had significantly reduced white blood cells and lymphocytes.

## 11. TOXICOLOGICAL INFORMATION (Continued)

**SUSPECTED CANCER AGENT:** Benzene is listed as follows:

**BENZENE:** ACGIH-A2 (Suspected Human Carcinogen); EPA-A (Human Carcinogen); IARC-1 (Carcinogenic to Humans); MAK-A1 (Capable of Inducing Malignant Tumors/Experience with Humans); NIOSH-X (Carcinogen); NTP-1 (Known to be a Carcinogen); OSHA-X (Carcinogen); Cal-OSHA (Carcinogen).

**IRRITANCY OF PRODUCT:** Benzene is irritating to the skin, eyes, and other contaminated tissue.

**SENSITIZATION OF PRODUCT:** Benzene is not known to cause respiratory system or skin sensitization in humans. Cardiac sensitization to stimulants (e.g., epinephrine, ephedrine) is a possible result of severe or chronic overexposure.

**REPRODUCTIVE TOXICITY INFORMATION:** Listed below is information concerning the effects of Benzene on the human reproductive system.

**Mutagenicity:** Human mutation data are available for Benzene. These data were obtained from individuals who were exposed at levels which produced changes in the blood system.

**Embryotoxicity:** Benzene is not reported to cause embryotoxic effects in humans.

**Teratogenicity:** Benzene is not reported to cause teratogenic effects in humans. Teratogenic data are available from clinical studies involving test animals exposed to relatively high doses of Benzene. Fetotoxic effects (e.g., reduced birth weight and/or minor skeletal variations) were observed at exposures above 50 ppm.

**Reproductive Toxicity:** Data on reproductive effects on ovaries and testes are available from clinical studies involving test animals exposed to relatively high doses of Benzene. These data were obtained at doses which caused toxic effects on other organs.

*A **mutagen** is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An **embryotoxin** is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance which interferes in any way with the reproductive process.*

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Pre-existing blood system disorders, respiratory conditions, central nervous, liver, kidney, and cardio-vascular conditions may be aggravated by severe or chronic overexposure to Benzene. Skin disorders may also be aggravated by exposures to Benzene.

**RECOMMENDATIONS TO PHYSICIANS:** The following guidelines are derived from "Clinical Toxicology of Commercial Chemical Products" (5th edition, 1984).

- Check for signs of impending pulmonary edema.
- Because of the aspiration hazard, avoid emetic drugs, whenever practical.
- For overexposures in which emesis is advisable: If the patient is not drowsy, comatose, or in respiratory difficulty, induce vomiting. If necessary, as an alternative treatment, remove Benzene from the stomach via gastric lavage. One or two ounces of mineral oil may be instilled and left in the stomach at the completion of lavage.
- Avoid epinephrine because of its possible adverse effect on the sensitized myocardium. Avoid all digestible fats, oils and alcohol,, which may promote the absorption of Benzene in the intestinal system.
- If eyes or skin are affected, wash thoroughly and apply a bland analgetic ointment.
- Because of the possibility of ventricular fibrillation, monitor the ECG continuously and be prepared to administer external cardiac massage.

Refer to the OSHA Benzene Standard [29 CFR 1910.1028; paragraph(i) and Appendix C] for specific information on Medical Surveillance requirements (i.e. for the general physical exam, medical history, specific tests, and re-examination protocol).

**BIOLOGICAL EXPOSURE INDICES (BEIs):** The following Biological Exposure Indices (BEIs) are currently applicable for Benzene.

BIOLOGICAL EXPOSURE INDICES (BEIs) for Benzene are as follows:		
CHEMICAL DETERMINANT	SAMPLING TIME	BEI
BENZENE • Total phenol in urine • Benzene in exhaled air: mixed-exhaled end-exhaled	• End of shift • Prior to next shift	• 50 mg/g creatinine  • 0.08 ppm • 0.12 ppm

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## 12. ECOLOGICAL INFORMATION

**ENVIRONMENTAL STABILITY:** Benzene will be degraded over time into other organic compounds. The following environmental data are available for Benzene.

**BENZENE:**  $K_{OW} = 2.13$ . Water Solubility = 1791 mg/L. BCF (*Anguilla japonica*, eels) = 3.5. BCF (*Clupea harengus Pallasii*, pacific herring) = 4.4. BCF (goldfish) = 4.3. BCF, benzene = 24 (estimated). If benzene is released into the soil, it will be volatilized near the surface or it will leach to the groundwater. No degradation of benzene (BOD) was reported in coarse-filtered Lake Superior harbor water incubated at 21°C for 12 days. In the marine eco-system, biodegradation occurs from 2 days to 2 weeks in the summer and spring, respectively. The half-life of Benzene in estuarine water was 6 days, as measured by  $^{14}CO_2$  produced. Biodegradation half-lives of 28 and 16 days were reported in die-away tests for degradation of up to 3.2 UL/L benzene using groundwater and Lester River water, respectively, under aerobic conditions. In a base-rich para-brownish soil, 20 ppm benzene was 24% degraded in one week, 44% in 5 weeks and 47% in 10 weeks. It is not expected to adsorb to sediment nor bioconcentrate in aquatic organisms.

**EFFECT OF MATERIAL ON PLANTS or ANIMALS:** Benzene may be harmful or fatal to contaminated plant and animal-life (especially if large quantities of Benzene are released). Refer to Section 11 (Toxicology Information). Additional information is available on the effects of Benzene on plants as follows:

Benzene is lethal to plants at high concentrations (GT 15600 ppm in air) and short (30 minutes) exposure times. In all species studied recovery was complete upon removal from exposure to sub-lethal concentrations.

Plant growth and rooting is stimulated by aqueous solutions of low benzene concentrations (0.01-0.10 saturated). Aqueous solutions containing high concentrations (0.10-0.15% Benzene) inhibit growth and interfere with metabolism and cell division.

**EFFECT OF CHEMICAL ON AQUATIC LIFE:** Benzene can be harmful or fatal to contaminated aquatic plant and animal life. Benzene floats on water, and can potentially form slicks which are capable of creating oxygen-deprived waterways which can contaminate coastal and shore life. The following aquatic toxicity data are available for Benzene.

LC<sub>100</sub> (*Tetrahymena pyriformis*, ciliate) = 12.8 mmol/L/24 hours  
LC<sub>50</sub> (*Palaemonetes pugio*, grass shrimp) = 27 ppm/96 hours  
LC<sub>50</sub> (*Cancer magister*, crab larvae, stage 1) = 108 ppm/96 hours  
LC<sub>50</sub> (*Crangon franciscorum*, shrimp) = 20 ppm/96 hours  
LC<sub>50</sub> (*Poecilia reticulata*, guppy) = 63 ppm/14 days  
LC<sub>50</sub> (*Morone saxatilis*, bass) = 5.8 to 10.9 ppm/96 hours  
LC<sub>50</sub> (*Salmo trutta*, brown trout yearling) = 12 mg/L/1-hour  
LC<sub>50</sub> (*Ambystoma mexicana*, mexican axototl salamander, 3-4 weeks after hatching) = 370 mg/L/48 hours  
LC<sub>50</sub> (clawed toad, 3-4 weeks after hatching) = 190 mg/L/48 hours  
LD<sub>50</sub> (*Carassium auratus*, goldfish) = 46 mg/L/24-hours  
LD<sub>50</sub> (*Lepomis macrochirus*, bluegill sunfish) = 60 mg/L/2-hours

LC (*Daphnia magna*) highest no adverse level = 98 mg/L  
Effect level (blue crab) = 1 mg/L  
EC<sub>50</sub> (freshwater green algae, *Ankistrodesmus falcatus*) = 310 mg (3.97 mmol/L)  
Photosynthetic carbon fixation (*selenastrum capricornutum*) = 100, 95, 84, 5; for 24 hour exposure to 0, 10, 100 Or 1000 mg Benzene/L  
Growth inhibition (*Chlorella vulgaris*) = significant for 25-1744 ppm Benzene  
Light saturated photosynthesis relative rates (*Nitzschia palea*, freshwater diatom) = 100, 61, 38, 13; exposure for 2 hours to 0, 175, 350, 520 mg Benzene/L  
Growth inhibition (*Skeletonema costatum*) = at 20 mg/L

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## 13. DISPOSAL CONSIDERATIONS

**PREPARING WASTES FOR DISPOSAL:** Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with residual product to Airgas Inc. Do not dispose of locally.

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## 14. TRANSPORTATION INFORMATION

**THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.**

**PROPER SHIPPING NAME:** Benzene  
**HAZARD CLASS NUMBER and DESCRIPTION:** 3 (Flammable Liquid)  
**UN IDENTIFICATION NUMBER:** UN 1114  
**PACKING GROUP:** PG II  
**DOT LABEL(S) REQUIRED:** Flammable Liquid  
**NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996):** 130

**MARINE POLLUTANT:** Benzene is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

**TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:** THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments. Also, there is an additional Hazard Class: 9.2 (Substance Hazardous to the Environment).

## 15. REGULATORY INFORMATION

**U.S. SARA REPORTING REQUIREMENTS:** Benzene is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows:

COMPONENT	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Benzene	NO	YES	YES

**U.S. SARA THRESHOLD PLANNING QUANTITY:** Not applicable.

**U.S. CERCLA REPORTABLE QUANTITIES (RQ):** 10 lb; RCRA Code = U019.

**CANADIAN DSL/NDL INVENTORY STATUS:** Benzene is on the DSL Inventory.

**U.S. TSCA INVENTORY STATUS:** Benzene is listed on the TSCA Inventory.

**OTHER U.S. FEDERAL REGULATIONS:** Benzene is subject to the requirements of CFR 29 1910.1028, the OSHA Benzene Standard. The Action Level for Benzene is 0.5 ppm as an 8-hour, time-weighted average under this regulation. The EPA is promulgating water regulations for certain volatile synthetic organic chemicals. Specifically, this notice promulgates a maximum contaminant level for Benzene at 0.005 mg/L. Benzene is not listed in Appendix A as a highly hazardous chemical, per 29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals. Under this regulation, however, any process that involves a flammable liquid on-site, in one location, in quantities of 10,000 lbs (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

**U.S. STATE REGULATORY INFORMATION:** Benzene is covered under specific State regulations, as denoted below:

<b>Alaska - Designated Toxic and Hazardous Substances:</b> Benzene.	<b>Minnesota - List of Hazardous Substances:</b> Benzene.	<b>Pennsylvania - Hazardous Substance List:</b> Benzene.
<b>California - Permissible Exposure Limits for Chemical Contaminants:</b> Benzene.	<b>Missouri - Employer Information/Toxic Substance List:</b> Benzene.	<b>Rhode Island - Hazardous Substance List:</b> Benzene.
<b>Florida - Substance List:</b> Benzene.	<b>New Jersey - Right to Know Hazardous Substance List:</b> Benzene.	<b>Texas - Hazardous Substance List:</b> Benzene.
<b>Illinois - Toxic Substance List:</b> Benzene.	<b>North Dakota - List of Hazardous Chemicals, Reportable Quantities:</b> Benzene.	<b>West Virginia - Hazardous Substance List:</b> Benzene.
<b>Kansas - Section 302/313 List:</b> Benzene.		<b>Wisconsin - Toxic and Hazardous Substances:</b> Benzene.
<b>Massachusetts - Substance List:</b> Benzene.		
<b>Michigan Critical Materials Register:</b> Benzene.		

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):** Benzene is listed on the California Proposition 65 Lists. **WARNING:** Benzene is known to the State of California to cause cancer.

**LABELING: DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR CAN CAUSE FLASH FIRE. FLASH POINT = -11°C (12°F). HARMFUL IF INHALED. HARMFUL OR FATAL IF SWALLOWED. PROLONGED OR REPEATED SKIN CONTACT MAY DRY SKIN AND CAUSE IRRITATION. CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. CHRONIC EXPOSURE MAY CAUSE LEUKEMIA AND CAN CAUSE ADVERSE EFFECTS ON THE BLOOD SYSTEM, LIVER, KIDNEYS, REPRODUCTIVE SYSTEM. CAN CAUSE DEATH IF TOO MUCH IS BREATHED. ASPIRATION HAZARD IF SWALLOWED - CAN ENTER LUNGS AND CAUSE DAMAGE.** Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Avoid contact with skin and clothing. Avoid exposure to vapor. Wash thoroughly after handling. **FIRST-AID:** In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if irritation develops or persists. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of fire, use water fog, foam, dry chemical, or CO<sub>2</sub>. In case of spill: Absorb spill with inert materials (e.g. activated carbon, dry sand). Flush residual spill with water. Consult Material Safety Data Sheet for additional information.

**CANADIAN WHMIS SYMBOLS:** **Class B2:** Flammable Liquid.  
**Class D2A/D2B:** Material Causing Other Toxic Effects



## 16. OTHER INFORMATION

### PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.  
9163 Chesapeake Drive, San Diego, CA 92123-1002  
619/565-0302

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. AIRGAS, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, AIRGAS, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

### DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

**CAS #:** This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

#### EXPOSURE LIMITS IN AIR:

**ACGIH** - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

**OSHA** - U.S. Occupational Safety and Health Administration. **PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

**IDLH** - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL.

**NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

#### HAZARD RATINGS:

**HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:** Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

**NATIONAL FIRE PROTECTION ASSOCIATION:** Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury).

#### NATIONAL FIRE PROTECTION ASSOCIATION (Continued):

Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

#### FLAMMABILITY LIMITS IN AIR:

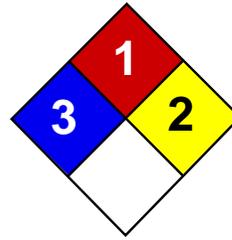
Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

#### TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m<sup>3</sup>** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. Ecological Information: EC is the effect concentration in water.

#### REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA** or **Superfund**); and various state regulations.



Health	3
Fire	1
Reactivity	2
Personal Protection	E

# Material Safety Data Sheet

## Arsenic MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Arsenic

**Catalog Codes:** SLA1006

**CAS#:** 7440-38-2

**RTECS:** CG0525000

**TSCA:** TSCA 8(b) inventory: Arsenic

**CI#:** Not applicable.

**Synonym:**

**Chemical Name:** Arsenic

**Chemical Formula:** As

**Contact Information:**

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

**Toxicological Data on Ingredients:** Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

**Potential Chronic Health Effects:**

**CARCINOGENIC EFFECTS:** Classified A1 (Confirmed for human.) by ACGIH. **MUTAGENIC EFFECTS:** Not available.

**TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

### Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:**

Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

**Special Remarks on Explosion Hazards:** Not available.

### Section 6: Accidental Release Measures

**Small Spill:** Use appropriate tools to put the spilled solid in a convenient waste disposal container.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Lustrous solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 74.92 g/mole

**Color:** Silvery.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** Not available.

**Melting Point:** Sublimation temperature: 615°C (1139°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 5.72 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, moisture.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 145 mg/kg [Mouse].

**Chronic Effects on Humans:**

**CARCINOGENIC EFFECTS:** Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

**Other Toxic Effects on Humans:**

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are as toxic as the original product.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

## Section 14: Transport Information

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** : Arsenic UNNA: UN1558 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:****WHMIS (Canada):**

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R22- Harmful if swallowed. R45- May cause cancer.

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 1

**Reactivity:** 2

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 3

**Flammability:** 1

**Reactivity:** 2

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

**Section 16: Other Information****References:**

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangereuses au Canada. Centre de conformité international Ltée. 1986.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 04:16 PM

**Last Updated:** 11/01/2010 12:00 PM

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# 4,4'-DDT

sc-238975



The Power is Question

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

4,4'-DDT

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and  
Canada: 877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436  
2255 (1-800-CHEMCALL) or call +613 9573 3112

### PRODUCT USE

Insecticide for tobacco and cotton, pesticide (tussock moth). Intermediate

### SYNONYMS

C<sub>14</sub>H<sub>9</sub>Cl<sub>5</sub>, "1, 1' -(2, 2, 2-trichloroethylidene) bis [4-chlorobenzene]", "1, 1' -(2, 2, 2-trichloroethylidene) bis [4-chlorobenzene]", "1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)ethane", "1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)ethane", "ethane, 1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)", "ethane, 1, 1, 1-trichloro-2, 2-bis(p-chlorophenyl)", "benzene, 1, 1' -(, 2, 2-trichloroethylidene)bis(4-chloro)-", "benzene, 1, 1' -(, 2, 2-trichloroethylidene)bis(4-chloro)-", "alpha, alpha-bis(p-chlorophenyl)-beta, beta, beta-trichloroethane", "1, 1-bis-(p-chlorophenyl)-2, 2, 2-trichloroethane", "1, 1-bis-(p-chlorophenyl)-2, 2, 2-trichloroethane", "2, 2-bis(p-chlorophenyl)-1, 1, 1-trichloroethane", "2, 2-bis(p-chlorophenyl)-1, 1, 1-trichloroethane", "p, p' -DDT", "p, p' -DDT", "diphenyl trichloroethane", "dichlorodiphenyltrichloroethane", "p, p-dichlorodiphenyltrichloroethane", "p, p-dichlorodiphenyltrichloroethane", "4, 4' -dichlorodiphenyltrichloroethane", "4, 4' -dichlorodiphenyltrichloroethane", Agritan, Anofex, Arkotine, Azotox, "Bosan supra", Bovidermal, Chlorophenothane, Chlorophenotoxum, Citox, Clofenotane, Dedelo, Deoval, Ditoxan, Dibovan, Dicophane, Didigam, Didimac, Dodat, Dykol, Estonate, Genitox, Gesafid, Gesapon, Gesarex, Gesarol, Guesapon, Guesarol, Gyron, Havero-extra, Hildit, Ivoran, Ixodex, Kopsal, Mutoxin, Neocid, OMS-16, Parachlorodicum, Peb1, Pentachlorin, Zeidane, Zerdane, insecticide

## Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Limited evidence of a carcinogenic effect.

Toxic: danger of serious damage to health by prolonged exposure if swallowed.  
Toxic in contact with skin and if swallowed.  
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## POTENTIAL HEALTH EFFECTS

### ACUTE HEALTH EFFECTS

#### SWALLOWED

- Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
- Organochlorine pesticides excite the central nervous system, causing shortness of breath, cough, narrowing of airways and throat spasms. In the muscles it can cause twitches, spastic movements and seizures. Headache, dizziness and confusion may result as well as a feeling of warmth. Other symptoms include nausea, vomiting, diarrhea and difficulty in urination. There may be alterations in blood pressure or irregularities in heart rhythm. Delayed poisoning may occur after 30 minutes to several hours. Symptoms may include diarrhea, stomach pain, headache, dizziness, inco-ordination, "pins and needles", restlessness, irritability, confusion and tremors, progressing to stupor, coma and epilepsy-like or spastic seizures with frothing at the mouth, a contorted face, violent convulsions and limb stiffness. Tremors may spread from the face to the torso and limbs. Severe poisoning may cause continuous convulsion, fever, unconsciousness, labored breathing, rapid heartbeat and general depression; this is followed by lack of oxygen, collapse of breathing, and death. Kidney damage and inflammation and anemia has also been reported.
- Earliest symptom of exposure to DDT is a prickling or tingling sensation in the mouth, tongue and lower face. This is followed by dizziness, abdominal pain, headache, nausea, vomiting, diarrhoea, mental confusion, a sense of apprehension, weakness, loss of muscle control and tremors. Higher exposures can cause severe convulsions followed by death. Symptoms may occur within 30 minutes to 6 hours after exposure, depending upon the severity of the exposure. DDT and its analogues may cause gastrointestinal effects.

#### EYE

- Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

#### SKIN

- Skin contact with the material may produce toxic effects; systemic effects may result following absorption.
- The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

#### INHALED

- The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
- Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

### CHRONIC HEALTH EFFECTS

- There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.

There is some evidence to provide a presumption that human exposure to the material may result in impaired fertility on the basis of: some evidence in animal studies of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects but which is not a secondary non-specific consequence of other toxic effects.

The following chronic health effects can occur some time after exposure to DDT and can last for months or years. There is some evidence that it causes cancer in humans and it has been shown to cause liver cancer in animals.

DDT may damage the liver and kidneys, damage the developing fetus and decrease fertility in males and females, and cause central nervous system degeneration.

High doses of o,p'-DDT fed to immature female rats exert clear oestrogenic effects. Males fed 1 ppm o,p'-DDT from birth had significantly heavier bodies, testes and seminal vesicles at day 112. In a another study adult male rats treated with o,p'-DDT showed decreased corticosterone formed from progesterone in the adrenals and lowered unchanged progesterone. In brain metabolism, treatment with o,p'-DDT increased dihydrotestosterone from testosterone while androstenediol decreased. The authors concluded that the effects of o,p'-DDT administration are a decrease in plasma testosterone and in androgen biosynthesis, and an increase in plasma oestradiol.

Exposure to organochlorine pesticides for long periods can cause multiple nervous system infections and disorders involving the brain and autonomic nerves with headache, dizziness, "pins and needles", tremor in the limbs, disturbances in nerves supplying blood vessels, pain in the bowel and stiffening of the bile duct, rapid heartbeat, hollow heart sounds and a tight pain in the chest. There can be blood problems with loss of platelets and white blood cells, change in blood cell distribution, anemia, loss of appetite and weight. There may be disturbed behavior. Some organochlorines may have female sex hormone-like effects, causing withering of the testicles, reduced fertility and disturbed sexual activity.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

### HAZARD RATINGS

Flammability: 1  Min Max

Toxicity:	3	
Body Contact:	3	
Reactivity:	1	
Chronic:	3	

Min/Nil=0  
 Low=1  
 Moderate=2  
 High=3  
 Extreme=4



NAME	CAS RN	%
DDT (dichlorodiphenyltrichloroethane)	50-29-3	>99

## Section 4 - FIRST AID MEASURES

### SWALLOWED

- - Give a slurry of activated charcoal in water to drink. NEVER GIVE AN UNCONSCIOUS PATIENT WATER TO DRINK.
  - At least 3 tablespoons in a glass of water should be given.
  - Although induction of vomiting may be recommended (IN CONSCIOUS PERSONS ONLY), such a first aid measure is dissuaded because to the risk of aspiration of stomach contents. (i) It is better to take the patient to a doctor who can decide on the necessity and method of emptying the stomach. (ii) Special circumstances may however exist; these include non- availability of charcoal and the ready availability of the doctor.
- NOTE: If vomiting is induced, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. NOTE: Wear protective gloves when inducing vomiting.
- REFER FOR MEDICAL ATTENTION WITHOUT DELAY.
  - In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
  - If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
  - If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.
- (ICSC20305/20307).

### EYE

- If this product comes in contact with the eyes:
- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

### SKIN

- If skin or hair contact occurs:
- Quickly but gently, wipe material off skin with a dry, clean cloth.
- Immediately remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
- Transport to hospital, or doctor.

### INHALED

- 
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

### NOTES TO PHYSICIAN

- Organochlorines are well absorbed from the lungs, gastrointestinal tract and skin.
  - Intoxication from acute oral exposures generally begins within 45 minutes to several hours.
  - Diazepam is the anticonvulsant of choice. [Phenobarbitone, sodium phenobarbitone or in repeated convulsions sodium pentothal (2.5% solution) may also be given - calcium gluconate may also be helpful] (Manufacturers; David Gray and Hoechst)
  - Usual methods of decontamination (Ipecac / lavage / charcoal / cathartics) are recommended within the first several hours following exposure.
  - Dialysis, diuresis and hemoperfusion are ineffective because of extensive tissue binding and large volumes of distribution.
  - There is no antidote.
- [Ellenhorn and Barceloux: Medical Toxicology].

## Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not applicable
Upper Explosive Limit (%):	Not Available
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not Available

## EXTINGUISHING MEDIA

- 
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

## FIRE FIGHTING

- 
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

## GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- 
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), hydrogen chloride, phosgene, other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

## FIRE INCOMPATIBILITY

- 
- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

## PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

## Section 6 - ACCIDENTAL RELEASE MEASURES

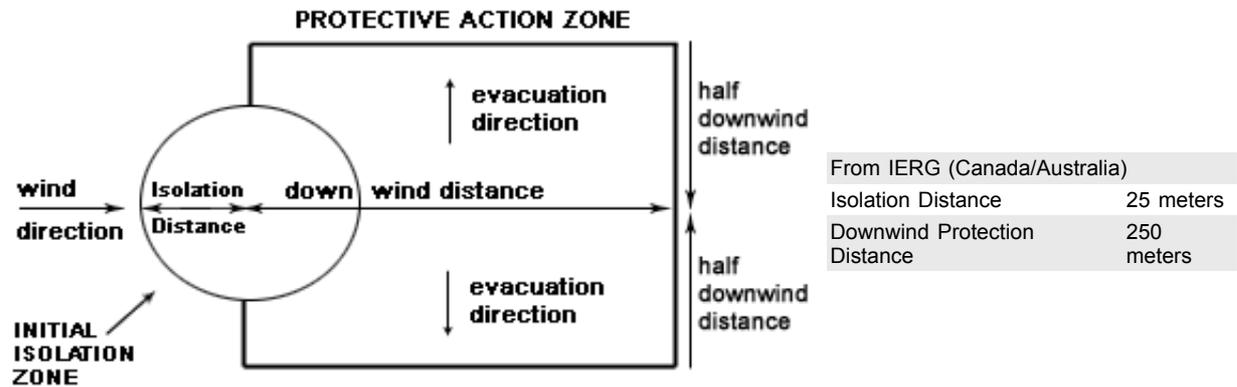
### MINOR SPILLS

- 
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

### MAJOR SPILLS

- 
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

## PROTECTIVE ACTIONS FOR SPILL



## FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 151 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTEC - Transport Canada.

## ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

- 
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

### RECOMMENDED STORAGE METHODS

- 
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
- Cans with friction closures and
- low pressure tubes and cartridges may be used.

- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages \* . - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage \*. - \* unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

### STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
US - California Permissible Exposure Limits for Chemical Contaminants	DDT (DDT; 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane)		1						
Canada - Ontario Occupational Exposure Limits	DDT (1,1,1-Trichloro-2,2-bis-(p-chlorophenyl)ethane)		1						
US - Minnesota Permissible Exposure Limits (PELs)	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Idaho - Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Alaska Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))		1						
US - Michigan Exposure Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane(DDT))		1						
US - Hawaii Air Contaminant Limits	DDT (DDT (Dichlorodiphenyltrichloroethane))		1		3				
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	DDT (DDT (Dichlorodiphenyltrichloroethane))	-	1	-	3				
US - Washington Permissible exposure limits of air contaminants	DDT (DDT (Dichlorodiphenyltrichloroethane))		1		3				

Canada - Northwest Territories

Canada - Northwest Territories Occupational Exposure Limits (English)	DDT (DDT (Dichlorodiphenyltrichloroethane))	1	3	
US ACGIH Threshold Limit Values (TLV)	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
US NIOSH Recommended Exposure Limits (RELs)	DDT	0.5		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - Nova Scotia Occupational Exposure Limits	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
Canada - Prince Edward Island Occupational Exposure Limits	DDT (DDT [Dichlorodiphenyltrichloroethane])	1		TLV Basis: liver damage
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	DDT (Diesel fuel as total hydrocarbons, (vapour))	100	150	Skin
Canada - Alberta Occupational Exposure Limits	DDT (Diesel fuel, as total hydrocarbons)	100		
Canada - Alberta Occupational Exposure Limits	DDT (Kerosene/Jet fuels, as total hydrocarbon vapour)	200		
Canada - Alberta Occupational Exposure Limits	DDT (DDT (Dichlorodiphenyl trichloroethane))	1		
Canada - British Columbia Occupational Exposure Limits	DDT (DDT (Dichloro-diphenyltrichloroethane))	1		2B
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	DDT (DDT (Dichlorodiphenyltrichloroethane))	1	3	T20
US - Oregon Permissible Exposure Limits (Z1)	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	DDT (DDT (Dichlorodiphenyltrichloroethane))	1		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	DDT (Dichlorodiphenyltrichloroethane (DDT))	1		
Canada - British Columbia Occupational Exposure Limits	DDT (Diesel fuel, as total hydrocarbons, Inhalable)	100 (V)		Skin

#### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
DDT	500	

#### MATERIAL DATA

DDT:

■ for DDT:

The TLV-TWA is thought to provide a wide margin of safety in the prevention of acute poisoning and also is thought to be protective against the significant risk of accumulation in body stores.

Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

#### PERSONAL PROTECTION



Consult your EHS staff for recommendations

#### EYE

- 
- Safety glasses with side shields
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

## HANDS/FEET

- Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

## OTHER

- 
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- 
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

## RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x PEL	P1 Air-line*	-	PAPR-P1
50 x PEL	Air-line**	P2	PAPR-P2
100 x PEL	-	P3 Air-line*	-
100+ x PEL	-	Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

## ENGINEERING CONTROLS

- 
- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:
  - (a): particle dust respirators, if necessary, combined with an absorption cartridge;
  - (b): filter respirators with absorption cartridge or canister of the right type;
  - (c): fresh-air hoods or masks
- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.

- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)
--	------------------------------

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

Does not mix with water.

State	Divided solid	Molecular Weight	354.48
Melting Range (°F)	227.3	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Immiscible
Flash Point (°F)	Not Available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not applicable
Upper Explosive Limit (%)	Not Available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not Available	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Not applicable	Evaporation Rate	Not applicable
Gas group	IIA		

### APPEARANCE

Colourless crystals or white to slightly off-white powder. Odourless or with slight aromatic odour. Insoluble in water; soluble in acetone, benzene, carbon tetrachloride, ether, kerosene, dioxane and pyridine. Since DDT is not biodegradable and is ecologically damaging, its agricultural use in the USA was prohibited in 1973.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- 
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

### STORAGE INCOMPATIBILITY

- - Avoid strong bases.
- Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

## Section 11 - TOXICOLOGICAL INFORMATION

DDT

### TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 87 mg/kg	Nil Reported

Oral (human infant) LDLo: 150 mg/kg

Oral (man) TDLo: 6 mg/kg

Oral (human) TDLo: 16 mg/kg

Oral (human) LDLo: 500 mg/kg

Oral (human) TDLo: 5 mg/kg

Dermal (rat) LD50: 1931 mg/kg

Dermal (rabbit) LD50: 300 mg/kg

#### ■ For DDT:

DDT is moderately to slightly toxic to studied mammalian species via the oral route. Toxicity will vary according to formulation. DDT is readily absorbed through the gastrointestinal tract, with increased absorption in the presence of fats.

One-time administration of DDT to rats at doses of 50 mg/kg led to decreased thyroid function and a single dose of 150 mg/kg led to increased blood levels of liver-produced enzymes and changes in the cellular chemistry in the central nervous system of monkeys. Single doses of 50-160 mg/kg produced tremors in rats, and single doses of 160 mg/kg produced hind leg paralysis in guinea pigs. Mice suffered convulsions following a one-time oral dose of 200 mg/kg. Single administrations of low doses to developing 10-day old mice are reported to have caused subtle effects on their neurological development.

DDT is slightly to practically non-toxic to test animals via the dermal route. It is not readily absorbed through the skin unless it is in solution.

It is thought that inhalation exposure to DDT will not result in significant absorption through the lung alveoli (tiny gas-exchange sacs) but rather that it is probably trapped in mucous secretions and swallowed by exposed individuals following the tracheo-bronchial clearance of secretions by the cilia.

Acute effects likely in humans due to low to moderate exposure may include nausea, diarrhoea, increased liver enzyme activity, irritation (of the eyes, nose or throat), disturbed gait, malaise and excitability; at higher doses, tremors and convulsions are possible. While adults appear to tolerate moderate to high ingested doses of up to 280 mg/kg, a case of fatal poisoning was seen in a child who ingested one ounce of a 5% DDT:kerosene solution.

Chronic toxicity: DDT has caused chronic effects on the nervous system, liver, kidneys, and immune systems in experimental animals. Effects on the nervous system observed in test animals include: tremors in rats at doses of 16-32 mg/kg/day over 26 weeks; tremors in mice at doses of 6.5-13 mg/kg/day over 80-140 weeks; changes in cellular chemistry in the central nervous system of monkeys at doses of 10 mg/kg/day over 100 days, and loss of equilibrium in monkeys at doses of 50 mg/kg/day for up to 6 months.

The main effect on the liver seen in animal studies was localized liver damage. This effect was seen in rats given 3.75 mg/kg/day over 36 weeks, rats exposed to 5 mg/kg/day over 2 years and dogs at doses of 80 mg/kg/day over the course of 39 months. In many cases lower doses produced subtle changes in liver cell physiology, and in some cases higher doses produced more severe effects. In mice doses of 8.33 mg/kg/day over 28 days caused increased liver weight and increased liver enzyme activity. Liver enzymes are commonly involved in detoxification of foreign compounds, so it is unclear whether increased liver enzyme activity in itself would constitute an adverse effect. In some species (monkeys and hamsters), doses as high as 8-20 mg/kg/day caused no observed adverse effects over exposure periods as long as 3.5-7 years.

Kidney effects observed in animal studies include adrenal gland hemorrhage in dogs at doses of 138.5 mg/kg/day over 10 days and adrenal gland damage at 50 mg/kg/day over 150 days in dogs. Kidney damage was also seen in rats at doses of 10 mg/kg/day over 27 months.

Immunological effects observed in test animals include: reduced antibody formation in mice following administration of 13 mg/kg/day for 3-12 weeks and reduced levels of immune cells in rats at doses of 1 mg/kg/day. No immune system effects were observed in mice at doses of 6.5 mg/kg/day for 3-12 weeks.

Dose levels at which effects were observed in test animals are very much higher than those which may be typically encountered by humans. Due to the persistence of DDT and its metabolites in the environment, very low levels may continue to be detected in foodstuffs grown in some areas of prior use. It has been suggested that, depending on patterns of international DDT use and trade, it is possible that dietary exposure levels may actually increase over time. Persons eating fish contaminated with DDT or metabolites may also be exposed via bioaccumulation of the compound in fish.

Even though current dietary levels are quite low, past and current exposures may result in measurable body burdens due to its persistence in the body. More information on the metabolism and storage of DDT and its metabolites in mammalian systems is provided below (Fate in Humans and Animals).

Adverse effects on the liver, kidney and immune system due to DDT exposure have not been demonstrated in humans in any of the studies which have been conducted to date.

Reproductive Effects: There is evidence that DDT causes reproductive effects in test animals. No reproductive effects were observed in rats at doses of 38 mg/kg/day administered at days 15-19 of gestation. In another study in rats, oral doses of 7.5 mg/kg/day for 36 weeks resulted in sterility. In rabbits, doses of 1 mg/kg/day administered on gestation days 4-7 resulted in decreased fetal weights and 10 mg/kg/day on days 7-9 of gestation resulted in increased resorptions. In mice, doses of 1.67 mg/kg/day resulted in decreased embryo implantation and irregularities in the estrus cycle over 28 weeks. It is thought that many of these observed effects may be the result of disruptions in the endocrine (hormonal) system.

Available epidemiological evidence from two studies does not indicate that reproductive effects have occurred in humans as a result of DDT exposure. No associations between maternal blood levels of DDT and miscarriage nor premature rupture of fetal membranes were observed in two separate studies. One study did report a significant association between maternal DDT blood levels and miscarriage, but the presence of other organochlorine chemicals (e.g., PCBs) in maternal blood which may have accounted for the effect make it impossible to attribute the effect to DDT and its metabolites.

Teratogenic Effects: There is evidence that DDT causes teratogenic effects in test animals as well. In mice, maternal doses of 26 mg/kg/day DDT from gestation through lactation resulted in impaired learning performance in maze tests. In a two-generational study of rats, 10 mg/kg/day resulted in abnormal tail development. Epidemiological evidence regarding the occurrence of teratogenic effects as a result of DDT exposure are unavailable. It seems unlikely that teratogenic effects will occur in humans due to DDT at likely exposure levels.

Mutagenic Effects: The evidence for mutagenicity and genotoxicity is contradictory. In only 1 out of 11 mutagenicity assays in various cell cultures and organisms did DDT show positive results. Results of in vitro and in vivo genotoxicity assays for chromosomal aberrations indicated that DDT was genotoxic in 8 out of 12 cases, and weakly genotoxic in 1 case.

In humans, blood cell cultures of men occupationally exposed to DDT showed an increase in chromosomal damage. In a separate study, significant increases in chromosomal damage were reported in workers who had direct and indirect occupational exposure to DDT. Thus it appears that DDT may have the potential to cause genotoxic effects in humans, but does not appear to be strongly mutagenic. It is unclear whether these effects may occur at exposure levels likely to be encountered by most people.

Carcinogenic Effects: The evidence regarding the carcinogenicity of DDT is equivocal. It has been shown to cause increased tumor production (mainly in the liver and lung) in test animals such as rats, mice and hamsters in some studies but not in others. In rats, liver tumors were induced in three separate studies at doses of 12.5 mg/kg/day over periods of 78 weeks to life, and thyroid tumors were induced at doses of 85 mg/kg/day over 78 weeks. In mice, lifetime doses of 0.4 mg/kg/day resulted in lung tumors in the second generation and leukemia in the third generation; liver tumors were induced at oral doses of 0.26 mg/kg/day in two separate studies over several generations. In hamsters, significant increases in adrenal gland tumors were

seen at doses of 83 mg/kg/day in females (but not males) , and in males (but not females) at doses of 40 mg/kg/day. In other studies, however, no carcinogenic activity was observed in rats at doses less than 25 mg/kg/day; no carcinogenic activity was seen in mice with at doses of 3-23 mg/kg/day over an unspecified period, and in other hamster studies there have been no indications of carcinogenic effects.

The available epidemiological evidence regarding DDT's carcinogenicity in humans, when taken as a whole, does not suggest that DDT and its metabolites are carcinogenic in humans at likely dose levels. In several epidemiological studies, no significant associations were seen between DDT exposure and disease, but in one other study, a weak association was observed. In this latter study, which found a significant association between long-term, high DDT exposures and pancreatic cancers in chemical workers, there were questions raised as to the reliability of the medical records of a large proportion of the cancer cases.

Organ Toxicity: Acute human exposure data and animal studies reveal that DDT can affect the nervous system, liver, kidney. Increased tumor production in the liver and lung has been observed in test animals. An association with pancreatic cancer was suggested in humans in one study.

Fate in Humans & Animals: DDT is very slowly transformed in animal systems. Initial degradates in mammalian systems are 1,1-dichloro-2,2-bis(p-dichlorodiphenyl)ethylene (DDE) and 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane (DDD), which are very readily stored in fatty tissues. These compounds in turn are ultimately transformed into bis(dichlorodiphenyl) acetic acid (DDA) via other metabolites at a very slow rate. DDA, or conjugates of DDA, are readily excreted via the urine.

Levels of DDT or metabolites may occur in fatty tissues (e.g. fat cells, the brain, etc.) at levels of up to several hundred times that seen in the blood. DDT or metabolites may also be eliminated via mother's milk by lactating women.

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

ADI: 0.002 mg/kg/day

NOEL: 0.25 mg/kg/day

## CARCINOGEN

DDT [p,p'-DDT]	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2B
Non-arsenical insecticides (occupational exposures in spraying and application of)	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2A
p,p'-Dichlorodiphenyltrichloroethane (DDT)	US EPA Carcinogens Listing	Carcinogenicity	B2
p,p'-Dichlorodiphenyltrichloroethane (DDT)	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	B2
DDT [Dichlorodiphenyltrichloroethane]	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A3
DDT	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
DDT (TOTAL)	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65-MC
DDT	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
DDT (TOTAL)	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC
DDT [Dichlorodiphenyltrichloroethane]	US NIOSH Recommended Exposure Limits (RELs) - Carcinogens	Carcinogen	Ca

## SKIN

DDT Canada - Ontario Occupational Exposure Limits - Skin	Notes	Skin
DDT US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	Skin
DDT Canada - Quebec Permissible Exposure Values for Airborne Contaminants - Skin (French)	Notes	Skin
DDT US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
DDT US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants - Skin	Skin Designation	X
DDT US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
DDT US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
DDT Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
DDT US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
DDT US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
DDT ND	Skin Designation	X
DDT US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
DDT US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	X
DDT US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
DDT Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

DDT:

■ Daphnia magna EC50 (48hr.) (mg/l):	0.002- 0.00
■ Half- life Soil - High (hours):	1.40E+05
■ Half- life Soil - Low (hours):	17520

■ Half- life Air - High (hours):	177
■ Half- life Air - Low (hours):	17.7
■ Half- life Surface water - High (hours):	8400
■ Half- life Surface water - Low (hours):	168
■ Half- life Ground water - High (hours):	2.70E+05
■ Half- life Ground water - Low (hours):	384
■ Aqueous biodegradation - Aerobic - High (hours):	1.37E+05
■ Aqueous biodegradation - Aerobic - Low (hours):	17520
■ Aqueous biodegradation - Anaerobic - High (hours):	2400
■ Aqueous biodegradation - Anaerobic - Low (hours):	384
■ Aqueous biodegradation - Removal secondary treatment - High (hours):	100%
■ Photolysis maximum light absorption - High (nano- m):	<282
■ Photooxidation half- life water - High (hours):	8400
■ Photooxidation half- life water - Low (hours):	168
■ Photooxidation half- life air - High (hours):	177
■ Photooxidation half- life air - Low (hours):	17.7
■ First order hydrolysis half- life (hours):	1.94E+05

■ Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

■ Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

■ For DDT

log Kow : 6.19

Half-life (hr) air: 170

Half-life (hr) H<sub>2</sub>O surface water: 5500

Half-life (hr) soil: 17000

BCF : 12000-40000

Environmental fate:

Breakdown in Soil and Groundwater: DDT is very highly persistent in the environment, with a reported half life of between 2-15 years and is immobile in most soils. Routes of loss and degradation include runoff, volatilization, photolysis and biodegradation (aerobic and anaerobic). These processes generally occur only very slowly. Breakdown products in the soil environment are DDE and DDD, which are also highly persistent and have similar chemical and physical properties.

Due to its extremely low solubility in water, DDT will be retained to a greater degree by soils and soil fractions with higher proportions of soil organic matter. It may accumulate in the top soil layer in situations where heavy applications are (or were) made annually; e.g., for apples. Generally DDT is tightly sorbed by soil organic matter, but it (along with its metabolites) has been detected in many locations in soil and groundwater where it may be available to organisms. This is probably due to its high persistence; although it is immobile or only very slightly mobile, over very long periods of time it may be able to eventually leach into groundwater, especially in soils with little soil organic matter.

Residues at the surface of the soil are much more likely to be broken down or otherwise dissipated than those below several inches. Studies in Arizona have shown that volatilization losses may be significant and rapid in soils with very low organic matter content (desert soils) and high irradiance of sunlight, with volatilization losses reported as high as 50% in 5 months. In other soils (Hood River and Medford) this rate may be as low as 17- 18% over 5 years. Volatilisation loss will vary with the amount of DDT applied, proportion of soil organic matter, proximity to soil-air interface and the amount of sunlight.

Breakdown of Chemical in Surface Water: DDT may reach surface waters primarily by runoff, atmospheric transport, drift, or by direct application (e.g. to control mosquito-borne malaria). The reported half-life for DDT in the water environment is 56 days in lake water and approximately 28 days in river water. The main pathways for loss are volatilization, photodegradation, adsorption to water-borne particulates and sedimentation. Aquatic organisms, as noted above, also readily take up and store DDT and its metabolites. Field and laboratory studies in the United Kingdom demonstrated that very little breakdown of DDT occurred in estuary sediments over the course of 46 days.

Breakdown of Chemical in Vegetation: DDT does not appear to be taken up or stored by plants to a great extent. It was not translocated into alfalfa or soybean plants, and only trace amounts of DDT or its metabolites were observed in carrots, radishes and turnips all grown in DDT-treated soils. Some accumulation was reported in grain, maize and rice-plants, but little translocation occurred and residues were located primarily in the roots.

Ecotoxicity:

Effects on Birds:

Bird dietary LD<sub>50</sub>: mallard duck 2240 mg/kg, Japanese quail 841 mg/kg, pheasant 1334 mg/kg

Reported dietary LD<sub>50</sub>s in such species as bobwhite quail, California quail, red-winged blackbird, cardinal, house sparrow, blue jay, sandhill crane and clapper rail also indicate slight toxicity both in acute 5-day trials and over longer periods of up to 100 days. In birds, exposure to DDT occurs mainly through the food web through predation on aquatic and/or terrestrial species having body burdens of DDT, such as fish, earthworms and other birds.

There has been much concern over chronic exposure of bird species to DDT and effects on reproduction, especially eggshell thinning and embryo deaths. The mechanisms of eggshell thinning are not fully understood. It is thought that this may occur from the major metabolite, DDE, and that predator species of birds are the most sensitive to these effects. Laboratory studies on bird reproduction have demonstrated the potential of DDT and DDE to cause subtle effects on courtship behavior, delays in pairing and egg laying and decreases in egg weight in ring doves and Bengalese finches. The implications of these for long-term survival and reproduction of wild bird species is unclear.

There is evidence that synergism may be possible between DDT's metabolites and organophosphate (cholinesterase-inhibiting) pesticides to produce greater toxicity to the nervous system and higher mortality. Aroclor (polychlorinated biphenyls, or PCBs) may result in additive effects on eggshell thinning.

Effects on Aquatic Species

Fish LC<sub>50</sub> (96 h): coho salmon 4 ug/l, rainbow trout 8.7 ug/l, northern pike 2.7 ug/l, black bullhead 4.8 ug/l, bluegill sunfish 8.6 ug/l, largemouth bass 1.5 ug/l, walleye 2.9 ug/l, fathead minnow 21.5 ug/l, channel catfish 12.2 ug/l, largemouth bass 1.5 ug/l, guppy 56 ug/l

DDT is very highly toxic to many aquatic invertebrate species. Reported 96-hour LC<sub>50</sub>s in various aquatic invertebrates (e.g., stoneflies, midges, crayfish, sow bugs) range from 0.18 ug/L to 7.0 ug/L, and 48-hour LC<sub>50</sub>s are 4.7 ug/L for daphnids and 15 ug/L for sea shrimp. Other reported 96-hour LC<sub>50</sub>s for various aquatic invertebrate species are from 1.8 ug/L to 54 ug/L. Early developmental stages are more susceptible than adults to DDT's effects. The reversibility of some effects, as well as the

development of some resistance, may be possible in some aquatic invertebrates . DDT is very highly toxic to fish species as well. . Observed toxicity in coho and chinook salmon was greater in smaller fish than in larger . It is reported that DDT levels of 1 ng/L were sufficient to affect the hatching of coho salmon eggs DDT may be moderately toxic to some amphibian species and larval stages are probably more susceptible than adults In addition to acute toxic effects, DDT may bioaccumulate significantly in fish and other aquatic species, leading to long-term exposure. This occurs mainly through uptake from sediment and water into aquatic flora and fauna, and also fish . Fish uptake of DDT from the water will be size-dependent with smaller fish taking up relatively more than larger fish . A half- time for elimination of DDT from rainbow trout was estimated to be 160 days . The reported bioconcentration factor for DDT is 1,000 to 1,000,000 in various aquatic species, and bioaccumulation may occur in some species at very low environmental concentrations . Bioaccumulation may also result in exposure to species which prey on fish or other aquatic organisms (e.g., birds of prey).

**Effects on Other Animals (Nontarget species)**

Earthworms are not susceptible to acute effects of DDT and its metabolites at levels higher than those likely to be found in the environment, but they may serve as an exposure source to species that feed on them. DDT is non-toxic to bees; the reported topical LD50 for DDT in honeybees is 27 ug/bee . Laboratory studies indicate that bats may be affected by DDT released from stored body fat during long migratory periods.

- Outbreaks of poisoning from food contaminated with organochlorines are characterized by headache, nausea, vomiting, restlessness, irritability, vertigo, muscle twitching, confusion, stupor, coma and convulsions.

The organochlorine pesticides are highly soluble in lipids and most organic solvents but have low water solubilities and low vapor pressure.

Adsorption in various soils depends strongly on the presence of soil organic matter. Once adsorbed they do not readily desorb. Such compounds do not as a consequence leach or diffuse in soils and transport to the hydrosphere from contaminated soils will be largely as a result of the erosion of soil particles or sediments, rather than by desorption and dissolution.

When organochlorines are poorly adsorbed, as in sandy soils, vaporization losses are significant. Volatilization from water or soil may also occur.

The actual evaporation rate depends on factors such as temperature, soil properties, soil water content and other physicochemical properties such as water solubility and degree of adsorption. The importance of soil moisture in volatilization led to the use of the term "co-distillation".

The effect observed in soil however is more accurately described as displacement of the sorbed pesticides by water molecules. As a result compounds which otherwise possess low water solubility are quite volatile from water.

Degradation of the organochlorines is slow compared to other classes of insecticide and in soil and water is due mainly to the action of micro- organisms. Pathways include dechlorination and dehydrochlorination. Oxidation is only moderately important. Epoxidations and rearrangements are common amongst the cyclodiene pesticides. These rearrangement reactions produce complicated "cage-like" structures that are toxic.

Bioaccumulation of the some organochlorines (notably DDT and dieldrin) are higher in aquatic ecosystems than in terrestrial ecosystems. Physicochemical properties such as high lipid solubility, low water solubility and chemical stability are the most significant factors behind such bioaccumulation.

The effects of bioaccumulation are manifest at the top of the food chain where, for example, predatory fish and birds, suffer from acute and chronic toxicity and reproductive failures. Effects may range from obvious toxicity to subtle behavioral changes. Evidence exists that the population effects are reversible with time.

- DO NOT discharge into sewer or waterways.

■ The material is classified as an ecotoxin\* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

\* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

**Ecotoxicity**

Ingredient DDT	Persistence: Water/Soil HIGH	Persistence: Air HIGH	Bioaccumulation HIGH	Mobility LOW
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**Section 13 - DISPOSAL CONSIDERATIONS**

**US EPA Waste Number & Descriptions**

**B. Component Waste Numbers**

When DDT is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U061 (waste code T).

**Disposal Instructions**

All waste must be handled in accordance with local, state and federal regulations.

! Puncture containers to prevent re-use and bury at an authorized landfill.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

**Section 14 - TRANSPORTATION INFORMATION**



DOT:

Symbols:	None	Hazard class or Division:	6.1
Identification Numbers:	UN2761	PG:	III
Label Codes:	6.1	Special provisions:	IB8, IP3, T1, TP33
Packaging: Exceptions:	153	Packaging: Non-bulk:	213
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	100 kg
Quantity Limitations: Cargo aircraft only:	200 kg	Vessel stowage: Location:	A
Vessel stowage: Other:	40	S.M.P.:	Severe

Hazardous materials descriptions and proper shipping names:

Organochlorine pesticides, solid, toxic

#### Air Transport IATA:

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	2761	Packing Group:	III
Special provisions:	A3		

Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC \*(CONTAINS DDT)

#### Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	2761	Packing Group:	III
EMS Number:	F-A,S-A	Special provisions:	61 223 274 944

Limited Quantities: 5 kg

Shipping Name: ORGANOCHLORINE PESTICIDE, SOLID, TOXIC(contains DDT)

## Section 15 - REGULATORY INFORMATION

### DDT (CAS: 50-29-3) is found on the following regulatory lists;

"Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Environmental Protection Act (CEPA) 1999 - Schedule 1 Toxic Substances List", "Canada Environmental Protection Act (CEPA) 1999 - Schedule 3 Export Control List - Part 2 Substances Subject to Notification or Consent", "Canada Environmental Quality Guidelines (EQGs) Water: Aquatic life", "Canada Prohibited Toxic Substances (English)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "OECD Representative List of High Production Volume (HPV) Chemicals", "OSPAR List of Substances of Possible Concern", "United Nations List of Prior Informed Consent Chemicals - French", "United Nations List of Prior Informed Consent Chemicals - Spanish", "United Nations List of Prior Informed Consent Chemicals (English)", "US - Alaska Limits for Air Contaminants", "US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which production, use or other presence must be reported", "US - California Environmental Health Standards for the Management of Hazardous Waste - List of Organic Persistent and Bioaccumulative Toxic Substances and Their STLC & TTLC Values", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity", "US - California Proposition 65 - Reproductive Toxicity", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Hazardous Constituents", "US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Class A toxic air pollutants: Known and Probable Carcinogens", "US - Washington Dangerous waste constituents list", "US - Washington Discarded Chemical Products List - ""U"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CERCLA Priority List of Hazardous Substances", "US CERCLA Top 20 Priority List of Hazardous Substances", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Priority Pollutants", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Carcinogens Listing", "US EPA National Priorities List - Superfund Chemical Data Matrix (SCDM) - Hazard Ranking System - Hazardous Substance Benchmarks", "US National Toxicology Program (NTP) 11th Report Part B. Reasonably Anticipated to be a Human Carcinogen", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Limits (PELs) - Table Z1", "US RCRA (Resource Conservation & Recovery Act) - Appendix IX to Part 264 Ground-Water Monitoring List 1", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Inorganic and Organic Constituents 1", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements", "US

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Inhalation may produce health damage\*.
  - May affect fertility\*.
- \* (limited evidence).

### REPRODUCTIVE HEALTH GUIDELINES

■ Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
DDT	0.01 mg/m <sup>3</sup>	1000	R	3	-

■ These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise. CR = Cancer Risk/10000; UF = Uncertainty factor; TLV believed to be adequate to protect reproductive health; LOD: Limit of detection Toxic endpoints have also been identified as: D = Developmental; R = Reproductive; TC = Transplacental carcinogen Jankovic J., Drake F.: A Screening Method for Occupational Reproductive Health Risk: American Industrial Hygiene Association Journal 57: 641-649 (1996).

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■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:  
[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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Issue Date: Apr-27-2009

Print Date: Apr-22-2010

## Material Safety Data Sheet

Version 4.1  
Revision Date 02/02/2011  
Print Date 11/10/2011

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene	
Product Number	: 35487	
Brand	: Fluka	
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, Harmful by ingestion.

##### GHS Classification

Acute toxicity, Oral (Category 4)  
Carcinogenicity (Category 2)  
Acute aquatic toxicity (Category 1)  
Chronic aquatic toxicity (Category 4)

##### 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.
H413	May cause long lasting harmful effects 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.

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### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>14</sub>H<sub>8</sub>Cl<sub>4</sub>  
Molecular Weight : 318.03 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene</b>			
72-55-9	200-784-6	-	-

---

### 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, Hydrogen chloride gas

---

### 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	solid
Colour	no data available

### Safety data

pH	no data available
Melting/freezing point	88.0 - 90.0 °C (190.4 - 194.0 °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	< 0.00001 hPa (< 0.00001 mmHg)
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.51
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, Strong bases

### 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 - 880.0 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

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

### 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: Not available

---

## 12. ECOLOGICAL INFORMATION

### Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 0.2 - 0.3 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.03 - 0.04 mg/l - 96.0 h
	LC50 - Salmo salar (Atlantic salmon) - 0.05 - 0.18 mg/l - 96.0 h

### Persistence and degradability

no data available

### Bioaccumulative potential

Bioaccumulation	Gambusia affinis (Mosquito fish) - 33 d
	Bioconcentration factor (BCF): 12,037

### 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)

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant:  
Poison Inhalation Hazard: No

### IMDG

UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F  
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)  
Marine pollutant: Marine pollutant

### IATA

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)

### 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, Harmful by ingestion.

### 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
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

### New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.  
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene

CAS-No.  
72-55-9

Revision Date

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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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## Material Safety Data Sheet

Version 4.0  
 Revision Date 03/12/2010  
 Print Date 11/10/2011

### 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

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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, Hydrogen chloride gas  
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

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## 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

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**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
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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

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
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### 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

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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## **APPENDIX 3**

### **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and 215-219 West 28<sup>th</sup> Street Mazal Owner LLC 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, 215-219 West 28<sup>th</sup> Street Mazal Owner LLC 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, Eric Ilijevich, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 341-2034

**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. 215-219 West 28<sup>th</sup> Street Mazal Owner LLC will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is: **New York Public Library – Muhlenberg Library**

209 West 23rd Street

New York, New York, NY 10011 Phone: 212-924-1585

Hours (Call to verify):

Monday, Wednesday: 10:00 a.m. to 6:00 p.m.

Tuesday, Thursday: 10:00 a.m. to 7:00 p.m.

Friday, Saturday: 10:00 a.m. to 5:00 p.m.

Sunday: Closed

**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).

**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 215-219 West 28<sup>th</sup> Street Mazal Owner LLC , reviewed and approved by OER prior to distribution and mailed by 215-219 West 28<sup>th</sup> Street Mazal Owner LLC. . 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.

## **APPENDIX 4**

### **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.

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.

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.

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

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

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

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

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

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

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

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

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

**Paperless Brownfield Cleanup Program.** 215-219 West 28<sup>th</sup> Street Mazal Owner LLC is participating in OER's Paperless Brownfield 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.** 215-219 West 28<sup>th</sup> Street Mazal Owner LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

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

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

## **APPENDIX 5**

### **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;
- 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 as follows: east on West 28<sup>th</sup> Street, south on 7<sup>th</sup> Avenue, west on West 23<sup>rd</sup> Street to the West Side Highway (Route 9A) then use either Lincoln and Holland Tunnels . 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 Manhattan, 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 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 does not exhibit evidence of contamination may be reused on-site beneath the building. ‘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 will meet the Unrestricted SCOs and Groundwater Protection Standard listed in Groundwater Protection Standard listed in 6NYCRR Part 375, Table 6.8(a) Table 375-6.8(b).

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.

Appendix 6  
*Plans and Specifications for Vapor  
Barrier/Waterproofing Membrane*

## PREPRUFE® 300R & 160R

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

### Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

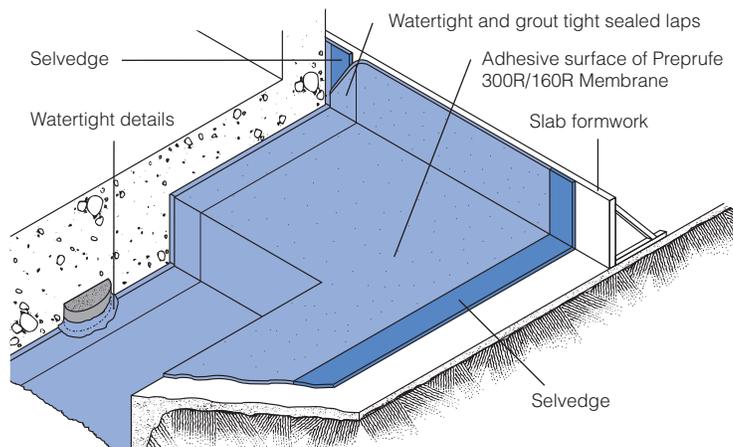
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe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

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

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

### Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



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

## Installation

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

Preprufe 300R & 160R membranes are supplied in rolls 4 ft (1.2 m) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

### Substrate Preparation

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

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

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

### Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions 55°F (<13°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe LT data sheet for more information.

**Horizontal substrates**—Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed (see Figure 2).

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

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

**Vertical substrates**—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to

overlap. Roll firmly to ensure a watertight seal.

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

### Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [graceconstruction.com](http://graceconstruction.com). This manual gives comprehensive guidance and standard details.

### Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe membrane and tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

### Removal of Formwork

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

A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

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

Figure 1

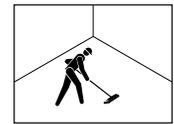


Figure 2

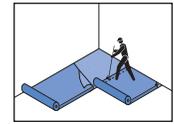
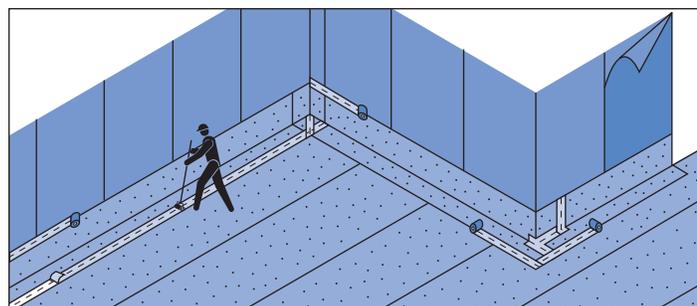
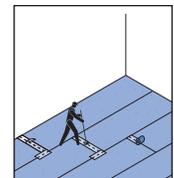


Figure 3

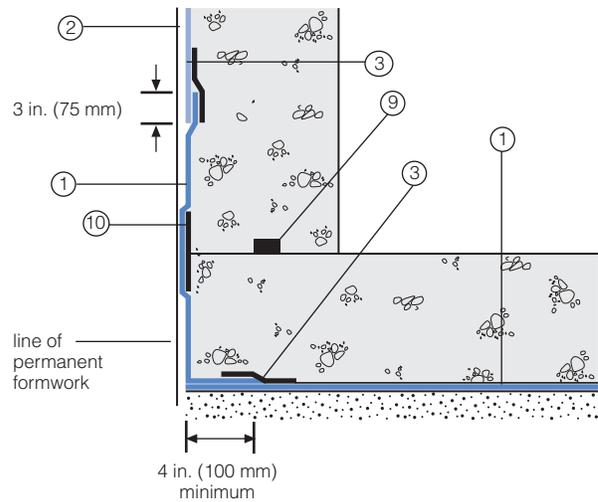


## Detail Drawings

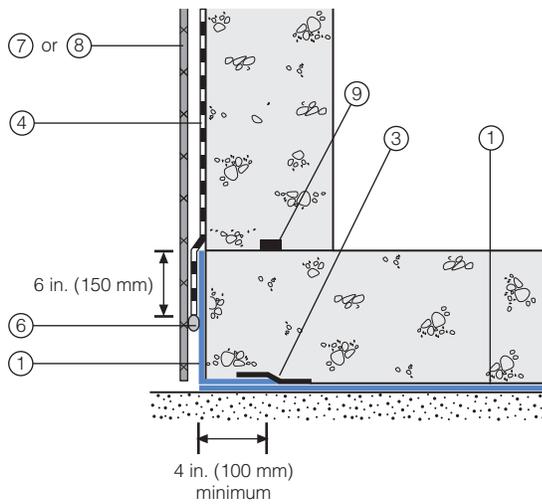
Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [graceconstruction.com](http://graceconstruction.com).

For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

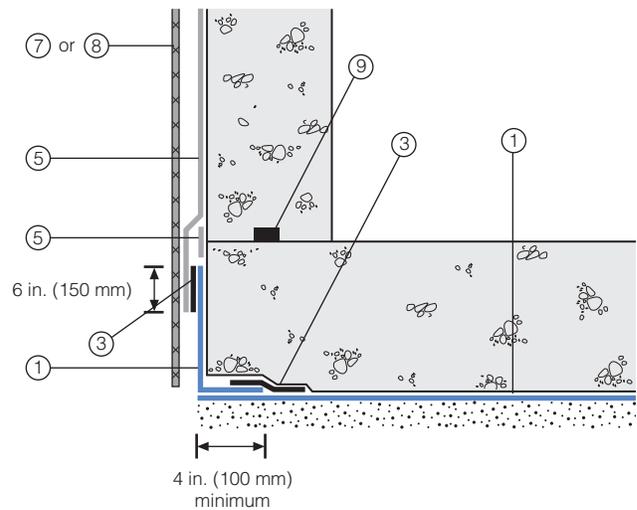
### Wall base detail against permanent shutter



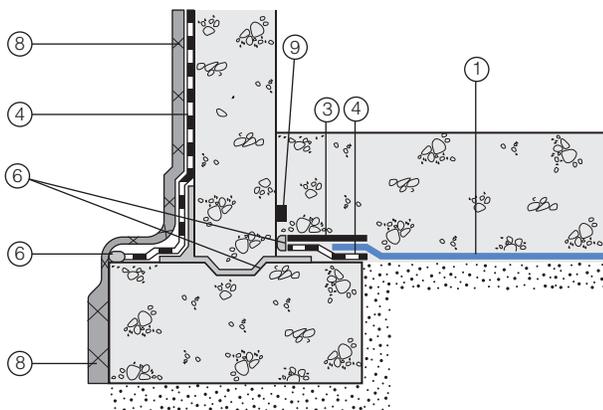
### Bituthene wall base detail (Option 1)



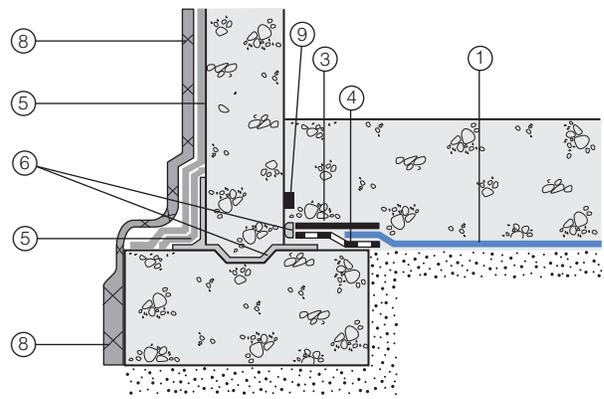
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



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

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

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

## Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	4 ft x 98 ft (1.2 m x 30 m)	4 ft x 115 ft (1.2 m x 35 m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft <sup>2</sup> (36 m <sup>2</sup> )	460 ft <sup>2</sup> (42 m <sup>2</sup> )	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
<b>Ancillary Products</b>			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

## Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified <sup>1</sup>
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified <sup>2</sup>
Elongation	500%	500%	ASTM D412, modified <sup>3</sup>
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified <sup>4</sup>
Lap peel adhesion	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D1876, modified <sup>5</sup>
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	ASTM E96, method B
Water absorption	0.5%	0.5%	ASTM D570

### Footnotes:

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

### Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

### Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

[www.graceconstruction.com](http://www.graceconstruction.com)

For technical assistance call toll free at 866-333-3SBM (3726)

Adcor is a trademark and Preprufe, Bituthene and Hydroduct are registered trademarks of W. R. Grace & Co.—Conn. Procor is a U.S. registered trademark of W. R. Grace & Co.—Conn., and is used in Canada under license from PROCOR LIMITED.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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**GRACE**

## **Section 071326**

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

#### **PART 1 — GENERAL**

##### **1.01 SUMMARY**

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

**NOTE TO SPECIFIER: For vertical applications, coordinate with concrete formwork section to require one-sided wall forming system to minimize punctures to the sheet membrane waterproofing during formwork installation.**

##### **1.02 SUBMITTALS**

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

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

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

- D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
- E 96 Standard Test Methods for Water Vapor Transmission of Materials
- E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

#### **1.04 QUALITY ASSURANCE**

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

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

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

#### **1.06 PROJECT CONDITIONS**

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

#### **1.07 WARRANTY**

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

## PART 2 — PRODUCTS

### 2.01 MATERIALS

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

**NOTE TO SPECIFIER: Preprufe 300R Plus and Preprufe 300LT Plus can both be installed at temperatures 25°F (-4°C) and above. For temperatures 25°F (-4°C) to 40°F (4°C) the use of Preprufe LT Tape is recommended at all side laps when using Preprufe 300R Plus. Alternatively, contractors may elect the use of Preprufe 300LT Plus, which does not require the use of Preprufe LT Tape at side laps in temperature ranges 25°F (-4°C) to 40°F (4°C). For this reason, Grace suggests that both products be incorporated into the specification.**

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

Property	Test Method	Typical Value
Color		White with Yellow and Blue Zip Strips in the Side Lap Area
Thickness	ASTM D 3767 Method A	0.046 in. (1.2 mm) nominal
Lateral Water Migration Resistance	ASTM D 5385 Modified <sup>1</sup>	Pass at 231 ft (71m) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -20°F (-29°C)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>2</sup>	231 ft (71m)
Elongation	ASTM D 412 Modified <sup>3</sup>	500%
Tensile Strength, film	ASTM D 412	4,000 psi (27.6 MPa)
Crack Cycling at -9.4°F (-23°C), 100 Cycles	ASTM C 836	Unaffected, Pass
Puncture Resistance	ASTM E 154	221 lbs (990 N)
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>4</sup>	5.0 lbs/in. (880 N/m)
Lap Peel Adhesion	ASTM D 1876 Modified <sup>5</sup>	8.0 lbs/in. (1408 N/m)
Permeance to water vapor transmission	ASTM E 96 Method B	0.01 perms (0.6 ng/Pa x s x m <sup>2</sup> )

*Footnotes:*

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

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

**NOTE TO SPECIFIER: Preprufe 160R Plus and Preprufe 160LT Plus can both be installed at temperatures 25°F (-4°C) and above. For temperatures 25°F (-4°C) to 40°F (4°C) the use of Preprufe LT Tape is recommended at all side laps when using Preprufe 160R Plus. Alternatively, contractors may elect the use of Preprufe 160LT Plus, which does not require the use of Preprufe LT Tape at side laps in temperature ranges 25°F (-4°C) to 40°F (4°C). For this reason, Grace suggests that both products be incorporated into the specification.**

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

Property	Test Method	Typical Value
Color		White with Yellow and Blue Zip Strips in the Side Lap Area
Thickness	ASTM D 3767 Method A	0.032 in. (0.8 mm) nominal
Lateral Water Migration Resistance	ASTM D 5385 Modified <sup>1</sup>	Pass at 231 ft (71m) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -20°F (-29°C)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>2</sup>	231 ft (71m)
Elongation	ASTM D 412 Modified <sup>3</sup>	500%
Tensile Strength, film	ASTM D 412	4,000 psi (27.6 MPa)
Crack Cycling at -9.4°F (-23°C), 100 Cycles	ASTM C 836	Unaffected, Pass
Puncture Resistance	ASTM E 154	100 lbs (445 N)
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>4</sup>	5.0 lbs/in. (880 N/m)
Lap Peel Adhesion	ASTM D 1876 Modified <sup>5</sup>	8.0 lbs/in. (1408 N/m)
Permeance to water vapor transmission	ASTM E 96 Method B	0.01 perms (0.6 ng/Pa x s x m <sup>2</sup> )

*Footnotes:*

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

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

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

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

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

**PART 3 — EXECUTION**

**3.01 EXECUTION**

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

**3.02 SUBSTRATE PREPARATION**

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

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

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Place the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
  2. Leave the yellow and blue zip strips in position until overlap procedure is completed.
  3. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. The blue zip strip on the underside of the membrane shall be positioned on top of the yellow zip strip on the top of the succeeding sheet. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
  4. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve and adhesive to adhesive bond at the overlap.
  5. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.

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

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the yellow zip strip facing towards the concrete pour. The membrane may be installed in any convenient length.
  2. Fasten through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
  3. Leave the yellow and blue zip strips in position until overlap procedure is completed.
  4. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. The blue zip strip on the underside of the membrane shall be positioned on top of the yellow zip strip on the top of the succeeding sheet. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
  5. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve and adhesive to adhesive bond at the overlap.
  6. Roll firmly to ensure a watertight seal.

### **3.05 INSTALLATION, ROLL ENDS AND CUT EDGES**

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

### **3.06 WATERSTOP INSTALLATION**

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Secure Adcor ES using masonry nails 1½ in. - 2 in. (40 mm – 50 mm) long with a washer ¾ in. (20 mm) in diameter. Hilti EM6-20-12 FP8 shot fired fixings with ¼ in. (6 mm) nuts

and  $\frac{3}{4}$  in. (20 mm) diameter washers may also be used. Fixings should be spaced at a maximum of 12 in. (300 mm) centers with a minimum spacing that ensures proper contact to substrate.

2. On irregular concrete faces, or on vertical surfaces, apply a  $\frac{1}{2}$  in. (12 mm) bead of Adcor ES Adhesive as bedding for Adcor ES.
3. Adcor ES joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.

### 3.07 PROTECTION

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

**END OF SECTION**

**W.R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140**

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## Section 071326 - Pre-Applied Sheet Membrane Waterproofing

## PART 1 — GENERAL

## 1.01 SUMMARY

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

## 1.02 SUBMITTALS

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

## 1.03 REFERENCE STANDARDS

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

D 3767 Standard Practice for Rubber - Measurements of Dimensions

D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes

E 96 Standard Test Methods for Water Vapor Transmission of Materials

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

#### 1.04 QUALITY ASSURANCE

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

#### 1.05 DELIVERY, STORAGE AND HANDLING

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

#### 1.06 PROJECT CONDITIONS

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

#### 1.07 WARRANTY

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

## PART 2 — PRODUCTS

## 2.01 MATERIALS

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

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

Property	Test Method	Typical Value
Color		White with Yellow and Blue Zip Strips in the Side Lap Area
Thickness	ASTM D 3767 Method A	0.046 in. (1.2 mm) nominal
Lateral Water Migration Resistance	ASTM D 5385 Modified <sup>1</sup>	Pass at 231 ft (71m) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -20°F (-29°C)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>2</sup>	231 ft (71m)
Elongation	ASTM D 412 Modified <sup>3</sup>	500%
Tensile Strength, film	ASTM D 412	4,000 psi (27.6 MPa)
Crack Cycling at -9.4°F (-23°C), 100 Cycles	ASTM C 836	Unaffected, Pass
Puncture Resistance	ASTM E 154	221 lbs (990 N)
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>4</sup>	5.0 lbs/in. (880 N/m)
Lap Peel Adhesion	ASTM D 1876 Modified <sup>5</sup>	8.0 lbs/in. (1408 N/m)
Permeance to water vapor transmission	ASTM E 96 Method B	0.01 perms (0.6 ng/Pa x s x m <sup>2</sup> )

*Footnotes:*

- Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.*
- Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.*
- Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.*

4. *Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.*
5. *The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute.*

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

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

Property	Test Method	Typical Value
Color		White with Yellow and Blue Zip Strips in the Side Lap Area
Thickness	ASTM D 3767 Method A	0.032 in. (0.8 mm) nominal
Lateral Water Migration Resistance	ASTM D 5385 Modified <sup>1</sup>	Pass at 231 ft (71m) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -20°F (-29°C)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>2</sup>	231 ft (71m)
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Tensile Strength, film	ASTM D 412	4,000 psi (27.6 MPa)
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Puncture Resistance	ASTM E 154	100 lbs (445 N)
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>4</sup>	5.0 lbs/in. (880 N/m)
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Permeance to water vapor transmission	ASTM E 96 Method B	0.01 perms (0.6 ng/Pa x s x m <sup>2</sup> )

*Footnotes:*

1. *Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.*
2. *Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.*

3. *Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.*
4. *Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.*
5. *The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute.*

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

PHYSICAL PROPERTIES FOR GRACE ADCOR<sup>TM</sup> ES HYDROPHYLIC WATERSTOP:

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

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

PART 3 — EXECUTION

3.01 EXECUTION

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

3.02 SUBSTRATE PREPARATION

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

### 3.03 INSTALLATION, HORIZONTAL APPLICATIONS

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  - 1. Place the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
  - 2. Leave the yellow and blue zip strips in position until overlap procedure is completed.
  - 3. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. The blue zip strip on the underside of the membrane shall be positioned on top of the yellow zip strip on the top of the succeeding sheet. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
  - 4. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve and adhesive to adhesive bond at the overlap.
  - 5. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.

### 3.04 INSTALLATION, VERTICAL APPLICATIONS

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  - 1. Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the yellow zip strip facing towards the concrete pour. The membrane may be installed in any convenient length.
  - 2. Fasten through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
  - 3. Leave the yellow and blue zip strips in position until overlap procedure is completed.

4. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. The blue zip strip on the underside of the membrane shall be positioned on top of the yellow zip strip on the top of the succeeding sheet. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
5. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve and adhesive to adhesive bond at the overlap.
6. Roll firmly to ensure a watertight seal.

### 3.05 INSTALLATION, ROLL ENDS AND CUT EDGES

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

### 3.06 WATERSTOP INSTALLATION

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  1. Secure Adcor ES using masonry nails 1½ in. - 2 in. (40 mm – 50 mm) long with a washer ¾ in. (20 mm) in diameter. Hilti EM6-20-12 FP8 shot fired fixings with ¼ in. (6 mm) nuts and ¾ in. (20 mm) diameter washers may also be used. Fixings should be spaced at a maximum of 12 in. (300 mm) centers with a minimum spacing that ensures proper contact to substrate.
  2. On irregular concrete faces, or on vertical surfaces, apply a ½ in. (12 mm) bead of Adcor ES Adhesive as bedding for Adcor ES.
  3. Adcor ES joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.

### 3.07 PROTECTION

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

END OF SECTION

## SECTION 071616 - CRYSTALLINE WATERPROOFING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes crystalline waterproofing.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" for the finishing of concrete walls and slabs to receive waterproofing.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, and installation instructions.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Applicator.
- B. Product Certificates: For each type of waterproofing, patching, and plugging material.
- C. Product Test Reports: For each product formulation, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Field quality-control reports.

## 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.
- B. Mockups: Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.
- B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.
- C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at **40 deg F (4.4 deg C)** or above during work and cure period, and space is well ventilated and kept free of water.

## PART 2 - PRODUCTS

### 2.1 WATERPROOFING MATERIALS

- A. Crystalline Waterproofing: Prepackaged, colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; with properties complying with or exceeding the criteria specified below.
  1. Aquafin, Inc, Elkton, MD  
Kryton Intl, Inc, Vancouver, BC , Canada
  2. Water Permeability: Maximum **zero for water at 30 feet (9 m)** > when tested according to COE CRD-C 48.
  3. Compressive Strength: Minimum [**4000 psi (27.6 MPa)**] at 28 days when tested according to ASTM C 109/C 109M.

### 2.2 ACCESSORY MATERIALS

- A. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; and compatible with substrate and other materials indicated.

- B. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); and compatible with substrate and other materials indicated.
- C. Water: Potable.

### 2.3 MIXES

- A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
- B. Proceed with application only after unsatisfactory conditions have been corrected.
- C. Notify Architect in writing of active leaks or defects that would affect system performance.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions.
- B. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure[ **to confine spraying operation and**] to ensure adequate ambient temperatures and ventilation conditions for application.
- C. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
- D. Stop active water leaks with plugging compound.
- E. Repair damaged or unsatisfactory substrate with patching compound.
  - 1. At holes and cracks **1/16 inch (1.6 mm)** wide or larger in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and minimum **1 inch (25 mm)** deep. Fill reveal with patching compound flush with surface.
- F. Surface Preparation: Remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
  - 1. Clean concrete surfaces according to ASTM D 4258.

- a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic acid solution according to ASTM D 4260.
  - b. Smooth-Formed and Trowel-Finished Concrete: Prepare by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
2. Clean concrete unit masonry surfaces according to ASTM D 4261.
    - a. Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
    - b. Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of **1/16 inch (1.6 mm)**.
  3. Concrete Joints: Clean reveals.

### 3.3 APPLICATION

- A. General: Comply with waterproofing manufacturer's written instructions for application and curing.
  1. Saturate surface with water for several hours and maintain damp condition until applying waterproofing. Remove standing water.
  2. Apply waterproofing to surfaces, and extend waterproofing onto adjacent surfaces as follows:
    - a. Onto columns integral with treated walls.
    - b. Onto interior nontreated walls intersecting exterior treated walls, for a distance of **[24 inches (600 mm)]** for cast-in-place concrete.
    - c. Onto exterior walls and onto both exterior and interior columns, for a height of **12 inches (300 mm)**, where floors, but not walls, are treated.
    - d. Onto every substrate in areas indicated for treatment, including [pipe trenches] [pipe chases] [pits] [sumps] and [similar offsets and features].
  3. Number of Coats: **Three**
  4. Application Method: Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
  5. Dampen surface between coats.
- B. Final Coat Finish: **Spray texture**].
- C. Curing: Moist-cure waterproofing for **three** days immediately after final coat has set, followed by air drying, unless otherwise recommended in writing by manufacturer.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed application of waterproofing.

- B. Prepare test and inspection reports.

END OF SECTION 071616

SECTION 031510  
HYDROPHILIC WATERSTOPS

Grace Adcor™ ES

PART 1 — GENERAL

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.02 SUMMARY

- A. Section provides for an expanding hydrophilic waterstop as specified herein, illustrated on project drawings, or as required to complete the work to comply with waterproofing warranty requirements.
- B. System Description:
  - 1. Waterstop Strip: A non-Bentonite hydrophilic waterstop with a minimum swell as per Section 2.02
  - 2. Accessories for complete waterstop application
- C. Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
  - 1. Section 033000 – Cast-In-Place Concrete
  - 2. Section 042000 – Unit Masonry
  - 3. Section 071100 – Dampproofing
  - 4. Section 076000 – Flashing and Sheet Metal
  - 5. Section 079200 – Joint Sealants
  - 6. Section 079500 – Expansion Control
  - 7. Section 334600 – Subdrainage

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations.
- B. Shop drawings showing locations and extent of waterstop.
- C. Written documentation demonstrating Installers qualifications under the "Quality Assurance" article including reference projects of a similar scope.
- D. Samples: Submit representative sample of actual product.
- E. Warranty: Submit a sample warranty identifying the terms and conditions stated in Section 1.7.

#### 1.04 QUALITY ASSURANCE

- A. **Manufacturer:** Waterstop systems shall be manufactured and marketed by a firm with a minimum of 20 years' experience in the production and sales of building materials. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.
- B. **Installer Qualifications:** A firm which has at least three (3) years experience in work for the type required by this section.
- C. **Material:** Waterstop shall be by single source manufacturer and shall be specially engineered to be a swellable and conformable polyurethane/butyl blended rubber free of sodium bentonite that expands when in contact with water.
- D. **Pre-Installation Conference:** A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of surface preparation, installation procedures, special details, inspection, protection, and repair procedures.
- E. **Expansion Joints:** Adcor ES is not designed for moving joints.
- F. **Concrete:** Concrete shall be normal weight structural concrete and provide a minimum cover of 3" around Adcor ES Waterstop.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in the original, unopened containers with seals unbroken, labeled with the manufacturer's name, product brand name and type, date of manufacture and directions for storage and use.
- B. Store and handle materials in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
  - 1. Store material off of ground and keep dry.
  - 2. Provide cover for material to protect top and sides.
- C. Sequence deliveries to avoid delays, but minimize on-site storage.

#### 1.06 PROJECT CONDITIONS

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive waterstop.
- C. Do not allow waste products (i.e. petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, acids, etc.) to come into contact with the waterstop. Any exposure to foreign materials or chemical discharges must be presented to the Membrane Manufacturer to determine the impact on the waterstop performance.
- D. Maintain environmental conditions within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- E. General contractor shall assure adequate protection during and after the application of the waterstop.

1.07 WARRANTY

- A. Upon completion of work, provide a copy of Manufacturer's standard warranty.

PART 2 — PRODUCTS

2.01 GENERAL

- A. All waterstop materials shall be manufactured and supplied by:

Grace Construction Products

62 Whittemore Avenue, Cambridge, MA. 02140

Telephone: 866-333-3726

2.02 MATERIALS

- A. Hydrophilic Waterstop Strip: Grace Adcor™ ES by Grace Construction Products; a swellable, conformable polyurethane/butyl blended rubber based material free of sodium bentonite.
- B. Waterstop Physical Properties:

PHYSICAL PROPERTIES FOR GRACE ADCOR™ ES HYDROPHYLIC WATERSTOP:

Property	Typical Value
Color	Grey
Size	1.0 in. x ½ in. x 16 ft. (25.4 mm x 12.7 mm x 4.9 m) rolls
Packaging	6 rolls per case
Hydrostatic Head Resistance	70 m (231 ft)
Wet - Dry Cycling [25 Cycles @ 231 ft. (70 m)]	No Effect
Adhesion to Concrete using Adcor ES Adhesive	Excellent

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Examine conditions of substrates and other conditions under which this work is to be performed and notify the Architect, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 PREPARATION OF SUBSTRATES

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Do not install waterstop onto any substrates with standing water.

### 3.03 INSTALLATION

A. Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following:

1. Construction Joint:

- a) On irregular concrete faces, apply a ½ in. (12 mm) bead of Adcor ES Adhesive as bedding for Adcor ES.
- b) Secure Adcor ES using masonry nails 1½ in. - 2 in. (40 mm – 50 mm) long with a washer ¾ in. (20 mm) in diameter. Hilti EM6-20-12 FP8 shot fired fixings with ¼ in. (6 mm) nuts and ¾ in. (20 mm) diameter washers may also be used. Fixings should be spaced at a maximum of 12 in. (300 mm) centers with a minimum spacing that ensures proper contact to substrate.
- c) Adcor ES joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.
- d) Adcor ES can be bent around corners; however on complex geometry use Adcor ES Adhesive to fill any gaps.
- e) Any damaged sections should be removed and repaired with a new section of Adcor ES.
- f) Keep Adcor ES dry prior to pouring concrete.

2. Pipe Penetration:

- a) Adcor ES Adhesive must be applied to dry substrates only. Apply by brush to the substrate. Wait until surface is dry to touch, and then press Adcor ES firmly into place.
- b) Adcor ES joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.
- c) Keep Adcor ES dry prior to pouring concrete.

### 3.04 CLEANING AND PROTECTION

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete.
- B. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

END OF SECTION

W.R. Grace & Co.-Conn.                      62 Whittemore Avenue                      Cambridge, MA 02140

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.-Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, W. R. Grace & Co. Canada, Ltd., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6

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Updated: 4/2012

# Attachment A

## *Waste Characterization Sampling Results*

### *Laboratory Deliverables*

Laboratory Deliverables with Chains-of-Custody



## ANALYTICAL REPORT

Lab Number:	L1500997
Client:	Tenen Environmental, LLC 121 West 27th Street Suite 1004 New York City, NY
ATTN:	Matt Carroll
Phone:	(646) 606-2332
Project Name:	217 WEST 20TH STREET
Project Number:	217W28
Report Date:	01/23/15

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

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1500997-01	217W28-F1	SOIL	NY, NY	01/16/15 09:30	01/16/15
L1500997-02	217W28-F2	SOIL	NY, NY	01/16/15 09:45	01/16/15
L1500997-03	217W28-N1	SOIL	NY, NY	01/16/15 09:55	01/16/15

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

### Case Narrative

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

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

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

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

### Case Narrative (continued)

#### Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Semivolatile Organics

L1500997-01 and -02 have elevated detection limits due to the dilutions required by the sample matrices.

WG757107 LCS/LCSD: One or more compounds failed to meet the recovery and/or RPD limits. Please refer to the QC section of the report for specific details.

#### Semivolatile Organics by SIM

L1500997-01 and -02 have elevated detection limits due to the dilutions required by the sample matrices.

WG757108 LCS/LCSD: One or more compounds failed to meet the recovery and/or RPD limits. Please refer to the QC section of the report for specific details.

#### Total Metals

L1500997-01, -02, and -03 have elevated detection limits for all elements, with the exception of mercury, due to the dilutions required by matrix interferences encountered during analysis.

The WG756812-4 MS recovery, performed on L1500997-01, is outside the acceptance criteria for mercury (24%). A post digestion spike was performed and was within acceptance criteria.

The WG757784-4 MS recoveries, performed on L1500997-01, are outside the acceptance criteria for arsenic (9%), barium (59%), chromium (21%), copper (0%), and magnesium (2040%). A post digestion spike was performed and yielded unacceptable recoveries for arsenic (71%), barium (58%), and magnesium (64%); chromium and copper were within acceptance criteria. This has been attributed to sample matrix.

The WG757784-4 MS recoveries for calcium (3210%), iron (0%), lead (0%), manganese (0%), and zinc (0%), performed on L1500997-01, do not apply because the sample concentrations are greater than four times the spike amounts added.

The WG757784-3 Laboratory Duplicate RPDs, performed on L1500997-01, are outside the acceptance criteria for arsenic (82%), cadmium (27%), calcium (50%), chromium (26%), cobalt (22%), copper (63%), iron

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

### Case Narrative (continued)

(92%), manganese (43%), sodium (25%), vanadium (34%), and zinc (40%). The elevated RPDs have been attributed to the non-homogeneous nature of the sample utilized for the laboratory duplicate.

#### TCLP Metals

The WG757737-2 LCS recovery, associated with L1500997-02, is above the acceptance criteria for mercury (129%); however, the associated samples are non-detect for this target compound. The results of the original analysis are reported.

The WG757736-4 MS recovery, performed on L1500997-01, is outside the acceptance criteria for mercury (124%). A post digestion spike was performed and was within acceptance criteria.

The WG757737-4 MS recovery, performed on L1500997-02, is outside the acceptance criteria for mercury (125%). A post digestion spike was performed and yielded an unacceptable recovery of 122%. This has been attributed to sample matrix.

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

Authorized Signature:

 Kelly Stenstrom

Title: Technical Director/Representative

Date: 01/23/15

# ORGANICS

# VOLATILES

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-01  
 Client ID: 217W28-F1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8260C  
 Analytical Date: 01/21/15 03:54  
 Analyst: PP  
 Percent Solids: 84%

Date Collected: 01/16/15 09:30  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Volatile Organics by GC/MS-5035 - Westborough Lab</b>						
1,2-Dibromo-3-chloropropane	ND		mg/kg	0.0040	0.00053	1
1,4-Dioxane	ND		mg/kg	0.13	0.019	1
1,2-Dibromoethane	ND		mg/kg	0.0040	0.00023	1
Methylene chloride	ND		mg/kg	0.0066	0.0015	1
1,1-Dichloroethane	ND		mg/kg	0.0020	0.00011	1
Chloroform	ND		mg/kg	0.0020	0.00049	1
Carbon tetrachloride	ND		mg/kg	0.0013	0.00028	1
1,2-Dichloropropane	ND		mg/kg	0.0046	0.00030	1
Dibromochloromethane	ND		mg/kg	0.0013	0.00020	1
1,1,2-Trichloroethane	ND		mg/kg	0.0020	0.00040	1
2-Chloroethylvinyl ether	ND		mg/kg	0.026	0.00082	1
Tetrachloroethene	0.0011	J	mg/kg	0.0013	0.00019	1
Chlorobenzene	ND		mg/kg	0.0013	0.00046	1
Trichlorofluoromethane	ND		mg/kg	0.0066	0.00052	1
1,2-Dichloroethane	ND		mg/kg	0.0013	0.00015	1
1,1,1-Trichloroethane	ND		mg/kg	0.0013	0.00015	1
Bromodichloromethane	ND		mg/kg	0.0013	0.00023	1
trans-1,3-Dichloropropene	ND		mg/kg	0.0013	0.00016	1
cis-1,3-Dichloropropene	ND		mg/kg	0.0013	0.00016	1
Bromoform	ND		mg/kg	0.0053	0.00031	1
1,1,2,2-Tetrachloroethane	ND		mg/kg	0.0013	0.00013	1
Benzene	ND		mg/kg	0.0013	0.00016	1
Toluene	ND		mg/kg	0.0020	0.00026	1
Ethylbenzene	ND		mg/kg	0.0013	0.00017	1
Chloromethane	ND		mg/kg	0.0066	0.00039	1
Bromomethane	ND		mg/kg	0.0026	0.00045	1
Vinyl chloride	ND		mg/kg	0.0026	0.00016	1
Chloroethane	ND		mg/kg	0.0026	0.00042	1
1,1-Dichloroethene	ND		mg/kg	0.0013	0.00035	1
trans-1,2-Dichloroethene	ND		mg/kg	0.0020	0.00028	1

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-01  
**Client ID:** 217W28-F1  
**Sample Location:** NY, NY

**Date Collected:** 01/16/15 09:30  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Volatile Organics by GC/MS-5035 - Westborough Lab</b>						
Trichloroethene	0.00029	J	mg/kg	0.0013	0.00017	1
1,2-Dichlorobenzene	ND		mg/kg	0.0066	0.00020	1
1,3-Dichlorobenzene	ND		mg/kg	0.0066	0.00018	1
1,4-Dichlorobenzene	ND		mg/kg	0.0066	0.00018	1
Methyl tert butyl ether	ND		mg/kg	0.0026	0.00011	1
p/m-Xylene	ND		mg/kg	0.0026	0.00026	1
o-Xylene	ND		mg/kg	0.0026	0.00023	1
Xylenes, Total	ND		mg/kg	0.0026	0.00023	1
cis-1,2-Dichloroethene	ND		mg/kg	0.0013	0.00019	1
Styrene	ND		mg/kg	0.0026	0.00053	1
Dichlorodifluoromethane	ND		mg/kg	0.013	0.00025	1
Acetone	ND		mg/kg	0.048	0.0014	1
Carbon disulfide	ND		mg/kg	0.013	0.0015	1
4-Methyl-2-pentanone	ND		mg/kg	0.013	0.00032	1
2-Hexanone	ND		mg/kg	0.013	0.00088	1
Acrolein	ND		mg/kg	0.033	0.011	1
Acrylonitrile	ND		mg/kg	0.0053	0.00068	1
Bromochloromethane	ND		mg/kg	0.0066	0.00037	1
1,1,1,2-Tetrachloroethane	ND		mg/kg	0.0013	0.00042	1
Isopropylbenzene	ND		mg/kg	0.0013	0.00014	1
1,2,3-Trichlorobenzene	ND		mg/kg	0.0066	0.00020	1
1,2,4-Trichlorobenzene	ND		mg/kg	0.0066	0.00024	1
Methyl Acetate	ND		mg/kg	0.0053	0.00036	1
Cyclohexane	ND		mg/kg	0.026	0.00019	1
Tert-Butyl Alcohol	ND		mg/kg	0.13	0.0039	1
Methyl cyclohexane	ND		mg/kg	0.0053	0.00020	1
Freon-113	ND		mg/kg	0.026	0.00036	1

**Tentatively Identified Compounds**

Total TIC Compounds	0.027	J	mg/kg			1
Unknown	0.0060	J	mg/kg			1
Unknown	0.0089	J	mg/kg			1
Unknown	0.0034	J	mg/kg			1
Unknown	0.0058	J	mg/kg			1
Unknown	0.0030	J	mg/kg			1

**Project Name:** 217 WEST 20TH STREET**Lab Number:** L1500997**Project Number:** 217W28**Report Date:** 01/23/15**SAMPLE RESULTS**

Lab ID: L1500997-01

Date Collected: 01/16/15 09:30

Client ID: 217W28-F1

Date Received: 01/16/15

Sample Location: NY, NY

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Volatile Organics by GC/MS-5035 - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	87		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	94		70-130
Dibromofluoromethane	93		70-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02  
 Client ID: 217W28-F2  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8260C  
 Analytical Date: 01/21/15 04:21  
 Analyst: PP  
 Percent Solids: 87%

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Volatile Organics by GC/MS-5035 - Westborough Lab</b>						
1,2-Dibromo-3-chloropropane	ND		mg/kg	0.0038	0.00050	1
1,4-Dioxane	ND		mg/kg	0.12	0.018	1
1,2-Dibromoethane	ND		mg/kg	0.0038	0.00022	1
Methylene chloride	ND		mg/kg	0.0062	0.0014	1
1,1-Dichloroethane	ND		mg/kg	0.0019	0.00011	1
Chloroform	ND		mg/kg	0.0019	0.00046	1
Carbon tetrachloride	ND		mg/kg	0.0012	0.00026	1
1,2-Dichloropropane	ND		mg/kg	0.0044	0.00028	1
Dibromochloromethane	ND		mg/kg	0.0012	0.00019	1
1,1,2-Trichloroethane	ND		mg/kg	0.0019	0.00038	1
2-Chloroethylvinyl ether	ND		mg/kg	0.025	0.00077	1
Tetrachloroethene	ND		mg/kg	0.0012	0.00018	1
Chlorobenzene	ND		mg/kg	0.0012	0.00044	1
Trichlorofluoromethane	ND		mg/kg	0.0062	0.00048	1
1,2-Dichloroethane	ND		mg/kg	0.0012	0.00014	1
1,1,1-Trichloroethane	ND		mg/kg	0.0012	0.00014	1
Bromodichloromethane	ND		mg/kg	0.0012	0.00022	1
trans-1,3-Dichloropropene	ND		mg/kg	0.0012	0.00015	1
cis-1,3-Dichloropropene	ND		mg/kg	0.0012	0.00015	1
Bromoform	ND		mg/kg	0.0050	0.00030	1
1,1,2,2-Tetrachloroethane	ND		mg/kg	0.0012	0.00013	1
Benzene	ND		mg/kg	0.0012	0.00015	1
Toluene	ND		mg/kg	0.0019	0.00024	1
Ethylbenzene	ND		mg/kg	0.0012	0.00016	1
Chloromethane	ND		mg/kg	0.0062	0.00037	1
Bromomethane	ND		mg/kg	0.0025	0.00042	1
Vinyl chloride	ND		mg/kg	0.0025	0.00015	1
Chloroethane	ND		mg/kg	0.0025	0.00040	1
1,1-Dichloroethene	ND		mg/kg	0.0012	0.00033	1
trans-1,2-Dichloroethene	ND		mg/kg	0.0019	0.00026	1

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-02  
**Client ID:** 217W28-F2  
**Sample Location:** NY, NY

**Date Collected:** 01/16/15 09:45  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Volatile Organics by GC/MS-5035 - Westborough Lab</b>						
Trichloroethene	ND		mg/kg	0.0012	0.00016	1
1,2-Dichlorobenzene	ND		mg/kg	0.0062	0.00019	1
1,3-Dichlorobenzene	ND		mg/kg	0.0062	0.00017	1
1,4-Dichlorobenzene	ND		mg/kg	0.0062	0.00017	1
Methyl tert butyl ether	ND		mg/kg	0.0025	0.00010	1
p/m-Xylene	ND		mg/kg	0.0025	0.00025	1
o-Xylene	ND		mg/kg	0.0025	0.00021	1
Xylenes, Total	ND		mg/kg	0.0025	0.00021	1
cis-1,2-Dichloroethene	ND		mg/kg	0.0012	0.00018	1
Styrene	ND		mg/kg	0.0025	0.00050	1
Dichlorodifluoromethane	ND		mg/kg	0.012	0.00024	1
Acetone	0.0032	J	mg/kg	0.045	0.0013	1
Carbon disulfide	ND		mg/kg	0.012	0.0014	1
4-Methyl-2-pentanone	ND		mg/kg	0.012	0.00030	1
2-Hexanone	ND		mg/kg	0.012	0.00083	1
Acrolein	ND		mg/kg	0.031	0.010	1
Acrylonitrile	ND		mg/kg	0.0050	0.00064	1
Bromochloromethane	ND		mg/kg	0.0062	0.00034	1
1,1,1,2-Tetrachloroethane	ND		mg/kg	0.0012	0.00040	1
Isopropylbenzene	ND		mg/kg	0.0012	0.00013	1
1,2,3-Trichlorobenzene	ND		mg/kg	0.0062	0.00018	1
1,2,4-Trichlorobenzene	ND		mg/kg	0.0062	0.00023	1
Methyl Acetate	ND		mg/kg	0.0050	0.00034	1
Cyclohexane	ND		mg/kg	0.025	0.00018	1
Tert-Butyl Alcohol	ND		mg/kg	0.12	0.0036	1
Methyl cyclohexane	ND		mg/kg	0.0050	0.00019	1
Freon-113	ND		mg/kg	0.025	0.00034	1

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-02  
**Client ID:** 217W28-F2  
**Sample Location:** NY, NY

**Date Collected:** 01/16/15 09:45  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Volatile Organics by GC/MS-5035 - Westborough Lab

## Tentatively Identified Compounds

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Total TIC Compounds	0.040	J	mg/kg			1
Unknown	0.0026	J	mg/kg			1
Unknown	0.0032	J	mg/kg			1
Unknown	0.013	J	mg/kg			1
Unknown	0.010	J	mg/kg			1
Unknown	0.0026	J	mg/kg			1
Unknown	0.0055	J	mg/kg			1
Unknown	0.0028	J	mg/kg			1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	88		70-130
Toluene-d8	92		70-130
4-Bromofluorobenzene	94		70-130
Dibromofluoromethane	90		70-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-03  
**Client ID:** 217W28-N1  
**Sample Location:** NY, NY  
**Matrix:** Soil  
**Analytical Method:** 1,8260C  
**Analytical Date:** 01/21/15 04:47  
**Analyst:** PP  
**Percent Solids:** 86%

**Date Collected:** 01/16/15 09:55  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Volatile Organics by GC/MS-5035 - Westborough Lab</b>						
1,2-Dibromo-3-chloropropane	ND		mg/kg	0.0034	0.00045	1
1,4-Dioxane	ND		mg/kg	0.11	0.016	1
1,2-Dibromoethane	ND		mg/kg	0.0034	0.00020	1
Methylene chloride	ND		mg/kg	0.0057	0.0013	1
1,1-Dichloroethane	ND		mg/kg	0.0017	0.00009	1
Chloroform	ND		mg/kg	0.0017	0.00042	1
Carbon tetrachloride	ND		mg/kg	0.0011	0.00024	1
1,2-Dichloropropane	ND		mg/kg	0.0040	0.00026	1
Dibromochloromethane	ND		mg/kg	0.0011	0.00018	1
1,1,2-Trichloroethane	ND		mg/kg	0.0017	0.00035	1
2-Chloroethylvinyl ether	ND		mg/kg	0.023	0.00070	1
Tetrachloroethene	ND		mg/kg	0.0011	0.00016	1
Chlorobenzene	ND		mg/kg	0.0011	0.00040	1
Trichlorofluoromethane	ND		mg/kg	0.0057	0.00044	1
1,2-Dichloroethane	ND		mg/kg	0.0011	0.00013	1
1,1,1-Trichloroethane	ND		mg/kg	0.0011	0.00013	1
Bromodichloromethane	ND		mg/kg	0.0011	0.00020	1
trans-1,3-Dichloropropene	ND		mg/kg	0.0011	0.00014	1
cis-1,3-Dichloropropene	ND		mg/kg	0.0011	0.00013	1
Bromoform	ND		mg/kg	0.0046	0.00027	1
1,1,2,2-Tetrachloroethane	ND		mg/kg	0.0011	0.00012	1
Benzene	ND		mg/kg	0.0011	0.00013	1
Toluene	ND		mg/kg	0.0017	0.00022	1
Ethylbenzene	ND		mg/kg	0.0011	0.00014	1
Chloromethane	ND		mg/kg	0.0057	0.00034	1
Bromomethane	ND		mg/kg	0.0023	0.00038	1
Vinyl chloride	ND		mg/kg	0.0023	0.00013	1
Chloroethane	ND		mg/kg	0.0023	0.00036	1
1,1-Dichloroethene	ND		mg/kg	0.0011	0.00030	1
trans-1,2-Dichloroethene	ND		mg/kg	0.0017	0.00024	1

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

## SAMPLE RESULTS

Lab ID: L1500997-03

Date Collected: 01/16/15 09:55

Client ID: 217W28-N1

Date Received: 01/16/15

Sample Location: NY, NY

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS-5035 - Westborough Lab						
Trichloroethene	ND		mg/kg	0.0011	0.00014	1
1,2-Dichlorobenzene	ND		mg/kg	0.0057	0.00017	1
1,3-Dichlorobenzene	ND		mg/kg	0.0057	0.00015	1
1,4-Dichlorobenzene	ND		mg/kg	0.0057	0.00016	1
Methyl tert butyl ether	ND		mg/kg	0.0023	0.00009	1
p/m-Xylene	ND		mg/kg	0.0023	0.00022	1
o-Xylene	ND		mg/kg	0.0023	0.00020	1
Xylenes, Total	ND		mg/kg	0.0023	0.00020	1
cis-1,2-Dichloroethene	ND		mg/kg	0.0011	0.00016	1
Styrene	ND		mg/kg	0.0023	0.00046	1
Dichlorodifluoromethane	ND		mg/kg	0.011	0.00022	1
Acetone	ND		mg/kg	0.041	0.0012	1
Carbon disulfide	ND		mg/kg	0.011	0.0012	1
4-Methyl-2-pentanone	ND		mg/kg	0.011	0.00028	1
2-Hexanone	ND		mg/kg	0.011	0.00076	1
Acrolein	ND		mg/kg	0.028	0.0092	1
Acrylonitrile	ND		mg/kg	0.0046	0.00059	1
Bromochloromethane	ND		mg/kg	0.0057	0.00032	1
1,1,1,2-Tetrachloroethane	ND		mg/kg	0.0011	0.00036	1
Isopropylbenzene	ND		mg/kg	0.0011	0.00012	1
1,2,3-Trichlorobenzene	ND		mg/kg	0.0057	0.00017	1
1,2,4-Trichlorobenzene	ND		mg/kg	0.0057	0.00021	1
Methyl Acetate	ND		mg/kg	0.0046	0.00031	1
Cyclohexane	ND		mg/kg	0.023	0.00017	1
Tert-Butyl Alcohol	ND		mg/kg	0.11	0.0033	1
Methyl cyclohexane	ND		mg/kg	0.0046	0.00018	1
Freon-113	ND		mg/kg	0.023	0.00031	1

## Tentatively Identified Compounds

Total TIC Compounds	0.015	J	mg/kg	1
Unknown	0.0038	J	mg/kg	1
Unknown	0.0045	J	mg/kg	1
Unknown	0.0026	J	mg/kg	1
Unknown	0.0040	J	mg/kg	1

**Project Name:** 217 WEST 20TH STREET**Lab Number:** L1500997**Project Number:** 217W28**Report Date:** 01/23/15**SAMPLE RESULTS**

Lab ID: L1500997-03

Date Collected: 01/16/15 09:55

Client ID: 217W28-N1

Date Received: 01/16/15

Sample Location: NY, NY

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Volatile Organics by GC/MS-5035 - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	88		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	95		70-130
Dibromofluoromethane	92		70-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 1,8260C  
Analytical Date: 01/20/15 21:15  
Analyst: PP

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-5035 - Westborough Lab for sample(s): 01-03 Batch: WG757329-3					
1,2-Dibromo-3-chloropropane	ND		mg/kg	0.0030	0.00040
1,4-Dioxane	ND		mg/kg	0.10	0.014
1,2-Dibromoethane	ND		mg/kg	0.0030	0.00017
Methylene chloride	ND		mg/kg	0.0050	0.0011
1,1-Dichloroethane	ND		mg/kg	0.0015	0.00008
Chloroform	ND		mg/kg	0.0015	0.00037
Carbon tetrachloride	ND		mg/kg	0.0010	0.00021
1,2-Dichloropropane	ND		mg/kg	0.0035	0.00023
Dibromochloromethane	ND		mg/kg	0.0010	0.00015
1,1,2-Trichloroethane	ND		mg/kg	0.0015	0.00030
2-Chloroethylvinyl ether	ND		mg/kg	0.020	0.00062
Tetrachloroethene	ND		mg/kg	0.0010	0.00014
Chlorobenzene	ND		mg/kg	0.0010	0.00035
Trichlorofluoromethane	ND		mg/kg	0.0050	0.00039
1,2-Dichloroethane	ND		mg/kg	0.0010	0.00011
1,1,1-Trichloroethane	ND		mg/kg	0.0010	0.00011
Bromodichloromethane	ND		mg/kg	0.0010	0.00017
trans-1,3-Dichloropropene	ND		mg/kg	0.0010	0.00012
cis-1,3-Dichloropropene	ND		mg/kg	0.0010	0.00012
Bromoform	ND		mg/kg	0.0040	0.00024
1,1,2,2-Tetrachloroethane	ND		mg/kg	0.0010	0.00010
Benzene	ND		mg/kg	0.0010	0.00012
Toluene	ND		mg/kg	0.0015	0.00019
Ethylbenzene	ND		mg/kg	0.0010	0.00013
Chloromethane	0.00031	J	mg/kg	0.0050	0.00029
Bromomethane	ND		mg/kg	0.0020	0.00034
Vinyl chloride	ND		mg/kg	0.0020	0.00012
Chloroethane	ND		mg/kg	0.0020	0.00032
1,1-Dichloroethene	ND		mg/kg	0.0010	0.00026

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 1,8260C  
Analytical Date: 01/20/15 21:15  
Analyst: PP

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-5035 - Westborough Lab for sample(s): 01-03 Batch: WG757329-3					
trans-1,2-Dichloroethene	ND		mg/kg	0.0015	0.00021
Trichloroethene	ND		mg/kg	0.0010	0.00012
1,2-Dichlorobenzene	ND		mg/kg	0.0050	0.00015
1,3-Dichlorobenzene	ND		mg/kg	0.0050	0.00014
1,4-Dichlorobenzene	ND		mg/kg	0.0050	0.00014
Methyl tert butyl ether	ND		mg/kg	0.0020	0.00008
p/m-Xylene	ND		mg/kg	0.0020	0.00020
o-Xylene	ND		mg/kg	0.0020	0.00017
Xylenes, Total	ND		mg/kg	0.0020	0.00017
cis-1,2-Dichloroethene	ND		mg/kg	0.0010	0.00014
Styrene	ND		mg/kg	0.0020	0.00040
Dichlorodifluoromethane	ND		mg/kg	0.010	0.00019
Acetone	0.0018	J	mg/kg	0.036	0.0010
Carbon disulfide	ND		mg/kg	0.010	0.0011
4-Methyl-2-pentanone	ND		mg/kg	0.010	0.00024
2-Hexanone	ND		mg/kg	0.010	0.00067
Acrolein	ND		mg/kg	0.025	0.0081
Acrylonitrile	ND		mg/kg	0.0040	0.00051
Bromochloromethane	ND		mg/kg	0.0050	0.00028
1,1,1,2-Tetrachloroethane	ND		mg/kg	0.0010	0.00032
Isopropylbenzene	ND		mg/kg	0.0010	0.00010
1,2,3-Trichlorobenzene	ND		mg/kg	0.0050	0.00015
1,2,4-Trichlorobenzene	ND		mg/kg	0.0050	0.00018
Methyl Acetate	ND		mg/kg	0.0040	0.00027
Cyclohexane	ND		mg/kg	0.020	0.00015
Tert-Butyl Alcohol	ND		mg/kg	0.10	0.0029
Methyl cyclohexane	ND		mg/kg	0.0040	0.00015
Freon-113	ND		mg/kg	0.020	0.00027

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 1,8260C  
 Analytical Date: 01/20/15 21:15  
 Analyst: PP

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-5035 - Westborough Lab for sample(s): 01-03 Batch: WG757329-3					

Tentatively Identified Compounds

No Tentatively Identified Compounds                      ND                      mg/kg

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	83		70-130
Toluene-d8	93		70-130
4-Bromofluorobenzene	94		70-130
Dibromofluoromethane	85		70-130

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 01-03 Batch: WG757329-1 WG757329-2								
1,2-Dibromo-3-chloropropane	86		92		40-160	7		30
1,4-Dioxane	90		95		40-160	6		30
1,2-Dibromoethane	91		91		70-130	1		30
Methylene chloride	97		97		70-130	0		30
1,1-Dichloroethane	104		104		70-130	0		30
Chloroform	88		89		70-130	1		30
Carbon tetrachloride	97		96		70-130	1		30
1,2-Dichloropropane	111		110		70-130	1		30
Dibromochloromethane	96		99		70-130	3		30
1,1,2-Trichloroethane	88		87		70-130	1		30
2-Chloroethylvinyl ether	38	Q	38	Q	40-160	2		30
Tetrachloroethene	101		98		70-130	3		30
Chlorobenzene	92		92		70-130	0		30
Trichlorofluoromethane	69		67		40-160	3		30
1,2-Dichloroethane	87		88		70-130	1		30
1,1,1-Trichloroethane	88		87		70-130	1		30
Bromodichloromethane	91		91		70-130	0		30
trans-1,3-Dichloropropene	91		92		70-130	1		30
cis-1,3-Dichloropropene	100		102		40-160	2		30
1,1-Dichloropropene	96		96		70-130	1		30
Bromoform	91		94		40-160	4		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 01-03 Batch: WG757329-1 WG757329-2								
1,1,2,2-Tetrachloroethane	79		80		40-160	1		30
Benzene	100		100		70-130	0		30
Toluene	91		89		70-130	2		30
Ethylbenzene	92		92		70-130	1		30
Chloromethane	113		112		40-160	1		30
Bromomethane	102		95		40-160	7		30
Vinyl chloride	108		105		70-130	3		30
Chloroethane	86		81		40-160	5		30
1,1-Dichloroethene	97		97		70-130	1		30
trans-1,2-Dichloroethene	100		100		70-130	0		30
Trichloroethene	97		97		70-130	0		30
1,2-Dichlorobenzene	96		95		70-130	0		30
1,3-Dichlorobenzene	96		96		70-130	1		30
1,4-Dichlorobenzene	96		96		70-130	0		30
Methyl tert butyl ether	101		102		70-130	1		30
p/m-Xylene	98		97		70-130	1		30
o-Xylene	98		97		70-130	0		30
cis-1,2-Dichloroethene	102		100		70-130	2		30
Dibromomethane	87		89		70-130	2		30
1,4-Dichlorobutane	101		103		70-130	2		30
1,2,3-Trichloropropane	83		84		70-130	1		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 01-03 Batch: WG757329-1 WG757329-2								
Styrene	95		97		40-160	2		30
Dichlorodifluoromethane	68		67		40-160	3		30
Acetone	130		129		40-160	1		30
Carbon disulfide	78		77		40-160	1		30
2-Butanone	134		124		40-160	8		30
Vinyl acetate	98		101		70-130	3		30
4-Methyl-2-pentanone	108		113		40-160	5		30
2-Hexanone	100		104		40-160	4		30
Ethyl methacrylate	94		95		70-130	2		30
Acrolein	138		141		40-160	2		30
Acrylonitrile	126		132	Q	70-130	5		30
Bromochloromethane	106		107		70-130	1		30
Tetrahydrofuran	118		123		70-130	4		30
2,2-Dichloropropane	92		91		40-160	1		30
1,3-Dichloropropane	89		90		70-130	1		30
1,1,1,2-Tetrachloroethane	96		96		70-130	1		30
Bromobenzene	97		97		70-130	0		30
n-Butylbenzene	86		85		70-130	1		30
sec-Butylbenzene	88		88		70-130	0		30
tert-Butylbenzene	95		94		70-130	1		30
o-Chlorotoluene	90		90		70-130	0		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 01-03 Batch: WG757329-1 WG757329-2								
p-Chlorotoluene	90		90		70-130	1		30
Hexachlorobutadiene	91		92		70-130	0		30
Isopropylbenzene	90		88		70-130	2		30
p-Isopropyltoluene	96		95		70-130	1		30
Naphthalene	95		98		40-160	2		30
n-Propylbenzene	88		87		70-130	1		30
1,2,3-Trichlorobenzene	94		95		70-130	1		30
1,2,4-Trichlorobenzene	101		101		70-130	0		30
1,3,5-Trimethylbenzene	90		90		70-130	0		30
1,2,4-Trimethylbenzene	90		91		70-130	0		30
trans-1,4-Dichloro-2-butene	88		92		70-130	4		30
Ethyl ether	104		107		70-130	3		30
Methyl Acetate	104		118		70-130	13		30
Ethyl Acetate	111		114		70-130	3		30
Isopropyl Ether	129		127		70-130	2		30
Cyclohexane	99		99		70-130	1		30
Tert-Butyl Alcohol	94		100		40-160	6		30
Ethyl-Tert-Butyl-Ether	112		114		70-130	2		30
Tertiary-Amyl Methyl Ether	100		101		70-130	1		30
Methyl cyclohexane	76		76		70-130	0		30
Freon-113	72		70		70-130	2		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>%Recovery</i> Limits	<i>RPD</i>	<i>Qual</i>	<i>RPD</i> Limits
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Volatile Organics by GC/MS-5035 - Westborough Lab Associated sample(s): 01-03 Batch: WG757329-1 WG757329-2

<i>Surrogate</i>	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>Acceptance</i> Criteria
1,2-Dichloroethane-d4	82		84		70-130
Toluene-d8	93		92		70-130
4-Bromofluorobenzene	94		94		70-130
Dibromofluoromethane	92		93		70-130

# SEMIVOLATILES

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-01 D  
 Client ID: 217W28-F1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8270D  
 Analytical Date: 01/23/15 11:48  
 Analyst: JB  
 Percent Solids: 84%

Date Collected: 01/16/15 09:30  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:14

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS - Westborough Lab</b>						
Acenaphthene	0.68	J	mg/kg	0.78	0.20	5
Benzidine	ND		mg/kg	3.2	0.76	5
1,2,4-Trichlorobenzene	ND		mg/kg	0.97	0.32	5
Azobenzene	ND		mg/kg	0.97	0.26	5
2-Chloronaphthalene	ND		mg/kg	0.97	0.32	5
Bis(2-chloroethyl)ether	ND		mg/kg	0.87	0.27	5
1,2-Dichlorobenzene	ND		mg/kg	0.97	0.32	5
1,3-Dichlorobenzene	ND		mg/kg	0.97	0.30	5
1,4-Dichlorobenzene	ND		mg/kg	0.97	0.30	5
Fluoranthene	20.		mg/kg	0.58	0.18	5
4-Chlorophenyl phenyl ether	ND		mg/kg	0.97	0.30	5
Bis(2-chloroisopropyl)ether	ND		mg/kg	1.2	0.34	5
Bis(2-chloroethoxy)methane	ND		mg/kg	1.0	0.29	5
Hexachlorocyclopentadiene	ND		mg/kg	2.8	0.62	5
Naphthalene	1.3		mg/kg	0.97	0.32	5
Bis(2-ethylhexyl)phthalate	ND		mg/kg	0.97	0.25	5
Butyl benzyl phthalate	ND		mg/kg	0.97	0.19	5
Di-n-butylphthalate	ND		mg/kg	0.97	0.19	5
Di-n-octylphthalate	ND		mg/kg	0.97	0.24	5
Diethyl phthalate	ND		mg/kg	0.97	0.20	5
Dimethyl phthalate	ND		mg/kg	0.97	0.25	5
Benzo(b)fluoranthene	10.		mg/kg	0.58	0.20	5
Chrysene	8.6		mg/kg	0.58	0.19	5
Acenaphthylene	1.9		mg/kg	0.78	0.18	5
Anthracene	3.0		mg/kg	0.58	0.16	5
Benzo(ghi)perylene	4.8		mg/kg	0.78	0.20	5
Fluorene	0.89	J	mg/kg	0.97	0.28	5
Phenanthrene	13.		mg/kg	0.58	0.19	5
Pyrene	17.		mg/kg	0.58	0.19	5
4-Chloroaniline	ND		mg/kg	0.97	0.26	5

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

## SAMPLE RESULTS

Lab ID: L1500997-01 D

Date Collected: 01/16/15 09:30

Client ID: 217W28-F1

Date Received: 01/16/15

Sample Location: NY, NY

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
2-Nitroaniline	ND		mg/kg	0.97	0.27	5
3-Nitroaniline	ND		mg/kg	0.97	0.27	5
4-Nitroaniline	ND		mg/kg	0.97	0.26	5
Dibenzofuran	0.68	J	mg/kg	0.97	0.32	5
2-Methylnaphthalene	0.58	J	mg/kg	1.2	0.31	5
p-Chloro-m-cresol	ND		mg/kg	0.97	0.28	5
2-Nitrophenol	ND		mg/kg	2.1	0.30	5
Phenol	ND		mg/kg	0.97	0.29	5
2-Methylphenol	ND		mg/kg	0.97	0.31	5
3-Methylphenol/4-Methylphenol	ND		mg/kg	1.4	0.32	5
Carbazole	1.2		mg/kg	0.97	0.21	5
Benzoic Acid	ND		mg/kg	3.1	0.98	5
4-Nitrophenol	ND		mg/kg	1.4	0.31	5
n-Nitrosodimethylamine	ND		mg/kg	1.9	0.31	5
4-Bromophenyl phenyl ether	ND		mg/kg	0.97	0.22	5
Benzaldehyde	ND		mg/kg	1.3	0.39	5
Acetophenone	ND		mg/kg	0.97	0.30	5
Biphenyl	ND		mg/kg	2.2	0.32	5
Aniline	ND		mg/kg	1.2	0.20	5
1,2,4,5-Tetrachlorobenzene	ND		mg/kg	0.97	0.30	5
Atrazine	ND		mg/kg	0.78	0.22	5

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

## SAMPLE RESULTS

Lab ID: L1500997-01 D

Date Collected: 01/16/15 09:30

Client ID: 217W28-F1

Date Received: 01/16/15

Sample Location: NY, NY

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Tentatively Identified Compounds						
Total TIC Compounds	36.	J	mg/kg			5
Unknown PAH	1.8	J	mg/kg			5
Unknown	2.3	J	mg/kg			5
Unknown PAH	2.7	J	mg/kg			5
Unknown	2.9	J	mg/kg			5
Unknown	2.2	J	mg/kg			5
Unknown Benzene	1.7	J	mg/kg			5
Unknown	1.7	J	mg/kg			5
Unknown PAH	2.3	J	mg/kg			5
Benzo(e)Pyrene	5.8	NJ	mg/kg			5
Perylene	2.5	NJ	mg/kg			5
Unknown	2.1	J	mg/kg			5
Unknown	1.9	J	mg/kg			5
Unknown	2.0	J	mg/kg			5
Unknown	1.5	J	mg/kg			5
Unknown	3.0	J	mg/kg			5

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	50		30-130
Phenol-d6	52		30-130
Nitrobenzene-d5	50		30-130
2-Fluorobiphenyl	49		30-130
2,4,6-Tribromophenol	51		30-130
4-Terphenyl-d14	58		30-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-01 D  
 Client ID: 217W28-F1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8270D-SIM  
 Analytical Date: 01/22/15 20:19  
 Analyst: AS  
 Percent Solids: 84%

Date Collected: 01/16/15 09:30  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:12

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS-SIM - Westborough Lab</b>						
Bis(2-chloroethyl)ether	ND		mg/kg	0.50	0.11	10
2-Chlorophenol	ND		mg/kg	1.2	0.11	10
Benzo(a)anthracene	11.		mg/kg	1.2	0.20	10
n-Nitrosodi-n-propylamine	ND		mg/kg	0.50	0.10	10
Isophorone	ND		mg/kg	0.50	0.12	10
Nitrobenzene	ND		mg/kg	0.50	0.10	10
2,4-Dichlorophenol	ND		mg/kg	0.50	0.094	10
2,4-Dimethylphenol	ND		mg/kg	1.7	0.25	10
2,4,6-Trichlorophenol	ND		mg/kg	0.50	0.10	10
2,4,5-Trichlorophenol	ND		mg/kg	0.50	0.12	10
2,6-Dinitrotoluene	ND		mg/kg	0.50	0.12	10
2,4-Dinitrophenol	ND		mg/kg	0.74	0.24	10
2,4-Dinitrotoluene	ND		mg/kg	0.50	0.11	10
4,6-Dinitro-o-cresol	ND		mg/kg	0.74	0.17	10
NDPA/DPA	ND		mg/kg	0.50	0.13	10
3,3'-Dichlorobenzidine	ND		mg/kg	0.50	0.11	10
Benzo(a)pyrene	8.2		mg/kg	0.50	0.16	10
Benzo(b)fluoranthene	8.3		mg/kg	0.50	0.17	10
Benzo(k)fluoranthene	8.4		mg/kg	0.50	0.16	10
Dibenzo(a,h)anthracene	1.3		mg/kg	0.50	0.16	10
Indeno(1,2,3-cd)pyrene	5.6		mg/kg	1.5	0.22	10
Hexachlorobenzene	ND		mg/kg	0.50	0.11	10
Pentachlorophenol	ND		mg/kg	0.74	0.15	10
Hexachlorobutadiene	ND		mg/kg	1.5	0.10	10
Hexachloroethane	ND		mg/kg	0.50	0.10	10

**Project Name:** 217 WEST 20TH STREET**Lab Number:** L1500997**Project Number:** 217W28**Report Date:** 01/23/15**SAMPLE RESULTS**

Lab ID: L1500997-01 D

Date Collected: 01/16/15 09:30

Client ID: 217W28-F1

Date Received: 01/16/15

Sample Location: NY, NY

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Semivolatile Organics by GC/MS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	62		30-130
Phenol-d6	67		30-130
Nitrobenzene-d5	72		30-130
2-Fluorobiphenyl	72		30-130
2,4,6-Tribromophenol	88		30-130
4-Terphenyl-d14	72		30-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02 D  
 Client ID: 217W28-F2  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8270D  
 Analytical Date: 01/23/15 12:14  
 Analyst: JB  
 Percent Solids: 87%

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:14

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS - Westborough Lab</b>						
Acenaphthene	0.50	J	mg/kg	0.75	0.19	5
Benzidine	ND		mg/kg	3.1	0.74	5
1,2,4-Trichlorobenzene	ND		mg/kg	0.94	0.31	5
Azobenzene	ND		mg/kg	0.94	0.25	5
2-Chloronaphthalene	ND		mg/kg	0.94	0.31	5
Bis(2-chloroethyl)ether	ND		mg/kg	0.85	0.26	5
1,2-Dichlorobenzene	ND		mg/kg	0.94	0.31	5
1,3-Dichlorobenzene	ND		mg/kg	0.94	0.30	5
1,4-Dichlorobenzene	ND		mg/kg	0.94	0.28	5
Fluoranthene	18.		mg/kg	0.56	0.17	5
4-Chlorophenyl phenyl ether	ND		mg/kg	0.94	0.28	5
Bis(2-chloroisopropyl)ether	ND		mg/kg	1.1	0.33	5
Bis(2-chloroethoxy)methane	ND		mg/kg	1.0	0.28	5
Hexachlorocyclopentadiene	ND		mg/kg	2.7	0.60	5
Naphthalene	0.33	J	mg/kg	0.94	0.31	5
Bis(2-ethylhexyl)phthalate	0.25	J	mg/kg	0.94	0.25	5
Butyl benzyl phthalate	ND		mg/kg	0.94	0.18	5
Di-n-butylphthalate	ND		mg/kg	0.94	0.18	5
Di-n-octylphthalate	ND		mg/kg	0.94	0.23	5
Diethyl phthalate	ND		mg/kg	0.94	0.20	5
Dimethyl phthalate	ND		mg/kg	0.94	0.24	5
Benzo(b)fluoranthene	10.		mg/kg	0.56	0.19	5
Chrysene	8.3		mg/kg	0.56	0.18	5
Acenaphthylene	3.0		mg/kg	0.75	0.18	5
Anthracene	2.8		mg/kg	0.56	0.16	5
Benzo(ghi)perylene	5.4		mg/kg	0.75	0.20	5
Fluorene	0.63	J	mg/kg	0.94	0.27	5
Phenanthrene	9.0		mg/kg	0.56	0.18	5
Pyrene	15.		mg/kg	0.56	0.18	5
4-Chloroaniline	ND		mg/kg	0.94	0.25	5

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02 D  
 Client ID: 217W28-F2  
 Sample Location: NY, NY

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS - Westborough Lab</b>						
2-Nitroaniline	ND		mg/kg	0.94	0.26	5
3-Nitroaniline	ND		mg/kg	0.94	0.26	5
4-Nitroaniline	ND		mg/kg	0.94	0.25	5
Dibenzofuran	ND		mg/kg	0.94	0.31	5
2-Methylnaphthalene	ND		mg/kg	1.1	0.30	5
p-Chloro-m-cresol	ND		mg/kg	0.94	0.27	5
2-Nitrophenol	ND		mg/kg	2.0	0.29	5
Phenol	ND		mg/kg	0.94	0.28	5
2-Methylphenol	ND		mg/kg	0.94	0.30	5
3-Methylphenol/4-Methylphenol	ND		mg/kg	1.4	0.31	5
Carbazole	1.0		mg/kg	0.94	0.20	5
Benzoic Acid	ND		mg/kg	3.0	0.95	5
4-Nitrophenol	ND		mg/kg	1.3	0.30	5
n-Nitrosodimethylamine	ND		mg/kg	1.9	0.30	5
4-Bromophenyl phenyl ether	ND		mg/kg	0.94	0.22	5
Benzaldehyde	ND		mg/kg	1.2	0.38	5
Acetophenone	ND		mg/kg	0.94	0.29	5
Biphenyl	ND		mg/kg	2.1	0.31	5
Aniline	ND		mg/kg	1.1	0.19	5
1,2,4,5-Tetrachlorobenzene	ND		mg/kg	0.94	0.29	5
Atrazine	ND		mg/kg	0.75	0.21	5

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02 D  
 Client ID: 217W28-F2  
 Sample Location: NY, NY

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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## Semivolatile Organics by GC/MS - Westborough Lab

## Tentatively Identified Compounds

Total TIC Compounds	31.	J	mg/kg			5
Unknown PAH	1.8	J	mg/kg			5
Unknown	2.2	J	mg/kg			5
Unknown	2.6	J	mg/kg			5
Unknown	1.9	J	mg/kg			5
Unknown PAH	1.4	J	mg/kg			5
Unknown PAH	1.3	J	mg/kg			5
Unknown	1.2	J	mg/kg			5
Unknown	1.1	J	mg/kg			5
Unknown	1.1	J	mg/kg			5
Unknown PAH	2.4	J	mg/kg			5
Benzo(e)Pyrene	5.8	NJ	mg/kg			5
Perylene	2.6	NJ	mg/kg			5
Unknown	1.4	J	mg/kg			5
Unknown	1.7	J	mg/kg			5
Unknown	2.3	J	mg/kg			5

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	64		30-130
Phenol-d6	65		30-130
Nitrobenzene-d5	69		30-130
2-Fluorobiphenyl	61		30-130
2,4,6-Tribromophenol	66		30-130
4-Terphenyl-d14	61		30-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02 D  
 Client ID: 217W28-F2  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8270D-SIM  
 Analytical Date: 01/22/15 20:47  
 Analyst: AS  
 Percent Solids: 87%

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:12

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS-SIM - Westborough Lab</b>						
Bis(2-chloroethyl)ether	ND		mg/kg	0.48	0.10	10
2-Chlorophenol	ND		mg/kg	1.2	0.10	10
Benzo(a)anthracene	9.1		mg/kg	1.2	0.19	10
n-Nitrosodi-n-propylamine	ND		mg/kg	0.48	0.098	10
Isophorone	ND		mg/kg	0.48	0.12	10
Nitrobenzene	ND		mg/kg	0.48	0.10	10
2,4-Dichlorophenol	ND		mg/kg	0.48	0.091	10
2,4-Dimethylphenol	ND		mg/kg	1.7	0.24	10
2,4,6-Trichlorophenol	ND		mg/kg	0.48	0.10	10
2,4,5-Trichlorophenol	ND		mg/kg	0.48	0.11	10
2,6-Dinitrotoluene	ND		mg/kg	0.48	0.12	10
2,4-Dinitrophenol	ND		mg/kg	0.72	0.23	10
2,4-Dinitrotoluene	ND		mg/kg	0.48	0.11	10
4,6-Dinitro-o-cresol	ND		mg/kg	0.72	0.16	10
NDPA/DPA	ND		mg/kg	0.48	0.13	10
3,3'-Dichlorobenzidine	ND		mg/kg	0.48	0.11	10
Benzo(a)pyrene	7.8		mg/kg	0.48	0.15	10
Benzo(b)fluoranthene	8.4		mg/kg	0.48	0.16	10
Benzo(k)fluoranthene	7.3		mg/kg	0.48	0.16	10
Dibenzo(a,h)anthracene	1.3		mg/kg	0.48	0.16	10
Indeno(1,2,3-cd)pyrene	5.3		mg/kg	1.4	0.21	10
Hexachlorobenzene	ND		mg/kg	0.48	0.11	10
Pentachlorophenol	ND		mg/kg	0.72	0.14	10
Hexachlorobutadiene	ND		mg/kg	1.4	0.10	10
Hexachloroethane	ND		mg/kg	0.48	0.10	10

**Project Name:** 217 WEST 20TH STREET**Lab Number:** L1500997**Project Number:** 217W28**Report Date:** 01/23/15**SAMPLE RESULTS**

Lab ID: L1500997-02 D

Date Collected: 01/16/15 09:45

Client ID: 217W28-F2

Date Received: 01/16/15

Sample Location: NY, NY

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Semivolatile Organics by GC/MS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	71		30-130
Phenol-d6	79		30-130
Nitrobenzene-d5	85		30-130
2-Fluorobiphenyl	84		30-130
2,4,6-Tribromophenol	101		30-130
4-Terphenyl-d14	82		30-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-03  
 Client ID: 217W28-N1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8270D  
 Analytical Date: 01/22/15 04:20  
 Analyst: JB  
 Percent Solids: 86%

Date Collected: 01/16/15 09:55  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:14

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS - Westborough Lab</b>						
Acenaphthene	ND		mg/kg	0.15	0.039	1
Benzidine	ND		mg/kg	0.63	0.15	1
1,2,4-Trichlorobenzene	ND		mg/kg	0.19	0.063	1
Azobenzene	ND		mg/kg	0.19	0.051	1
2-Chloronaphthalene	ND		mg/kg	0.19	0.062	1
Bis(2-chloroethyl)ether	ND		mg/kg	0.17	0.054	1
1,2-Dichlorobenzene	ND		mg/kg	0.19	0.063	1
1,3-Dichlorobenzene	ND		mg/kg	0.19	0.060	1
1,4-Dichlorobenzene	ND		mg/kg	0.19	0.058	1
Fluoranthene	ND		mg/kg	0.11	0.035	1
4-Chlorophenyl phenyl ether	ND		mg/kg	0.19	0.058	1
Bis(2-chloroisopropyl)ether	ND		mg/kg	0.23	0.067	1
Bis(2-chloroethoxy)methane	ND		mg/kg	0.21	0.058	1
Hexachlorocyclopentadiene	ND		mg/kg	0.55	0.12	1
Naphthalene	ND		mg/kg	0.19	0.064	1
Bis(2-ethylhexyl)phthalate	0.086	J	mg/kg	0.19	0.050	1
Butyl benzyl phthalate	ND		mg/kg	0.19	0.037	1
Di-n-butylphthalate	ND		mg/kg	0.19	0.037	1
Di-n-octylphthalate	ND		mg/kg	0.19	0.047	1
Diethyl phthalate	ND		mg/kg	0.19	0.040	1
Dimethyl phthalate	ND		mg/kg	0.19	0.049	1
Benzo(b)fluoranthene	ND		mg/kg	0.11	0.039	1
Chrysene	ND		mg/kg	0.11	0.038	1
Acenaphthylene	0.081	J	mg/kg	0.15	0.036	1
Anthracene	ND		mg/kg	0.11	0.032	1
Benzo(ghi)perylene	ND		mg/kg	0.15	0.040	1
Fluorene	ND		mg/kg	0.19	0.055	1
Phenanthrene	ND		mg/kg	0.11	0.037	1
Pyrene	ND		mg/kg	0.11	0.037	1
4-Chloroaniline	ND		mg/kg	0.19	0.050	1

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-03  
**Client ID:** 217W28-N1  
**Sample Location:** NY, NY

**Date Collected:** 01/16/15 09:55  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS - Westborough Lab</b>						
2-Nitroaniline	ND		mg/kg	0.19	0.054	1
3-Nitroaniline	ND		mg/kg	0.19	0.053	1
4-Nitroaniline	ND		mg/kg	0.19	0.052	1
Dibenzofuran	ND		mg/kg	0.19	0.064	1
2-Methylnaphthalene	ND		mg/kg	0.23	0.061	1
p-Chloro-m-cresol	ND		mg/kg	0.19	0.056	1
2-Nitrophenol	ND		mg/kg	0.41	0.060	1
Phenol	ND		mg/kg	0.19	0.057	1
2-Methylphenol	ND		mg/kg	0.19	0.062	1
3-Methylphenol/4-Methylphenol	ND		mg/kg	0.28	0.063	1
Carbazole	ND		mg/kg	0.19	0.041	1
Benzoic Acid	ND		mg/kg	0.61	0.19	1
4-Nitrophenol	ND		mg/kg	0.27	0.062	1
n-Nitrosodimethylamine	ND		mg/kg	0.38	0.062	1
4-Bromophenyl phenyl ether	ND		mg/kg	0.19	0.044	1
Benzaldehyde	ND		mg/kg	0.25	0.077	1
Acetophenone	ND		mg/kg	0.19	0.059	1
Biphenyl	ND		mg/kg	0.44	0.063	1
Aniline	ND		mg/kg	0.23	0.039	1
1,2,4,5-Tetrachlorobenzene	ND		mg/kg	0.19	0.059	1
Atrazine	ND		mg/kg	0.15	0.043	1

**Tentatively Identified Compounds**

No Tentatively Identified Compounds ND mg/kg 1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	58		30-130
Phenol-d6	64		30-130
Nitrobenzene-d5	49		30-130
2-Fluorobiphenyl	62		30-130
2,4,6-Tribromophenol	98		30-130
4-Terphenyl-d14	94		30-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-03  
 Client ID: 217W28-N1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8270D-SIM  
 Analytical Date: 01/21/15 20:34  
 Analyst: AS  
 Percent Solids: 86%

Date Collected: 01/16/15 09:55  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:12

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>Semivolatile Organics by GC/MS-SIM - Westborough Lab</b>						
Bis(2-chloroethyl)ether	ND		mg/kg	0.049	0.011	1
2-Chlorophenol	ND		mg/kg	0.12	0.011	1
Benzo(a)anthracene	ND		mg/kg	0.12	0.020	1
n-Nitrosodi-n-propylamine	ND		mg/kg	0.049	0.010	1
Isophorone	ND		mg/kg	0.049	0.012	1
Nitrobenzene	ND		mg/kg	0.049	0.010	1
2,4-Dichlorophenol	ND		mg/kg	0.049	0.0093	1
2,4-Dimethylphenol	ND		mg/kg	0.17	0.025	1
2,4,6-Trichlorophenol	ND		mg/kg	0.049	0.010	1
2,4,5-Trichlorophenol	ND		mg/kg	0.049	0.011	1
2,6-Dinitrotoluene	ND		mg/kg	0.049	0.012	1
2,4-Dinitrophenol	ND		mg/kg	0.074	0.023	1
2,4-Dinitrotoluene	ND		mg/kg	0.049	0.011	1
4,6-Dinitro-o-cresol	ND		mg/kg	0.074	0.017	1
NDPA/DPA	ND		mg/kg	0.049	0.013	1
3,3'-Dichlorobenzidine	ND		mg/kg	0.049	0.011	1
Benzo(a)pyrene	0.021	J	mg/kg	0.049	0.016	1
Benzo(b)fluoranthene	ND		mg/kg	0.049	0.016	1
Benzo(k)fluoranthene	ND		mg/kg	0.049	0.016	1
Dibenzo(a,h)anthracene	ND		mg/kg	0.049	0.016	1
Indeno(1,2,3-cd)pyrene	0.053	J	mg/kg	0.15	0.021	1
Hexachlorobenzene	ND		mg/kg	0.049	0.011	1
Pentachlorophenol	ND		mg/kg	0.074	0.015	1
Hexachlorobutadiene	ND		mg/kg	0.15	0.010	1
Hexachloroethane	ND		mg/kg	0.049	0.010	1

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-03  
 Client ID: 217W28-N1  
 Sample Location: NY, NY

Date Collected: 01/16/15 09:55  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Semivolatile Organics by GC/MS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	54		30-130
Phenol-d6	62		30-130
Nitrobenzene-d5	63		30-130
2-Fluorobiphenyl	68		30-130
2,4,6-Tribromophenol	79		30-130
4-Terphenyl-d14	85		30-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

**Analytical Method:** 1,8270D  
**Analytical Date:** 01/21/15 20:00  
**Analyst:** JB

**Extraction Method:** EPA 3546  
**Extraction Date:** 01/20/15 18:14

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG757107-1					
Acenaphthene	ND		mg/kg	0.13	0.033
Benzidine	ND		mg/kg	0.54	0.13
1,2,4-Trichlorobenzene	ND		mg/kg	0.16	0.053
Azobenzene	ND		mg/kg	0.16	0.044
2-Chloronaphthalene	ND		mg/kg	0.16	0.053
Bis(2-chloroethyl)ether	ND		mg/kg	0.15	0.046
1,2-Dichlorobenzene	ND		mg/kg	0.16	0.053
1,3-Dichlorobenzene	ND		mg/kg	0.16	0.051
1,4-Dichlorobenzene	ND		mg/kg	0.16	0.049
Fluoranthene	ND		mg/kg	0.097	0.030
4-Chlorophenyl phenyl ether	ND		mg/kg	0.16	0.049
Bis(2-chloroisopropyl)ether	ND		mg/kg	0.19	0.057
Bis(2-chloroethoxy)methane	ND		mg/kg	0.18	0.049
Hexachlorocyclopentadiene	ND		mg/kg	0.46	0.10
Naphthalene	ND		mg/kg	0.16	0.054
Bis(2-ethylhexyl)phthalate	ND		mg/kg	0.16	0.042
Butyl benzyl phthalate	ND		mg/kg	0.16	0.032
Di-n-butylphthalate	ND		mg/kg	0.16	0.031
Di-n-octylphthalate	ND		mg/kg	0.16	0.040
Diethyl phthalate	ND		mg/kg	0.16	0.034
Dimethyl phthalate	ND		mg/kg	0.16	0.041
Benzo(b)fluoranthene	ND		mg/kg	0.097	0.033
Chrysene	ND		mg/kg	0.097	0.032
Acenaphthylene	ND		mg/kg	0.13	0.030
Anthracene	ND		mg/kg	0.097	0.027
Benzo(ghi)perylene	ND		mg/kg	0.13	0.034
Fluorene	ND		mg/kg	0.16	0.046
Phenanthrene	ND		mg/kg	0.097	0.032
Pyrene	ND		mg/kg	0.097	0.032

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

**Analytical Method:** 1,8270D  
**Analytical Date:** 01/21/15 20:00  
**Analyst:** JB

**Extraction Method:** EPA 3546  
**Extraction Date:** 01/20/15 18:14

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG757107-1					
4-Chloroaniline	ND		mg/kg	0.16	0.043
2-Nitroaniline	ND		mg/kg	0.16	0.046
3-Nitroaniline	ND		mg/kg	0.16	0.045
4-Nitroaniline	ND		mg/kg	0.16	0.044
Dibenzofuran	ND		mg/kg	0.16	0.054
2-Methylnaphthalene	ND		mg/kg	0.19	0.052
p-Chloro-m-cresol	ND		mg/kg	0.16	0.047
2-Nitrophenol	ND		mg/kg	0.35	0.051
Phenol	ND		mg/kg	0.16	0.048
2-Methylphenol	ND		mg/kg	0.16	0.052
3-Methylphenol/4-Methylphenol	ND		mg/kg	0.23	0.053
Carbazole	ND		mg/kg	0.16	0.035
Benzoic Acid	ND		mg/kg	0.52	0.16
4-Nitrophenol	ND		mg/kg	0.23	0.052
n-Nitrosodimethylamine	ND		mg/kg	0.32	0.052
4-Bromophenyl phenyl ether	ND		mg/kg	0.16	0.037
Benzaldehyde	ND		mg/kg	0.21	0.066
Acetophenone	ND		mg/kg	0.16	0.050
Biphenyl	ND		mg/kg	0.37	0.054
Aniline	ND		mg/kg	0.19	0.033
1,2,4,5-Tetrachlorobenzene	ND		mg/kg	0.16	0.050
Atrazine	ND		mg/kg	0.13	0.037

Tentatively Identified Compounds

No Tentatively Identified Compounds ND mg/kg

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

**Method Blank Analysis  
Batch Quality Control**

Analytical Method: 1,8270D  
 Analytical Date: 01/21/15 20:00  
 Analyst: JB

Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:14

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01-03 Batch: WG757107-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	64		30-130
Phenol-d6	63		30-130
Nitrobenzene-d5	53		30-130
2-Fluorobiphenyl	60		30-130
2,4,6-Tribromophenol	82		30-130
4-Terphenyl-d14	94		30-130

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

**Analytical Method:** 1,8270D-SIM  
**Analytical Date:** 01/21/15 19:10  
**Analyst:** AS

**Extraction Method:** EPA 3546  
**Extraction Date:** 01/20/15 18:12

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01-03 Batch: WG757108-1					
Bis(2-chloroethyl)ether	ND		mg/kg	0.042	0.0090
2-Chlorophenol	ND		mg/kg	0.10	0.0090
Benzo(a)anthracene	ND		mg/kg	0.10	0.016
n-Nitrosodi-n-propylamine	ND		mg/kg	0.042	0.0085
Isophorone	ND		mg/kg	0.042	0.010
Nitrobenzene	ND		mg/kg	0.042	0.0086
2,4-Dichlorophenol	ND		mg/kg	0.042	0.0078
2,4-Dimethylphenol	ND		mg/kg	0.14	0.021
2,4,6-Trichlorophenol	ND		mg/kg	0.042	0.0087
2,4,5-Trichlorophenol	ND		mg/kg	0.042	0.0096
2,6-Dinitrotoluene	ND		mg/kg	0.042	0.010
2,4-Dinitrophenol	ND		mg/kg	0.062	0.020
2,4-Dinitrotoluene	ND		mg/kg	0.042	0.0092
4,6-Dinitro-o-cresol	ND		mg/kg	0.062	0.014
NDPA/DPA	ND		mg/kg	0.042	0.011
3,3'-Dichlorobenzidine	ND		mg/kg	0.042	0.0094
Benzo(a)pyrene	ND		mg/kg	0.042	0.013
Benzo(b)fluoranthene	ND		mg/kg	0.042	0.014
Benzo(k)fluoranthene	ND		mg/kg	0.042	0.014
Dibenzo(a,h)anthracene	ND		mg/kg	0.042	0.014
Indeno(1,2,3-cd)pyrene	ND		mg/kg	0.12	0.018
Hexachlorobenzene	ND		mg/kg	0.042	0.0095
Pentachlorophenol	ND		mg/kg	0.062	0.012
Hexachlorobutadiene	ND		mg/kg	0.12	0.0087
Hexachloroethane	ND		mg/kg	0.042	0.0087

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 1,8270D-SIM  
 Analytical Date: 01/21/15 19:10  
 Analyst: AS

Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 18:12

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01-03 Batch: WG757108-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	59		30-130
Phenol-d6	65		30-130
Nitrobenzene-d5	66		30-130
2-Fluorobiphenyl	67		30-130
2,4,6-Tribromophenol	76		30-130
4-Terphenyl-d14	79		30-130

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG757107-2 WG757107-3								
Acenaphthene	73		72		70-130	1		30
Benzidine	12	Q	10	Q	20-160	18		30
1,2,4-Trichlorobenzene	69	Q	70		70-130	1		30
Azobenzene	81		76		70-130	6		30
2-Chloronaphthalene	68	Q	65	Q	70-130	5		30
Hexachlorobenzene	76		72		70-130	5		30
Bis(2-chloroethyl)ether	56	Q	56	Q	70-130	0		30
1,2-Dichlorobenzene	59	Q	62	Q	70-130	5		30
1,3-Dichlorobenzene	58	Q	62	Q	70-130	7		30
1,4-Dichlorobenzene	59	Q	62	Q	70-130	5		30
3,3'-Dichlorobenzidine	72		67	Q	70-130	7		30
2,4-Dinitrotoluene	86		80		70-130	7		30
2,6-Dinitrotoluene	75		70		70-130	7		30
Fluoranthene	89		82		70-130	8		30
4-Chlorophenyl phenyl ether	77		74		70-130	4		30
Bis(2-chloroisopropyl)ether	55	Q	56	Q	70-130	2		30
Bis(2-chloroethoxy)methane	57	Q	58	Q	70-130	2		30
Hexachlorobutadiene	69	Q	68	Q	70-130	1		30
Hexachlorocyclopentadiene	71		69		20-160	3		30
Hexachloroethane	57		59		20-160	3		30
Isophorone	63	Q	62	Q	70-130	2		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG757107-2 WG757107-3								
Naphthalene	66	Q	66	Q	70-130	0		30
Nitrobenzene	64	Q	64	Q	70-130	0		30
NitrosoDiPhenylAmine(NDPA)/DPA	86		80		70-130	7		30
n-Nitrosodi-n-propylamine	70		68	Q	70-130	3		30
Bis(2-ethylhexyl)phthalate	81		75		70-130	8		30
Butyl benzyl phthalate	81		74		70-130	9		30
Di-n-butylphthalate	94		86		70-130	9		30
Di-n-octylphthalate	84		79		70-130	6		30
Diethyl phthalate	82		76		70-130	8		30
Dimethyl phthalate	81		76		70-130	6		30
Benzo(a)anthracene	91		85		70-130	7		30
Benzo(a)pyrene	90		81		70-130	11		30
Benzo(b)fluoranthene	84		85		70-130	1		30
Benzo(k)fluoranthene	87		74		70-130	16		30
Chrysene	78		72		70-130	8		30
Acenaphthylene	73		68	Q	70-130	7		30
Anthracene	86		82		70-130	5		30
Benzo(ghi)perylene	85		78		70-130	9		30
Fluorene	82		77		70-130	6		30
Phenanthrene	80		75		70-130	6		30
Dibenzo(a,h)anthracene	69	Q	64	Q	70-130	8		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG757107-2 WG757107-3								
Indeno(1,2,3-cd)Pyrene	92		85		70-130	8		30
Pyrene	82		77		70-130	6		30
4-Chloroaniline	45		42		20-160	7		30
2-Nitroaniline	77		72		70-130	7		30
3-Nitroaniline	60	Q	52	Q	70-130	14		30
4-Nitroaniline	82		74		70-130	10		30
Dibenzofuran	81		77		70-130	5		30
2-Methylnaphthalene	74		72		70-130	3		30
2,4,6-Trichlorophenol	86		80		70-130	7		30
p-Chloro-m-cresol	90		83		70-130	8		30
2-Chlorophenol	71		72		70-130	1		30
2,4-Dichlorophenol	88		86		70-130	2		30
2,4-Dimethylphenol	68	Q	66	Q	70-130	3		30
2-Nitrophenol	69	Q	67	Q	70-130	3		30
2,4-Dinitrophenol	82		73		20-160	12		30
4,6-Dinitro-o-cresol	80		71		70-130	12		30
Pentachlorophenol	78		72		20-160	8		30
Phenol	68		68		20-160	0		30
2-Methylphenol	74		73		70-130	1		30
3-Methylphenol/4-Methylphenol	73		71		20-160	3		30
2,4,5-Trichlorophenol	87		82		70-130	6		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG757107-2 WG757107-3								
Carbazole	91		85		70-130	7		30
Benzoic Acid	64		45		20-160	35	Q	30
Benzyl Alcohol	70		71		20-160	1		30
4-Nitrophenol	87		80		20-160	8		30
n-Nitrosodimethylamine	56		62		20-160	10		30
4-Bromophenyl phenyl ether	82		77		70-130	6		30
Benzaldehyde	68		71		20-160	4		30
Caprolactam	70		65		20-160	7		30
Acetophenone	63	Q	64	Q	70-130	2		30
Biphenyl	76		74		70-130	3		30
Aniline	35		38		20-160	8		30
1,2,4,5-Tetrachlorobenzene	74		74		70-130	0		30
Atrazine	49	Q	46	Q	70-130	6		30
2,3,4,6-Tetrachlorophenol	92		85		70-130	8		30
Parathion, ethyl	90		83		20-160	8		30
Pyridine	22		40		20-160	58	Q	30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

Parameter	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>%Recovery</i> Limits	<i>RPD</i>	<i>Qual</i>	<i>RPD</i> Limits
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Semivolatile Organics by GC/MS - Westborough Lab Associated sample(s): 01-03 Batch: WG757107-2 WG757107-3

<i>Surrogate</i>	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>Acceptance</i> Criteria
2-Fluorophenol	75		75		30-130
Phenol-d6	75		74		30-130
Nitrobenzene-d5	66		65		30-130
2-Fluorobiphenyl	74		71		30-130
2,4,6-Tribromophenol	94		89		30-130
4-Terphenyl-d14	93		85		30-130

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01-03 Batch: WG757108-2 WG757108-3								
Bis(2-chloroethyl)ether	68	Q	59	Q	70-130	14		30
2-Chlorophenol	72		64	Q	70-130	12		30
Benzo(a)anthracene	82		82		70-130	0		30
n-Nitrosodi-n-propylamine	82		73		70-130	12		30
Isophorone	88		78		70-130	12		30
Nitrobenzene	85		74		70-130	14		30
2,4-Dichlorophenol	80		72		70-130	11		30
2,4-Dimethylphenol	81		73		70-130	10		30
2,4,6-Trichlorophenol	89		80		70-130	11		30
2,4,5-Trichlorophenol	85		78		70-130	9		30
2,6-Dinitrotoluene	99		93		70-130	6		30
2,4-Dinitrophenol	97		92		20-160	5		30
2,4-Dinitrotoluene	82		82		70-130	0		30
4,6-Dinitro-o-cresol	89		88		70-130	1		30
NDPA/DPA	82		80		70-130	2		30
Atrazine	89		88		70-130	1		30
3,3'-Dichlorobenzidine	76		76		70-130	0		30
Benzo(a)pyrene	78		83		70-130	6		30
Benzo(b)fluoranthene	82		90		70-130	9		30
Benzo(k)fluoranthene	74		82		70-130	10		30
Dibenzo(a,h)anthracene	80		87		70-130	8		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Semivolatile Organics by GC/MS-SIM - Westborough Lab Associated sample(s): 01-03 Batch: WG757108-2 WG757108-3								
Indeno(1,2,3-cd)pyrene	94		102		70-130	8		30
Hexachlorobenzene	76		73		70-130	4		30
Pentachlorophenol	68		66		20-160	3		30
Hexachlorobutadiene	73		64	Q	70-130	13		30
Hexachloroethane	66		56		20-160	16		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	69		60		30-130
Phenol-d6	74		66		30-130
Nitrobenzene-d5	77		67		30-130
2-Fluorobiphenyl	77		69		30-130
2,4,6-Tribromophenol	78		75		30-130
4-Terphenyl-d14	79		77		30-130

# **PETROLEUM HYDROCARBONS**

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-01  
 Client ID: 217W28-F1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8015C(M)  
 Analytical Date: 01/21/15 20:27  
 Analyst: AR  
 Percent Solids: 84%

Date Collected: 01/16/15 09:30  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/21/15 04:24

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Petroleum Hydrocarbon Quantitation - Westborough Lab						
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TPH	271.		mg/kg	38.8	3.80	1
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Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	92		40-140

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02  
 Client ID: 217W28-F2  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8015C(M)  
 Analytical Date: 01/21/15 21:00  
 Analyst: AR  
 Percent Solids: 87%

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/21/15 04:24

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Petroleum Hydrocarbon Quantitation - Westborough Lab						
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TPH	218.		mg/kg	37.4	3.66	1
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Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	92		40-140

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-03  
 Client ID: 217W28-N1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8015C(M)  
 Analytical Date: 01/21/15 19:22  
 Analyst: AR  
 Percent Solids: 86%

Date Collected: 01/16/15 09:55  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/21/15 04:24

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
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Petroleum Hydrocarbon Quantitation - Westborough Lab						
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TPH	5.30	J	mg/kg	37.3	3.66	1
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Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	91		40-140

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

**Method Blank Analysis  
Batch Quality Control**

Analytical Method: 1,8015C(M)  
 Analytical Date: 01/21/15 18:16  
 Analyst: AR

Extraction Method: EPA 3546  
 Extraction Date: 01/21/15 04:24

Parameter	Result	Qualifier	Units	RL	MDL
Petroleum Hydrocarbon Quantitation - Westborough Lab for sample(s): 01-03 Batch: WG757215-1					
TPH	ND		mg/kg	32.2	3.15

Surrogate	%Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	88		40-140

### Lab Control Sample Analysis Batch Quality Control

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

<b>Parameter</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>%Recovery Limits</b>	<b>RPD</b>	<b>Qual</b>	<b>RPD Limits</b>
Petroleum Hydrocarbon Quantitation - Westborough Lab Associated sample(s): 01-03 Batch: WG757215-2								
TPH	95		-		40-140	-		40

<b>Surrogate</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>Acceptance Criteria</b>
o-Terphenyl	78				40-140

**Lab Duplicate Analysis**  
**Batch Quality Control**

**Project Name:** 217 WEST 20TH STREET

**Project Number:** 217W28

**Lab Number:** L1500997

**Report Date:** 01/23/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Petroleum Hydrocarbon Quantitation - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757215-3 QC Sample: L1500997-01 Client ID: 217W28-F1						
TPH	271	279	mg/kg	3		40

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	92		97		40-140



# PCBS

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-01  
**Client ID:** 217W28-F1  
**Sample Location:** NY, NY  
**Matrix:** Soil  
**Analytical Method:** 1,8082A  
**Analytical Date:** 01/22/15 14:05  
**Analyst:** JT  
**Percent Solids:** 84%

**Date Collected:** 01/16/15 09:30  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 01/20/15 16:57  
**Cleanup Method:** EPA 3665A  
**Cleanup Date:** 01/21/15  
**Cleanup Method:** EPA 3660B  
**Cleanup Date:** 01/21/15

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>Polychlorinated Biphenyls by GC - Westborough Lab</b>							
Aroclor 1016	ND		mg/kg	0.0385	0.00304	1	A
Aroclor 1221	ND		mg/kg	0.0385	0.00355	1	A
Aroclor 1232	ND		mg/kg	0.0385	0.00452	1	A
Aroclor 1242	0.0231	J	mg/kg	0.0385	0.00472	1	A
Aroclor 1248	ND		mg/kg	0.0385	0.00325	1	A
Aroclor 1254	0.0806		mg/kg	0.0385	0.00317	1	A
Aroclor 1260	0.0696		mg/kg	0.0385	0.00294	1	A
Aroclor 1262	ND		mg/kg	0.0385	0.00191	1	A
Aroclor 1268	ND		mg/kg	0.0385	0.00559	1	A
PCBs, Total	0.173	J	mg/kg	0.0385	0.00191	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	71		30-150	A
Decachlorobiphenyl	113		30-150	A
2,4,5,6-Tetrachloro-m-xylene	77		30-150	B
Decachlorobiphenyl	96		30-150	B

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-02  
**Client ID:** 217W28-F2  
**Sample Location:** NY, NY  
**Matrix:** Soil  
**Analytical Method:** 1,8082A  
**Analytical Date:** 01/22/15 14:19  
**Analyst:** JT  
**Percent Solids:** 87%

**Date Collected:** 01/16/15 09:45  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 01/20/15 16:57  
**Cleanup Method:** EPA 3665A  
**Cleanup Date:** 01/21/15  
**Cleanup Method:** EPA 3660B  
**Cleanup Date:** 01/21/15

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>Polychlorinated Biphenyls by GC - Westborough Lab</b>							
Aroclor 1016	ND		mg/kg	0.0368	0.00291	1	A
Aroclor 1221	ND		mg/kg	0.0368	0.00340	1	A
Aroclor 1232	ND		mg/kg	0.0368	0.00432	1	A
Aroclor 1242	0.0227	J	mg/kg	0.0368	0.00451	1	A
Aroclor 1248	ND		mg/kg	0.0368	0.00311	1	A
Aroclor 1254	0.0784		mg/kg	0.0368	0.00303	1	A
Aroclor 1260	0.0487		mg/kg	0.0368	0.00281	1	A
Aroclor 1262	ND		mg/kg	0.0368	0.00183	1	A
Aroclor 1268	ND		mg/kg	0.0368	0.00534	1	A
PCBs, Total	0.150	J	mg/kg	0.0368	0.00183	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	55		30-150	A
Decachlorobiphenyl	89		30-150	A
2,4,5,6-Tetrachloro-m-xylene	56		30-150	B
Decachlorobiphenyl	71		30-150	B

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-03  
**Client ID:** 217W28-N1  
**Sample Location:** NY, NY  
**Matrix:** Soil  
**Analytical Method:** 1,8082A  
**Analytical Date:** 01/22/15 14:33  
**Analyst:** JT  
**Percent Solids:** 86%

**Date Collected:** 01/16/15 09:55  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 01/20/15 16:57  
**Cleanup Method:** EPA 3665A  
**Cleanup Date:** 01/21/15  
**Cleanup Method:** EPA 3660B  
**Cleanup Date:** 01/21/15

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>Polychlorinated Biphenyls by GC - Westborough Lab</b>							
Aroclor 1016	ND		mg/kg	0.0368	0.00291	1	A
Aroclor 1221	ND		mg/kg	0.0368	0.00340	1	A
Aroclor 1232	ND		mg/kg	0.0368	0.00432	1	A
Aroclor 1242	ND		mg/kg	0.0368	0.00451	1	A
Aroclor 1248	ND		mg/kg	0.0368	0.00311	1	A
Aroclor 1254	ND		mg/kg	0.0368	0.00303	1	A
Aroclor 1260	ND		mg/kg	0.0368	0.00281	1	A
Aroclor 1262	ND		mg/kg	0.0368	0.00183	1	A
Aroclor 1268	ND		mg/kg	0.0368	0.00534	1	A
PCBs, Total	ND		mg/kg	0.0368	0.00183	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	72		30-150	A
Decachlorobiphenyl	86		30-150	A
2,4,5,6-Tetrachloro-m-xylene	78		30-150	B
Decachlorobiphenyl	97		30-150	B

**Project Name:** 217 WEST 20TH STREET**Lab Number:** L1500997**Project Number:** 217W28**Report Date:** 01/23/15

**Method Blank Analysis  
Batch Quality Control**

Analytical Method: 1,8082A  
 Analytical Date: 01/22/15 17:35  
 Analyst: JT

Extraction Method: EPA 3546  
 Extraction Date: 01/20/15 16:57  
 Cleanup Method: EPA 3665A  
 Cleanup Date: 01/21/15  
 Cleanup Method: EPA 3660B  
 Cleanup Date: 01/21/15

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01-03 Batch: WG757077-1						
Aroclor 1016	ND		mg/kg	0.0325	0.00257	A
Aroclor 1221	ND		mg/kg	0.0325	0.00300	A
Aroclor 1232	ND		mg/kg	0.0325	0.00381	A
Aroclor 1242	ND		mg/kg	0.0325	0.00398	A
Aroclor 1248	ND		mg/kg	0.0325	0.00274	A
Aroclor 1254	ND		mg/kg	0.0325	0.00267	A
Aroclor 1260	ND		mg/kg	0.0325	0.00248	A
Aroclor 1262	ND		mg/kg	0.0325	0.00161	A
Aroclor 1268	ND		mg/kg	0.0325	0.00471	A
PCBs, Total	ND		mg/kg	0.0325	0.00161	A

Surrogate	%Recovery	Qualifier	Acceptance	
			Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	77		30-150	A
Decachlorobiphenyl	102		30-150	A
2,4,5,6-Tetrachloro-m-xylene	77		30-150	B
Decachlorobiphenyl	106		30-150	B

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01-03 Batch: WG757077-2 WG757077-3									
Aroclor 1016	79		71		40-140	11		30	A
Aroclor 1260	81		72		40-140	12		30	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	82		76		30-150	A
Decachlorobiphenyl	109		97		30-150	A
2,4,5,6-Tetrachloro-m-xylene	80		73		30-150	B
Decachlorobiphenyl	110		99		30-150	B

# PESTICIDES

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-01  
**Client ID:** 217W28-F1  
**Sample Location:** NY, NY  
**Matrix:** Soil  
**Analytical Method:** 1,8081B  
**Analytical Date:** 01/22/15 12:33  
**Analyst:** SS  
**Percent Solids:** 84%

**Date Collected:** 01/16/15 09:30  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 01/18/15 02:58  
**Cleanup Method:** EPA 3620B  
**Cleanup Date:** 01/22/15

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>Pesticides by GC - Westborough Lab</b>							
Delta-BHC	ND		mg/kg	0.00184	0.00036	1	A
Lindane	ND		mg/kg	0.00076	0.00034	1	A
Alpha-BHC	ND		mg/kg	0.00076	0.00021	1	A
Beta-BHC	ND		mg/kg	0.00184	0.00069	1	A
Heptachlor	ND		mg/kg	0.00092	0.00041	1	A
Aldrin	ND		mg/kg	0.00184	0.00064	1	A
Heptachlor epoxide	ND		mg/kg	0.00345	0.00103	1	A
Endrin	ND		mg/kg	0.00076	0.00031	1	A
Endrin aldehyde	ND		mg/kg	0.00230	0.00080	1	A
Endrin ketone	ND		mg/kg	0.00184	0.00047	1	A
Dieldrin	0.0190	PI	mg/kg	0.00115	0.00057	1	A
4,4'-DDE	0.0322		mg/kg	0.00184	0.00042	1	B
4,4'-DDD	0.00504		mg/kg	0.00184	0.00065	1	A
4,4'-DDT	0.173	E	mg/kg	0.00345	0.00148	1	B
Endosulfan I	ND		mg/kg	0.00184	0.00043	1	A
Endosulfan II	ND		mg/kg	0.00184	0.00061	1	A
Endosulfan sulfate	ND		mg/kg	0.00076	0.00036	1	A
Methoxychlor	ND		mg/kg	0.00345	0.00107	1	A
Toxaphene	ND		mg/kg	0.0345	0.00966	1	A
Chlordane	0.151		mg/kg	0.0149	0.00609	1	B

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	57		30-150	A
Decachlorobiphenyl	97		30-150	A
2,4,5,6-Tetrachloro-m-xylene	54		30-150	B
Decachlorobiphenyl	72		30-150	B

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-01 D  
 Client ID: 217W28-F1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Analytical Method: 1,8081B  
 Analytical Date: 01/22/15 22:15  
 Analyst: SS  
 Percent Solids: 84%

Date Collected: 01/16/15 09:30  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 01/18/15 02:58  
 Cleanup Method: EPA 3620B  
 Cleanup Date: 01/22/15

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Pesticides by GC - Westborough Lab							
4,4'-DDT	0.142		mg/kg	0.0345	0.0148	10	B

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-02  
**Client ID:** 217W28-F2  
**Sample Location:** NY, NY  
**Matrix:** Soil  
**Analytical Method:** 1,8081B  
**Analytical Date:** 01/22/15 12:46  
**Analyst:** SS  
**Percent Solids:** 87%

**Date Collected:** 01/16/15 09:45  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 01/18/15 02:58  
**Cleanup Method:** EPA 3620B  
**Cleanup Date:** 01/22/15

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>Pesticides by GC - Westborough Lab</b>							
Delta-BHC	ND		mg/kg	0.00178	0.00035	1	A
Lindane	ND		mg/kg	0.00074	0.00033	1	A
Alpha-BHC	ND		mg/kg	0.00074	0.00021	1	A
Beta-BHC	ND		mg/kg	0.00178	0.00067	1	A
Heptachlor	ND		mg/kg	0.00089	0.00040	1	A
Aldrin	ND		mg/kg	0.00178	0.00062	1	A
Heptachlor epoxide	ND		mg/kg	0.00335	0.00100	1	A
Endrin	ND		mg/kg	0.00074	0.00030	1	A
Endrin aldehyde	ND		mg/kg	0.00223	0.00078	1	A
Endrin ketone	ND		mg/kg	0.00178	0.00046	1	A
Dieldrin	ND		mg/kg	0.00112	0.00055	1	A
4,4'-DDE	0.0262		mg/kg	0.00178	0.00041	1	B
4,4'-DDD	0.0105		mg/kg	0.00178	0.00063	1	A
4,4'-DDT	0.0522	PI	mg/kg	0.00335	0.00144	1	A
Endosulfan I	ND		mg/kg	0.00178	0.00042	1	A
Endosulfan II	ND		mg/kg	0.00178	0.00059	1	A
Endosulfan sulfate	ND		mg/kg	0.00074	0.00035	1	A
Methoxychlor	ND		mg/kg	0.00335	0.00104	1	A
Toxaphene	ND		mg/kg	0.0335	0.00937	1	A
Chlordane	ND		mg/kg	0.0145	0.00591	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	61		30-150	A
Decachlorobiphenyl	30		30-150	A
2,4,5,6-Tetrachloro-m-xylene	63		30-150	B
Decachlorobiphenyl	37		30-150	B

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-03  
**Client ID:** 217W28-N1  
**Sample Location:** NY, NY  
**Matrix:** Soil  
**Analytical Method:** 1,8081B  
**Analytical Date:** 01/22/15 12:59  
**Analyst:** SS  
**Percent Solids:** 86%

**Date Collected:** 01/16/15 09:55  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 01/18/15 02:58  
**Cleanup Method:** EPA 3620B  
**Cleanup Date:** 01/22/15

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>Pesticides by GC - Westborough Lab</b>							
Delta-BHC	ND		mg/kg	0.00184	0.00036	1	A
Lindane	ND		mg/kg	0.00076	0.00034	1	A
Alpha-BHC	ND		mg/kg	0.00076	0.00021	1	A
Beta-BHC	ND		mg/kg	0.00184	0.00069	1	A
Heptachlor	ND		mg/kg	0.00092	0.00041	1	A
Aldrin	ND		mg/kg	0.00184	0.00064	1	A
Heptachlor epoxide	ND		mg/kg	0.00345	0.00104	1	A
Endrin	ND		mg/kg	0.00076	0.00031	1	A
Endrin aldehyde	ND		mg/kg	0.00230	0.00080	1	A
Endrin ketone	ND		mg/kg	0.00184	0.00047	1	A
Dieldrin	ND		mg/kg	0.00115	0.00057	1	A
4,4'-DDE	ND		mg/kg	0.00184	0.00042	1	A
4,4'-DDD	ND		mg/kg	0.00184	0.00065	1	A
4,4'-DDT	ND		mg/kg	0.00345	0.00148	1	A
Endosulfan I	ND		mg/kg	0.00184	0.00043	1	A
Endosulfan II	ND		mg/kg	0.00184	0.00061	1	A
Endosulfan sulfate	ND		mg/kg	0.00076	0.00036	1	A
Methoxychlor	ND		mg/kg	0.00345	0.00107	1	A
Toxaphene	ND		mg/kg	0.0345	0.00967	1	A
Chlordane	ND		mg/kg	0.0150	0.00610	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	51		30-150	A
Decachlorobiphenyl	34		30-150	A
2,4,5,6-Tetrachloro-m-xylene	55		30-150	B
Decachlorobiphenyl	36		30-150	B

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

**Analytical Method:** 1,8081B  
**Analytical Date:** 01/22/15 11:28  
**Analyst:** SS

**Extraction Method:** EPA 3546  
**Extraction Date:** 01/18/15 02:58  
**Cleanup Method:** EPA 3620B  
**Cleanup Date:** 01/22/15

Parameter	Result	Qualifier	Units	RL	MDL	Column
Pesticides by GC - Westborough Lab for sample(s): 01-03 Batch: WG756541-1						
Delta-BHC	ND		mg/kg	0.00156	0.00030	A
Lindane	ND		mg/kg	0.00064	0.00029	A
Alpha-BHC	ND		mg/kg	0.00064	0.00018	A
Beta-BHC	ND		mg/kg	0.00156	0.00059	A
Heptachlor	ND		mg/kg	0.00077	0.00034	A
Aldrin	ND		mg/kg	0.00156	0.00054	A
Heptachlor epoxide	ND		mg/kg	0.00292	0.00087	A
Endrin	ND		mg/kg	0.00064	0.00026	A
Endrin aldehyde	ND		mg/kg	0.00194	0.00068	A
Endrin ketone	ND		mg/kg	0.00156	0.00040	A
Dieldrin	ND		mg/kg	0.00097	0.00048	A
4,4'-DDE	ND		mg/kg	0.00156	0.00036	A
4,4'-DDD	ND		mg/kg	0.00156	0.00055	A
4,4'-DDT	ND		mg/kg	0.00292	0.00125	A
Endosulfan I	ND		mg/kg	0.00156	0.00036	A
Endosulfan II	ND		mg/kg	0.00156	0.00052	A
Endosulfan sulfate	ND		mg/kg	0.00064	0.00030	A
Methoxychlor	ND		mg/kg	0.00292	0.00090	A
Toxaphene	ND		mg/kg	0.0292	0.00816	A
Chlordane	ND		mg/kg	0.0126	0.00515	A

Surrogate	%Recovery	Qualifier	Acceptance	
			Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	75		30-150	A
Decachlorobiphenyl	53		30-150	A
2,4,5,6-Tetrachloro-m-xylene	80		30-150	B
Decachlorobiphenyl	75		30-150	B

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Pesticides by GC - Westborough Lab Associated sample(s): 01-03 Batch: WG756541-2 WG756541-3									
Delta-BHC	56		63		40-140	12		30	A
Lindane	65		72		40-140	10		30	A
Alpha-BHC	72		80		40-140	11		30	A
Beta-BHC	81		76		40-140	6		30	A
Heptachlor	73		80		40-140	9		30	A
Aldrin	68		76		40-140	11		30	A
Heptachlor epoxide	67		74		40-140	10		30	A
Endrin	70		78		40-140	11		30	A
Endrin aldehyde	50		53		40-140	6		30	A
Endrin ketone	56		62		40-140	10		30	A
Dieldrin	66		74		40-140	11		30	A
4,4'-DDE	69		77		40-140	11		30	A
4,4'-DDD	70		77		40-140	10		30	A
4,4'-DDT	69		77		40-140	11		30	A
Endosulfan I	61		68		40-140	11		30	A
Endosulfan II	65		71		40-140	9		30	A
Endosulfan sulfate	54		59		40-140	9		30	A
Methoxychlor	66		73		40-140	10		30	A
cis-Chlordane	63		70		40-140	11		30	A
trans-Chlordane	75		79		40-140	5		30	A

## Lab Control Sample Analysis

Batch Quality Control

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

Parameter	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>%Recovery</i> Limits	<i>RPD</i>	<i>Qual</i>	<i>RPD</i> Limits
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Pesticides by GC - Westborough Lab Associated sample(s): 01-03 Batch: WG756541-2 WG756541-3

<u>Surrogate</u>	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>Acceptance</i> Criteria	<i>Column</i>
2,4,5,6-Tetrachloro-m-xylene	62		68		30-150	A
Decachlorobiphenyl	45		51		30-150	A
2,4,5,6-Tetrachloro-m-xylene	71		83		30-150	B
Decachlorobiphenyl	69		77		30-150	B

## METALS

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-01  
 Client ID: 217W28-F1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Percent Solids: 84%

Date Collected: 01/16/15 09:30  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 TCLP/SPLP Ext. Date: 01/20/15 00:36

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>TCLP Metals by EPA 1311 - Westborough Lab</b>											
Arsenic, TCLP	ND		mg/l	1.0	0.02	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Barium, TCLP	0.27	J	mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Cadmium, TCLP	0.03	J	mg/l	0.10	0.01	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Chromium, TCLP	ND		mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Copper, TCLP	0.08	J	mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Lead, TCLP	0.89		mg/l	0.50	0.02	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Mercury, TCLP	ND		mg/l	0.0010	0.0003	1	01/22/15 14:31	01/23/15 14:06	EPA 7470A	1,7470A	AB
Nickel, TCLP	ND		mg/l	0.50	0.04	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Selenium, TCLP	0.04	J	mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Silver, TCLP	ND		mg/l	0.10	0.02	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG
Zinc, TCLP	7.2		mg/l	0.50	0.07	1	01/23/15 11:51	01/23/15 14:56	EPA 3015	1,6010C	MG



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-01  
 Client ID: 217W28-F1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Percent Solids: 84%

Date Collected: 01/16/15 09:30  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Total Metals - Westborough Lab</b>											
Aluminum, Total	5600		mg/kg	9.4	1.9	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Antimony, Total	ND		mg/kg	4.7	0.75	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Arsenic, Total	18		mg/kg	0.94	0.19	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Barium, Total	490		mg/kg	0.94	0.28	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Beryllium, Total	0.22	J	mg/kg	0.47	0.09	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Cadmium, Total	1.7		mg/kg	0.94	0.07	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Calcium, Total	35000		mg/kg	9.4	2.8	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Chromium, Total	26		mg/kg	0.94	0.19	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Cobalt, Total	5.5		mg/kg	1.9	0.47	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Copper, Total	88		mg/kg	0.94	0.19	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Iron, Total	27000		mg/kg	4.7	1.9	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Lead, Total	440		mg/kg	4.7	0.19	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Magnesium, Total	2900		mg/kg	9.4	0.94	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Manganese, Total	370		mg/kg	0.94	0.19	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Mercury, Total	0.85		mg/kg	0.08	0.02	1	01/20/15 09:31	01/23/15 11:05	EPA 7471B	1,7471B	MC
Nickel, Total	14		mg/kg	2.4	0.38	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Potassium, Total	700		mg/kg	240	38.	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Selenium, Total	0.30	J	mg/kg	1.9	0.28	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Silver, Total	0.51	J	mg/kg	0.94	0.19	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Sodium, Total	310		mg/kg	190	28.	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Thallium, Total	ND		mg/kg	1.9	0.38	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Vanadium, Total	34		mg/kg	0.94	0.09	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT
Zinc, Total	1100		mg/kg	4.7	0.66	2	01/22/15 16:49	01/23/15 12:39	EPA 3050B	1,6010C	TT



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02  
 Client ID: 217W28-F2  
 Sample Location: NY, NY  
 Matrix: Soil  
 Percent Solids: 87%

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 TCLP/SPLP Ext. Date: 01/20/15 00:36

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**TCLP Metals by EPA 1311 - Westborough Lab**

Arsenic, TCLP	ND		mg/l	1.0	0.02	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Barium, TCLP	0.20	J	mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Cadmium, TCLP	0.04	J	mg/l	0.10	0.01	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Chromium, TCLP	ND		mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Copper, TCLP	0.81		mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Lead, TCLP	7.4		mg/l	0.50	0.02	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Mercury, TCLP	ND		mg/l	0.0010	0.0003	1	01/22/15 14:36	01/23/15 15:27	EPA 7470A	1,7470A	AB
Nickel, TCLP	0.05	J	mg/l	0.50	0.04	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Selenium, TCLP	ND		mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Silver, TCLP	ND		mg/l	0.10	0.02	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG
Zinc, TCLP	17		mg/l	0.50	0.07	1	01/23/15 11:51	01/23/15 15:00	EPA 3015	1,6010C	MG



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-02  
 Client ID: 217W28-F2  
 Sample Location: NY, NY  
 Matrix: Soil  
 Percent Solids: 87%

Date Collected: 01/16/15 09:45  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Total Metals - Westborough Lab</b>											
Aluminum, Total	4800		mg/kg	8.8	1.8	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Antimony, Total	ND		mg/kg	4.4	0.70	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Arsenic, Total	9.1		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Barium, Total	640		mg/kg	0.88	0.26	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Beryllium, Total	0.13	J	mg/kg	0.44	0.09	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Cadmium, Total	1.2		mg/kg	0.88	0.06	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Calcium, Total	44000		mg/kg	8.8	2.6	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Chromium, Total	14		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Cobalt, Total	4.3		mg/kg	1.8	0.44	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Copper, Total	23		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Iron, Total	10000		mg/kg	4.4	1.8	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Lead, Total	510		mg/kg	4.4	0.18	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Magnesium, Total	4700		mg/kg	8.8	0.88	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Manganese, Total	170		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Mercury, Total	0.91		mg/kg	0.08	0.02	1	01/20/15 09:31	01/23/15 11:12	EPA 7471B	1,7471B	MC
Nickel, Total	12		mg/kg	2.2	0.35	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Potassium, Total	830		mg/kg	220	35.	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Selenium, Total	0.28	J	mg/kg	1.8	0.26	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Silver, Total	ND		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Sodium, Total	400		mg/kg	180	26.	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Thallium, Total	ND		mg/kg	1.8	0.35	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Vanadium, Total	38		mg/kg	0.88	0.09	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT
Zinc, Total	780		mg/kg	4.4	0.61	2	01/22/15 16:49	01/23/15 13:45	EPA 3050B	1,6010C	TT



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-03  
 Client ID: 217W28-N1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Percent Solids: 86%

Date Collected: 01/16/15 09:55  
 Date Received: 01/16/15  
 Field Prep: Not Specified  
 TCLP/SPLP Ext. Date: 01/20/15 00:36

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>TCLP Metals by EPA 1311 - Westborough Lab</b>											
Arsenic, TCLP	ND		mg/l	1.0	0.02	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Barium, TCLP	0.31	J	mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Cadmium, TCLP	ND		mg/l	0.10	0.01	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Chromium, TCLP	ND		mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Copper, TCLP	0.06	J	mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Lead, TCLP	0.03	J	mg/l	0.50	0.02	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Mercury, TCLP	ND		mg/l	0.0010	0.0003	1	01/22/15 14:31	01/23/15 14:54	EPA 7470A	1,7470A	AB
Nickel, TCLP	ND		mg/l	0.50	0.04	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Selenium, TCLP	ND		mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Silver, TCLP	ND		mg/l	0.10	0.02	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG
Zinc, TCLP	0.15	J	mg/l	0.50	0.07	1	01/23/15 11:51	01/23/15 15:39	EPA 3015	1,6010C	MG



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

Lab ID: L1500997-03  
 Client ID: 217W28-N1  
 Sample Location: NY, NY  
 Matrix: Soil  
 Percent Solids: 86%

Date Collected: 01/16/15 09:55  
 Date Received: 01/16/15  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Total Metals - Westborough Lab</b>											
Aluminum, Total	5800		mg/kg	8.8	1.8	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Antimony, Total	ND		mg/kg	4.4	0.71	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Arsenic, Total	3.9		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Barium, Total	26		mg/kg	0.88	0.26	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Beryllium, Total	0.26	J	mg/kg	0.44	0.09	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Cadmium, Total	ND		mg/kg	0.88	0.06	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Calcium, Total	1700		mg/kg	8.8	2.6	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Chromium, Total	8.4		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Cobalt, Total	5.8		mg/kg	1.8	0.44	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Copper, Total	14		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Iron, Total	10000		mg/kg	4.4	1.8	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Lead, Total	6.1		mg/kg	4.4	0.18	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Magnesium, Total	2800		mg/kg	8.8	0.88	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Manganese, Total	120		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Mercury, Total	0.03	J	mg/kg	0.08	0.02	1	01/20/15 09:31	01/23/15 11:14	EPA 7471B	1,7471B	MC
Nickel, Total	13		mg/kg	2.2	0.35	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Potassium, Total	260		mg/kg	220	35.	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Selenium, Total	ND		mg/kg	1.8	0.26	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Silver, Total	ND		mg/kg	0.88	0.18	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Sodium, Total	60	J	mg/kg	180	26.	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Thallium, Total	ND		mg/kg	1.8	0.35	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Vanadium, Total	14		mg/kg	0.88	0.09	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT
Zinc, Total	44		mg/kg	4.4	0.62	2	01/22/15 16:49	01/23/15 13:49	EPA 3050B	1,6010C	TT



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Westborough Lab for sample(s): 01-03 Batch: WG756812-1									
Mercury, Total	ND	mg/kg	0.08	0.02	1	01/20/15 09:31	01/23/15 11:01	1,7471B	MC

### Prep Information

Digestion Method: EPA 7471B

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Westborough Lab for sample(s): 01,03 Batch: WG757736-1									
Mercury, TCLP	ND	mg/l	0.0010	0.0003	1	01/22/15 14:31	01/23/15 14:03	1,7470A	AB

### Prep Information

Digestion Method: EPA 7470A  
TCLP/SPLP Extraction Date: 01/20/15 00:36

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Westborough Lab for sample(s): 02 Batch: WG757737-1									
Mercury, TCLP	ND	mg/l	0.0010	0.0003	1	01/22/15 14:36	01/23/15 15:26	1,7470A	AB

### Prep Information

Digestion Method: EPA 7470A  
TCLP/SPLP Extraction Date: 01/20/15 00:36

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Westborough Lab for sample(s): 01-03 Batch: WG757784-1									
Aluminum, Total	ND	mg/kg	4.0	0.80	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Antimony, Total	ND	mg/kg	2.0	0.32	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Arsenic, Total	ND	mg/kg	0.40	0.08	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Barium, Total	ND	mg/kg	0.40	0.12	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Beryllium, Total	ND	mg/kg	0.20	0.04	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Cadmium, Total	ND	mg/kg	0.40	0.03	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

### Method Blank Analysis Batch Quality Control

Calcium, Total	ND	mg/kg	4.0	1.2	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Chromium, Total	ND	mg/kg	0.40	0.08	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Cobalt, Total	ND	mg/kg	0.80	0.20	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Copper, Total	ND	mg/kg	0.40	0.08	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Iron, Total	ND	mg/kg	2.0	0.80	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Lead, Total	ND	mg/kg	2.0	0.08	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Magnesium, Total	ND	mg/kg	4.0	0.40	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Manganese, Total	ND	mg/kg	0.40	0.08	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Nickel, Total	ND	mg/kg	1.0	0.16	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Potassium, Total	ND	mg/kg	100	16.	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Selenium, Total	ND	mg/kg	0.80	0.12	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Silver, Total	ND	mg/kg	0.40	0.08	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Sodium, Total	ND	mg/kg	80	12.	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Thallium, Total	ND	mg/kg	0.80	0.16	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Vanadium, Total	ND	mg/kg	0.40	0.04	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT
Zinc, Total	ND	mg/kg	2.0	0.28	1	01/22/15 16:49	01/23/15 12:26	1,6010C	TT

#### Prep Information

Digestion Method: EPA 3050B

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Westborough Lab for sample(s): 01-03 Batch: WG757962-1										
Arsenic, TCLP	ND		mg/l	1.0	0.02	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Barium, TCLP	ND		mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Cadmium, TCLP	ND		mg/l	0.10	0.01	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Chromium, TCLP	ND		mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Copper, TCLP	0.06	J	mg/l	0.20	0.02	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Lead, TCLP	0.02	J	mg/l	0.50	0.02	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Nickel, TCLP	ND		mg/l	0.50	0.04	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Selenium, TCLP	0.04	J	mg/l	0.50	0.03	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Silver, TCLP	ND		mg/l	0.10	0.02	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG
Zinc, TCLP	ND		mg/l	0.50	0.07	1	01/23/15 11:51	01/23/15 13:22	1,6010C	MG

**Project Name:** 217 WEST 20TH STREET

**Lab Number:** L1500997

**Project Number:** 217W28

**Report Date:** 01/23/15

## Method Blank Analysis Batch Quality Control

### Prep Information

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Digestion Method: EPA 3015

TCLP/SPLP Extraction Date: 01/20/15 00:36

### Lab Control Sample Analysis Batch Quality Control

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 Batch: WG756812-2 SRM Lot Number: D083-540								
Mercury, Total	95		-		75-126	-		
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01,03 Batch: WG757736-2								
Mercury, TCLP	112		-		80-120	-		
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 02 Batch: WG757737-2								
Mercury, TCLP	129	Q	-		80-120	-		

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** 217 WEST 20TH STREET

**Project Number:** 217W28

**Lab Number:** L1500997

**Report Date:** 01/23/15

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 Batch: WG757784-2 SRM Lot Number: D083-540					
Aluminum, Total	69	-	51-148	-	
Antimony, Total	146	-	1-210	-	
Arsenic, Total	98	-	78-122	-	
Barium, Total	96	-	82-117	-	
Beryllium, Total	94	-	82-118	-	
Cadmium, Total	91	-	82-118	-	
Calcium, Total	88	-	82-118	-	
Chromium, Total	91	-	79-121	-	
Cobalt, Total	92	-	83-117	-	
Copper, Total	94	-	80-120	-	
Iron, Total	86	-	47-153	-	
Lead, Total	83	-	81-119	-	
Magnesium, Total	76	-	75-124	-	
Manganese, Total	92	-	81-119	-	
Nickel, Total	90	-	82-118	-	
Potassium, Total	84	-	70-130	-	
Selenium, Total	96	-	78-123	-	
Silver, Total	91	-	74-125	-	
Sodium, Total	89	-	70-130	-	
Thallium, Total	86	-	78-122	-	
Vanadium, Total	89	-	65-135	-	

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** 217 WEST 20TH STREET

**Project Number:** 217W28

**Lab Number:** L1500997

**Report Date:** 01/23/15

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 Batch: WG757784-2 SRM Lot Number: D083-540					
Zinc, Total	87	-	80-121	-	
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01-03 Batch: WG757962-2					
Arsenic, TCLP	100	-	75-125	-	20
Barium, TCLP	90	-	75-125	-	20
Cadmium, TCLP	100	-	75-125	-	20
Chromium, TCLP	95	-	75-125	-	20
Copper, TCLP	96	-	75-125	-	20
Lead, TCLP	94	-	75-125	-	20
Nickel, TCLP	94	-	75-125	-	20
Selenium, TCLP	100	-	75-125	-	20
Silver, TCLP	102	-	75-125	-	20
Zinc, TCLP	98	-	75-125	-	20

### Matrix Spike Analysis Batch Quality Control

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756812-4 QC Sample: L1500997-01 Client ID: 217W28-F1												
Mercury, Total	0.85	0.167	0.89	24	Q	-	-		80-120	-		20
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01,03 QC Batch ID: WG757736-4 QC Sample: L1500997-01 Client ID: 217W28-F1												
Mercury, TCLP	ND	0.025	0.0311	124	Q	-	-		80-120	-		20
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 02 QC Batch ID: WG757737-4 QC Sample: L1500997-02 Client ID: 217W28-F2												
Mercury, TCLP	ND	0.025	0.0313	125	Q	-	-		80-120	-		20

### Matrix Spike Analysis Batch Quality Control

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757784-4 QC Sample: L1500997-01 Client ID: 217W28-F1									
Aluminum, Total	5600	187	5800	107	-	-	75-125	-	20
Antimony, Total	ND	46.7	39	84	-	-	75-125	-	20
Arsenic, Total	18.	11.2	19	9	Q	-	75-125	-	20
Barium, Total	490	187	600	59	Q	-	75-125	-	20
Beryllium, Total	0.22J	4.67	4.8	103	-	-	75-125	-	20
Cadmium, Total	1.7	4.76	5.7	84	-	-	75-125	-	20
Calcium, Total	35000	934	65000	3210	Q	-	75-125	-	20
Chromium, Total	26.	18.7	30	21	Q	-	75-125	-	20
Cobalt, Total	5.5	46.7	44	82	-	-	75-125	-	20
Copper, Total	88.	23.3	80	0	Q	-	75-125	-	20
Iron, Total	27000	93.4	10000	0	Q	-	75-125	-	20
Lead, Total	440	47.6	420	0	Q	-	75-125	-	20
Magnesium, Total	2900	934	22000	2040	Q	-	75-125	-	20
Manganese, Total	370	46.7	280	0	Q	-	75-125	-	20
Nickel, Total	14.	46.7	50	77	-	-	75-125	-	20
Potassium, Total	700	934	1700	107	-	-	75-125	-	20
Selenium, Total	0.30J	11.2	11	98	-	-	75-125	-	20
Silver, Total	0.51J	28	30	107	-	-	75-125	-	20
Sodium, Total	310	934	1400	117	-	-	75-125	-	20
Thallium, Total	ND	11.2	8.6	77	-	-	75-125	-	20
Vanadium, Total	34.	46.7	73	84	-	-	75-125	-	20

### Matrix Spike Analysis Batch Quality Control

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757784-4 QC Sample: L1500997-01 Client ID: 217W28-F1									
Zinc, Total	1100	46.7	840	0	Q	-	75-125	-	20
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757962-4 QC Sample: L1500790-01 Client ID: MS Sample									
Arsenic, TCLP	ND	1.2	1.2	100	-	-	75-125	-	20
Barium, TCLP	0.37J	20	18	90	-	-	75-125	-	20
Cadmium, TCLP	0.01J	0.51	0.51	100	-	-	75-125	-	20
Chromium, TCLP	ND	2	1.8	90	-	-	75-125	-	20
Copper, TCLP	0.26	2.5	2.5	90	-	-	75-125	-	20
Lead, TCLP	0.93	5.1	5.6	92	-	-	75-125	-	20
Nickel, TCLP	ND	5	4.6	92	-	-	75-125	-	20
Selenium, TCLP	ND	1.2	1.2	100	-	-	75-125	-	20
Silver, TCLP	ND	0.5	0.46	92	-	-	75-125	-	20
Zinc, TCLP	1.6	5	6.3	94	-	-	75-125	-	20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756812-3 QC Sample: L1500997-01 Client ID: 217W28-F1						
Mercury, Total	0.85	0.86	mg/kg	1		20
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01,03 QC Batch ID: WG757736-3 QC Sample: L1500997-01 Client ID: 217W28-F1						
Mercury, TCLP	ND	ND	mg/l	NC		20
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 02 QC Batch ID: WG757737-3 QC Sample: L1500997-02 Client ID: 217W28-F2						
Mercury, TCLP	ND	ND	mg/l	NC		20

### Lab Duplicate Analysis Batch Quality Control

**Project Name:** 217 WEST 20TH STREET

**Project Number:** 217W28

**Lab Number:** L1500997

**Report Date:** 01/23/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757784-3 QC Sample: L1500997-01 Client ID: 217W28-F1					
Aluminum, Total	5600	5700	mg/kg	2	20
Antimony, Total	ND	ND	mg/kg	NC	20
Arsenic, Total	18.	7.5	mg/kg	82	Q 20
Barium, Total	490	550	mg/kg	12	20
Beryllium, Total	0.22J	0.22J	mg/kg	NC	20
Cadmium, Total	1.7	1.3	mg/kg	27	Q 20
Calcium, Total	35000	21000	mg/kg	50	Q 20
Chromium, Total	26.	20	mg/kg	26	Q 20
Cobalt, Total	5.5	4.4	mg/kg	22	Q 20
Copper, Total	88.	46	mg/kg	63	Q 20
Iron, Total	27000	10000	mg/kg	92	Q 20
Lead, Total	440	410	mg/kg	7	20
Magnesium, Total	2900	2400	mg/kg	19	20
Manganese, Total	370	240	mg/kg	43	Q 20
Nickel, Total	14.	12	mg/kg	15	20
Potassium, Total	700	670	mg/kg	4	20
Selenium, Total	0.30J	ND	mg/kg	NC	20
Silver, Total	0.51J	0.32J	mg/kg	NC	20
Sodium, Total	310	240	mg/kg	25	Q 20



## Lab Duplicate Analysis

Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757784-3 QC Sample: L1500997-01 Client ID: 217W28-F1					
Thallium, Total	ND	ND	mg/kg	NC	20
Vanadium, Total	34.	24	mg/kg	34 Q	20
Zinc, Total	1100	730	mg/kg	40 Q	20
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757962-3 QC Sample: L1500790-01 Client ID: DUP Sample					
Chromium, TCLP	ND	ND	mg/l	NC	20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

### SAMPLE RESULTS

**Lab ID:** L1500997-01  
**Client ID:** 217W28-F1  
**Sample Location:** NY, NY  
**Matrix:** Soil

**Date Collected:** 01/16/15 09:30  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

### Test Material Information

**Source of Material:** Unknown  
**Description of Material:** Non-Metallic - Dry Soil  
**Particle Size:** Medium  
**Preliminary Burning Time (sec):** 120

Parameter	Result	Date Analyzed	Analytical Method	Analyst
Ignitability of Solids - Westborough Lab				
Ignitability	NI	01/21/15 19:53	1,1030	SB



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

### SAMPLE RESULTS

**Lab ID:** L1500997-02  
**Client ID:** 217W28-F2  
**Sample Location:** NY, NY  
**Matrix:** Soil

**Date Collected:** 01/16/15 09:45  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

### Test Material Information

**Source of Material:** Unknown  
**Description of Material:** Non-Metallic - Dry Soil  
**Particle Size:** Medium  
**Preliminary Burning Time (sec):** 120

Parameter	Result	Date Analyzed	Analytical Method	Analyst
Ignitability of Solids - Westborough Lab				
Ignitability	NI	01/21/15 19:53	1,1030	SB



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

### SAMPLE RESULTS

**Lab ID:** L1500997-03  
**Client ID:** 217W28-N1  
**Sample Location:** NY, NY  
**Matrix:** Soil

**Date Collected:** 01/16/15 09:55  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

### Test Material Information

**Source of Material:** Unknown  
**Description of Material:** Non-Metallic - Dry Soil  
**Particle Size:** Fine  
**Preliminary Burning Time (sec):** 120

Parameter	Result	Date Analyzed	Analytical Method	Analyst
Ignitability of Solids - Westborough Lab				
Ignitability	NI	01/21/15 19:53	1,1030	SB



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-01  
**Client ID:** 217W28-F1  
**Sample Location:** NY, NY  
**Matrix:** Soil

**Date Collected:** 01/16/15 09:30  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Solids, Total	83.6		%	0.100	NA	1	-	01/19/15 22:10	30,2540G	RT
Cyanide, Total	0.82	J	mg/kg	1.2	0.27	1	01/17/15 19:00	01/20/15 13:31	30,4500CN-CE	ML
pH (H)	7.7		SU	-	NA	1	-	01/17/15 04:56	1,9045D	MR
Chromium, Hexavalent	ND		mg/kg	0.96	0.19	1	01/21/15 13:15	01/22/15 18:03	1,7196A	JT
Cyanide, Reactive	ND		mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:27	1,7.3	RP
Sulfide, Reactive	ND		mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:15	1,7.3	RP
Paint Filter Liquid	NEGATIVE		-	0	NA	1	-	01/19/15 19:34	1,9095A	AS



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-02  
**Client ID:** 217W28-F2  
**Sample Location:** NY, NY  
**Matrix:** Soil

**Date Collected:** 01/16/15 09:45  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Solids, Total	86.9		%	0.100	NA	1	-	01/19/15 22:10	30,2540G	RT
Cyanide, Total	0.80	J	mg/kg	1.1	0.25	1	01/17/15 19:00	01/20/15 13:31	30,4500CN-CE	ML
pH (H)	7.9		SU	-	NA	1	-	01/17/15 04:56	1,9045D	MR
Chromium, Hexavalent	ND		mg/kg	0.92	0.18	1	01/21/15 13:15	01/22/15 18:04	1,7196A	JT
Cyanide, Reactive	ND		mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:27	1,7.3	RP
Sulfide, Reactive	ND		mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:15	1,7.3	RP
Paint Filter Liquid	NEGATIVE		-	0	NA	1	-	01/19/15 19:34	1,9095A	AS



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**SAMPLE RESULTS**

**Lab ID:** L1500997-03  
**Client ID:** 217W28-N1  
**Sample Location:** NY, NY  
**Matrix:** Soil

**Date Collected:** 01/16/15 09:55  
**Date Received:** 01/16/15  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Solids, Total	85.9		%	0.100	NA	1	-	01/19/15 22:10	30,2540G	RT
Cyanide, Total	ND		mg/kg	1.1	0.27	1	01/17/15 19:00	01/20/15 13:32	30,4500CN-CE	ML
pH (H)	8.1		SU	-	NA	1	-	01/17/15 04:56	1,9045D	MR
Chromium, Hexavalent	ND		mg/kg	0.93	0.19	1	01/21/15 13:15	01/22/15 18:04	1,7196A	JT
Cyanide, Reactive	ND		mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:27	1,7.3	RP
Sulfide, Reactive	ND		mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:16	1,7.3	RP
Paint Filter Liquid	NEGATIVE		-	0	NA	1	-	01/19/15 19:34	1,9095A	AS



Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG756476-1									
Sulfide, Reactive	ND	mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:15	1,7.3	RP
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG756478-1									
Cyanide, Reactive	ND	mg/kg	10	10.	1	01/17/15 15:30	01/17/15 17:26	1,7.3	RP
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG756526-1									
Cyanide, Total	ND	mg/kg	0.93	0.22	1	01/17/15 19:00	01/20/15 13:20	30,4500CN-CE	ML
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG757402-1									
Chromium, Hexavalent	ND	mg/kg	0.80	0.16	1	01/21/15 13:15	01/22/15 18:02	1,7196A	JT

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** 217 WEST 20TH STREET

**Project Number:** 217W28

**Lab Number:** L1500997

**Report Date:** 01/23/15

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG756443-1								
pH	101		-		99-101	-		
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG756476-2								
Sulfide, Reactive	94		-		60-125	-		40
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG756478-2								
Cyanide, Reactive	37		-		30-125	-		40
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG756526-2								
Cyanide, Total	114		-			-		
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG757402-2								
Chromium, Hexavalent	99		-		80-120	-		20

**Matrix Spike Analysis**  
Batch Quality Control

Project Name: 217 WEST 20TH STREET

Lab Number: L1500997

Project Number: 217W28

Report Date: 01/23/15

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756526-4 QC Sample: L1500997-03 Client ID: 217W28-N1												
Cyanide, Total	ND	11	7.0	62	-	-	-	-	-	-	-	-
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757402-5 QC Sample: L1500997-02 Client ID: 217W28-F2												
Chromium, Hexavalent	ND	1260	1200	95	-	-	-	-	75-125	-	-	20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756443-2 QC Sample: L1501087-01 Client ID: DUP Sample						
pH	7.8	7.5	SU	4		5
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756476-3 QC Sample: L1500997-02 Client ID: 217W28-F2						
Sulfide, Reactive	ND	ND	mg/kg	NC		40
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756478-3 QC Sample: L1500997-02 Client ID: 217W28-F2						
Cyanide, Reactive	ND	ND	mg/kg	NC		40
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756526-3 QC Sample: L1500997-03 Client ID: 217W28-N1						
Cyanide, Total	ND	ND	mg/kg	NC		
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG756773-1 QC Sample: L1500997-01 Client ID: 217W28-F1						
Solids, Total	83.6	82.2	%	2		20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG757402-4 QC Sample: L1500997-02 Client ID: 217W28-F2						
Chromium, Hexavalent	ND	ND	mg/kg	NC		20

Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: 01/17/2015 01:04

## Cooler Information Custody Seal

## Cooler

A Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1500997-01A	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-01B	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-01C	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-01D	Plastic 2oz unpreserved for TS	A	N/A	3.1	Y	Absent	TS(7)
L1500997-01E	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-CI(180),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)
L1500997-01F	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-CI(180),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)

\*Values in parentheses indicate holding time in days



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1500997-01G	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-CI(180),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)
L1500997-01Q	Plastic 120ml HNO3 preserved spl	A	<2	3.1	Y	Absent	CD-CI(180),BA-CI(180),NI-CI(180),CU-CI(180),HG-C(28),PB-CI(180),ZN-CI(180),CR-CI(180),SE-CI(180),AG-CI(180)
L1500997-01X	Vial MeOH preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)
L1500997-01X9	Tumble Vessel	A	N/A	3.1	Y	Absent	-
L1500997-01Y	Vial Water preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)
L1500997-01Z	Vial Water preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)
L1500997-02A	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-02B	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-02C	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-02D	Plastic 2oz unpreserved for TS	A	N/A	3.1	Y	Absent	TS(7)
L1500997-02E	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)

\*Values in parentheses indicate holding time in days



**Project Name:** 217 WEST 20TH STREET  
**Project Number:** 217W28

**Lab Number:** L1500997  
**Report Date:** 01/23/15

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1500997-02F	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)
L1500997-02G	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)
L1500997-02Q	Plastic 120ml HNO3 preserved spl	A	<2	3.1	Y	Absent	CD-CI(180),AS-CI(180),BA-CI(180),NI-CI(180),CU-CI(180),HG-C(28),PB-CI(180),ZN-CI(180),CR-CI(180),SE-CI(180),AG-CI(180)
L1500997-02X	Vial MeOH preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)
L1500997-02X9	Tumble Vessel	A	N/A	3.1	Y	Absent	-
L1500997-02Y	Vial Water preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)
L1500997-02Z	Vial Water preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)
L1500997-03A	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-03B	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-03C	5 gram Encore Sampler	A	N/A	3.1	Y	Absent	NJ-8260HLW(2)
L1500997-03D	Plastic 2oz unpreserved for TS	A	N/A	3.1	Y	Absent	TS(7)

\*Values in parentheses indicate holding time in days



Project Name: 217 WEST 20TH STREET

Project Number: 217W28

Lab Number: L1500997

Report Date: 01/23/15

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1500997-03E	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)
L1500997-03F	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)
L1500997-03G	Glass 250ml/8oz unpreserved	A	N/A	3.1	Y	Absent	BE-TI(180),IGNIT-1030(14),REACTS(14),AS-TI(180),BA-TI(180),AG-TI(180),NJ-8082(14),NJ-8270(14),AL-TI(180),CR-TI(180),NI-TI(180),NJ-TPH-DRO-D(14),TCN-4500(14),TL-TI(180),CU-TI(180),NJ-8270SIM-TECH(14),PB-TI(180),PH-9045(1),SB-TI(180),SE-TI(180),ZN-TI(180),CO-TI(180),PAINTF(),V-TI(180),FE-TI(180),HG-T(28),MG-TI(180),MN-TI(180),NJ-8081(14),REACTCN(14),CA-TI(180),CD-TI(180),HEXCR-7196(30),K-TI(180),NA-TI(180)
L1500997-03Q	Plastic 120ml HNO3 preserved spl	A	<2	3.1	Y	Absent	CD-CI(180),AS-CI(180),BA-CI(180),NI-CI(180),CU-CI(180),HG-C(28),PB-CI(180),ZN-CI(180),CR-CI(180),SE-CI(180),AG-CI(180)
L1500997-03X	Vial MeOH preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)

\*Values in parentheses indicate holding time in days



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<b>Container ID</b>	<b>Container Type</b>	<b>Cooler</b>	<b>pH</b>	<b>Temp deg C</b>	<b>Pres</b>	<b>Seal</b>	<b>Analysis(*)</b>
L1500997-03X9	Tumble Vessel	A	N/A	3.1	Y	Absent	-
L1500997-03Y	Vial Water preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)
L1500997-03Z	Vial Water preserved split	A	N/A	3.1	Y	Absent	NJ-8260HLW(14)

\*Values in parentheses indicate holding time in days

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## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

### Footnotes

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

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

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

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**Report Format:** DU Report with 'J' Qualifiers



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#### Data Qualifiers

- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

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## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

## LIMITATION OF LIABILITIES

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

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



## Certification Information

Last revised December 16, 2014

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

### Westborough Facility

**EPA 524.2:** Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.

**EPA 8260C:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.

**EPA 8270D:** 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.

**EPA 625:** 4-Chloroaniline, 4-Methylphenol.

**SM4500:** Soil: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.

**EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

### Mansfield Facility

**EPA 8270D:** Biphenyl.

**EPA 2540D:** TSS

**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

### Drinking Water

**EPA 200.8:** Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7:** Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;

**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**

**EPA 332:** Perchlorate.

**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

**EPA 200.7:** Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F, EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**

**EPA 624:** Volatile Halocarbons & Aromatics,

**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

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

