

**211 WEST 28<sup>TH</sup> STREET**

**NEW YORK, NEW YORK 10001**

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# **Remedial Action Work Plan**

**NYC VCP Number: 15CVCP111M**

**E-Designation Site Number: 15EH-N350M**

**Prepared for:**

Arker Companies

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**Prepared by:**



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**MARCH 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
VCA	Voluntary Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	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, Ariel Czemerinski, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the 211 West 28<sup>th</sup> Street site, site number 15CVCP111M. I certify to the following:

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

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Name

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NYS PE License Number

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Signature

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Date



## EXECUTIVE SUMMARY

Arker Companies has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 2,456 ft<sup>2</sup> Site located at 211 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 at 211 West 28<sup>th</sup> Street in the Chelsea section of Manhattan, New York, and is currently identified as Block 778, Lot 33 on the New York City Tax Map. Figure 1 shows the Site location. Lot 33 is a rectangular shaped lot consisting of 24.87 feet of street frontage on West 28<sup>th</sup> Street and a depth of approximately 98.75 feet for a total of approximately 2,456 ft<sup>2</sup>. The Site is located on the north side of West 28<sup>th</sup> Street between 7th Avenue and 8th Avenue and is bordered by West 28<sup>th</sup> Street to the south, a 6-story commercial/office building to the east (207 West 28<sup>th</sup> Street), a 9-story commercial/office building to the north, a 5-story multi-family walk-up building to the west (213 West 28<sup>th</sup> Street), and two 10-story and one 6-story school buildings to the south just beyond West 28<sup>th</sup> Street. A map of the site boundary is shown on Figure 2.

The entire footprint of Lot 33 is currently developed with a 6-story commercial building that is currently vacant.

### Summary of Proposed Redevelopment Plan

The development project consists of redeveloping the lot with a new 14-story residential apartment building with a full cellar level. The cellar level will consist of a multi-purpose room, a bicycle storage room, a laundry room, a janitor's closet, a trash compactor and recycling room, six mechanical rooms, a stairwell, and an elevator. The first floor consists of the residential lobby containing the mailbox area, as well as the elevator, the stairwell, two supportive service areas, and two janitor closets. Floors 2 through 12 will consist of three residential apartments.



The thirteenth floor will consist of the two residential apartments. The fourteenth floor will consist of one residential apartment.

No excavation is anticipated to be required for the new building. A new slab will be installed across entire building foot print. The site will not be equipped with a yard area. The water table is expected at approximately 37 feet below grade surface (bgs), and therefore will not be encountered during excavation.

Layout of the redevelopment plans for the cellar level is presented in Figure 3. The current zoning designation is M1-6D. The proposed use is consistent with existing zoning for the property.

### **Summary of Environmental Findings**

1. The elevation of the Site is approximately 34 feet.
2. Depth to groundwater is estimated to be approximately 37 feet below sidewalk grade.
3. Groundwater flow is anticipated to be generally toward the northwest.
4. Depth to bedrock at the Site is greater than 100 feet.
5. The stratigraphy of the Site surrounding the existing foundation slab from the surface down consists of historic fill material to depths as great as 2 feet, underlain by native grey silt.
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). The sample results showed no PCBs above detection limits. Several VOCs including acetone (9.4 µg/kg), methylene chloride (maximum [max.] of 4.6 µg/kg), and tetrachloroethene (max. of 2.2 µg/kg) were detected in all six soil samples at concentrations below Unrestricted Use SCOs. Several SVOCs, including benzo(b)fluoranthene (130 µg/kg), benzyl butyl phthalate (max. of 970 µg/kg), bis(2-ethylhexyl)phthalate (max. of 3,300 µg/kg), dimethylphthalate (130 µg/kg), di-n-butylphthalate (max. of 810 µg/kg), fluoranthene (max. of 170 µg/kg), phenanthrene (170 µg/kg), and pyrene (max. of 170 µg/kg), were detected in all of the shallow soil samples and one deep soil sample at concentrations below Unrestricted Use SCOs. Five pesticides including, 4,4'-DDD (max. of 12 µg/kg), 4,4'-DDE (max. of 40 µg/kg), 4,4'-

DDT (max. of 140 µg/kg), dieldrin (max. of 24 µg/kg), and endrin (max. of 33 µg/kg) were detected in all three of the shallow soil samples and two of the deep soil samples above Unrestricted Use SCOs, but below Restricted Residential Use SCOs. Several metals including cadmium (max 5.01 mg/kg), chromium (max. of 33.1 mg/kg), copper (max. of 86.7 mg/kg), lead (max. of 328 mg/kg), mercury (max. of 0.4 mg/kg), silver (max. of 316 mg/kg), and zinc (max. of 264 mg/kg) exceeded Unrestricted Use SCOs. Of these metals, silver and cadmium also exceeded Restricted Residential Use SCOs. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.

7. Groundwater sampling was not performed as part of this investigation due to site access issues. One groundwater well will be installed after building demolition and prior to start of construction.
8. Soil vapor samples collected during the 2015 EBC RI were compared to the New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (October 2006) Matrix 1 and Matrix 2 values. Samples indicated petroleum-related and chlorinated VOCs were present at low concentrations. The total concentration of petroleum-related VOCs (BTEX) ranged from 20.36 µg/m<sup>3</sup> to 163.92 µg/m<sup>3</sup>. The chlorinated VOC, trichloroethylene (TCE) was detected in one of the soil gas samples at 1.72 µg/m<sup>3</sup>. Tetrachloroethylene (PCE) was detected in all three soil gas samples ranging in concentration from 2.91 µg/m<sup>3</sup> to 7.39 µg/m<sup>3</sup>. Carbon tetrachloride (maximum of 0.44 µg/m<sup>3</sup>) was detected in all three of the soil gas samples. 1,1,1-Trichloroethane was not detected in any of the soil gas samples. The TCE, PCE, 1,1,1-Trichloroethane and carbon tetrachloride concentrations are below the monitoring level ranges established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

### 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 implementation of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of of Site-specific (Track 4) SCOs; Collection and analysis of three end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
5. Installation of one groundwater well to evaluate ground water quality for the Site;
6. No excavation is anticipated to be performed on Site. If project plans change, the remedy will include
  - a. A Waste Characterization Study to be completed prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s);
  - b. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;

8. No import of materials to be used for backfill and cover is planned for the Site. If project plans change, import of materials to be used for backfill and cover will be conducted in compliance with this plan and in accordance with applicable laws and regulations;
9. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
10. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
11. Installation of a vapor barrier below the cellar and behind the foundation walls of the proposed building. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins;
12. Construction and maintenance of an engineered composite cover consisting of a 4 inch thick concrete basement slab to prevent human exposure to residual soil/fill remaining under the Site;
13. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site;
14. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency; and
15. The property will continue to be registered with an E-Designation by 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 (OER) 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.

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

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

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

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

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the on-Site Project Manager, Chawinie Reilly at (631) 504-6000 or NYC Office of Environmental Remediation Project Manager, Amanda Duchesne at 212-341-2077.

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

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

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

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

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager, Ms. Chawinie Reilly (EBC) at (631) 504-6000, the NYC Office of Environmental Remediation Project Manager, Amanda Duchesne at 212-341-2077, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

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

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

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

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

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

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

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

**Final Report.** The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review in the public document repositories located at the Brooklyn Library - Bedford Branch (496 Franklin Avenue).

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

Arker Companies has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 211 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 remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

### 1.1 Site Location and Current Usage

The Site is located at 211 West 28<sup>th</sup> Street in the Chelsea section of Manhattan, New York, and is currently identified as Block 778, Lot 33 on the New York City Tax Map. Figure 1 shows the Site location. Lot 33 is a rectangular shaped lot consisting of 24.87 feet of street frontage on West 28<sup>th</sup> Street and a depth of approximately 98.75 feet for a total of approximately 2,456 ft<sup>2</sup>. The Site is located on the north side of West 28<sup>th</sup> Street between 7<sup>th</sup> Avenue and 8<sup>th</sup> Avenue and is bordered by West 28<sup>th</sup> Street to the south, a 6-story commercial/office building to the east (207 West 28<sup>th</sup> Street), a 9-story commercial/office building to the north, a 5-story multi-family walk-up building to the west (213 West 28<sup>th</sup> Street), and two 10-story and one 6-story school buildings to the south just beyond West 28<sup>th</sup> Street. A map of the site boundary is shown on Figure 2.

The entire footprint of lot 33 is currently developed with a 6-story commercial building that is currently vacant.

### 1.2 Proposed Redevelopment Plan

The development project consists of redeveloping the lot with a new 14-story residential apartment building with a full cellar level. The cellar level will consist of a multi-purpose room,



a bicycle storage room, a laundry room, a janitor's closet, a trash compactor and recycling room, six mechanical rooms, a stairwell, and an elevator. The first floor consists of the residential lobby containing the mailbox area, as well as the elevator, the stairwell, two supportive service areas, and two janitor closets. Floors 2 through 12 will consist of three residential apartments. The thirteenth floor will consist of the two residential apartments. The fourteenth floor will consist of one residential apartment.

No excavation is anticipated to be required for the new building. A new slab will be installed across entire building foot print. The site will not be equipped with a yard area. The water table is expected at approximately 37 feet below grade surface (bgs), and therefore will not be encountered during excavation.

Layout of the redevelopment plans for the cellar level is presented in Figure 3. The current zoning designation is M1-6D. The proposed use is consistent with existing zoning for the property.

### 1.3 Description of Surrounding Property

The area immediately surrounding Site consists of a 6-story commercial/office building to the east, a 9-story commercial/office building to the north, a 5-story multi-family walk-up to the west, and a 6-story and two 10-story school buildings to the south beyond West 28<sup>th</sup> Street. Figure 4 shows the surrounding land usage of the adjacent properties listed below as well as additional properties located up to 500 feet away from the Site. No hospitals or daycare facilities are located within a 250 ft radius of the Site. Directly across the street located at 300 7<sup>th</sup> Avenue, Manhattan, NY are buildings associated with The Fashion Institute of Technology.

#### Surrounding Property Usage

Direction	Property Description
<b>North</b> – Adjacent Properties	<u>Block 778, Lot 46 – 210 West 29<sup>th</sup> Street</u> A 2,475 ft <sup>2</sup> lot developed with a 9-story commercial/office building..
<b>South</b> – Opposite Side of West 28 <sup>th</sup> Street	<u>Block 777 Lots 1, 18, &amp; 37– 340 8<sup>th</sup> Avenue, 243 West 27<sup>th</sup> Street, and 300 7<sup>th</sup> Avenue</u> A 66,700 ft <sup>2</sup> and 59,350 ft <sup>2</sup> lots developed with two 10-story school facility buildings. A 31,950 ft <sup>2</sup> lot developed with a 6-story school facility building

<b>East –</b> Adjacent Property	<u>Block 778, Lot 34 – 207 West 28<sup>th</sup> Street</u> A 9,880 ft <sup>2</sup> lot developed with a 6-story commercial/office building.
<b>West –</b> Adjacent Property	<u>Block 778, Lot 32 – 213 West 28<sup>th</sup> Street</u> A 2,456 ft <sup>2</sup> lot developed with a 5-story residential multi-family walk-up building.

## 1.4 Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 211 West 28<sup>th</sup> Street, Manhattan, New York*”, dated February 2015 (RIR).

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

A Phase I Environmental Site Assessment was performed by EBC on January 17, 2015. The Phase I Report noted the following recognized environmental condition in connection with the Site:

- Some of the past uses identified for the Site, including the printing use, fur dyeing company, scientific tool and die company, and aluminum company may have been associated with the use and storage of hazardous materials, such as solvents, metals, and dyes.
- Through the FDNY Review during the Phase I ESA, a tank was noted as being on the Site in 1985. It was not listed on the Sanborn maps or in the Federal Database search. The FDNY records did not indicate if the tank is an AST or UST. No tanks were noted during the site inspection.

EBC recommended a Phase II Subsurface Investigation including soil borings and sub slab vapor analysis to determine if any solvents, dyes, or metal contamination is present.

EBC conducted a Phase II Report on January 27, 2015. The Phase II Report and retained the following results:



- No VOCs were detected in any of the soil samples above Unrestricted Use SCOs. Chlorinated VOC tetrachloroethene (PCE) was detected in two of the 2-4 foot interval soil samples at concentrations well below Unrestricted Use SCOs.
- Soil vapor results indicated petroleum related VOCs were present at low concentrations.
- Chlorinated VOC concentrations in soil gas samples were below the monitoring level ranges established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

The AOCs identified for this Site include:

1. Historic fill layer is present at the Site from grade to depths as great as 2 feet below grade.
2. Some of the past uses identified for the Site, including the printing use, fur dyeing company, scientific tool and die company, and aluminum company may have been associated with the use and storage of hazardous materials, such as solvents, metals, and dyes.
3. Through the FDNY Review during the Phase I ESA, a tank was noted as being on the Site in 1985. It was not listed on the Sanborn maps or in the Federal Database search. The FDNY records did not indicate if the tank is an AST or UST. No tanks were noted during the site inspection.

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

EBC performed the following scope of work at the Site in January of 2015:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed three soil borings across the Site, and collected six soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three sub-slab soil gas implants and collected three soil gas samples for chemical analysis.

### **Summary of Environmental Findings**

1. The elevation of the Site is approximately 34 feet.
2. Depth to groundwater is estimated to be approximately 37 feet below sidewalk grade.

3. Groundwater flow is generally northwest.
4. Depth to bedrock at the Site is greater than 100 feet.
5. The stratigraphy of the Site surrounding the existing foundation slab from the surface down consists of historic fill material to depths as great as 2 feet, underlain by native grey silt.
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). The sample results showed no PCBs above detection limits. Several VOCs including acetone (9.4 µg/kg), methylene chloride (maximum [max.] of 4.6 µg/kg), and tetrachloroethene (max. of 2.2 µg/kg) were detected in all six soil samples at concentrations below Unrestricted Use SCOs. Several SVOCs, including benzo(b)fluoranthene (130 µg/kg), benzyl butyl phthalate (max. of 970 µg/kg), bis(2-ethylhexyl)phthalate (max. of 3,300 µg/kg), dimethylphthalate (130 µg/kg), di-n-butylphthalate (max. of 810 µg/kg), fluoranthene (max. of 170 µg/kg), phenanthrene (170 µg/kg), and pyrene (max. of 170 µg/kg), were detected in all of the shallow soil samples and one deep soil sample at concentrations below Unrestricted Use SCOs. Five pesticides including, 4,4'-DDD (max. of 12 µg/kg), 4,4'-DDE (max. of 40 µg/kg), 4,4'-DDT (max. of 140 µg/kg), dieldrin (max. of 24 µg/kg), and endrin (max. of 33 µg/kg) were detected in all three of the shallow soil samples and two of the deep soil samples above Unrestricted Use SCOs, but below Restricted Residential Use SCOs. Several metals including cadmium (max 5.01 mg/kg), chromium (max. of 33.1 mg/kg), copper (max. of 86.7 mg/kg), lead (max. of 328 mg/kg), mercury (max. of 0.4 mg/kg), silver (max. of 2.81 mg/kg), and zinc (max. of 264 mg/kg) exceeded Unrestricted Use SCOs within shallow soil samples. Of these metals, cadmium and silver also exceeded Restricted Residential Use SCOs. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.
7. Groundwater sampling was not performed as part of this investigation due to site access issues. One groundwater well will be installed after building demolition and prior to start of construction.
8. Soil vapor samples collected during the 2015 EBC RI were compared to the New

York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (October 2006) Matrix 1 and Matrix 2 values. Samples indicated petroleum-related and chlorinated VOCs were present at low concentrations. The total concentration of petroleum-related VOCs (BTEX) ranged from 20.36  $\mu\text{g}/\text{m}^3$  to 163.92  $\mu\text{g}/\text{m}^3$ . The chlorinated VOC, trichloroethylene (TCE) was detected in one of the soil gas samples at 1.72  $\mu\text{g}/\text{m}^3$ . Tetrachloroethylene (PCE) was detected in all three soil gas samples ranging in concentration from 2.91  $\mu\text{g}/\text{m}^3$  to 7.39  $\mu\text{g}/\text{m}^3$ . Carbon tetrachloride (maximum of 0.44  $\mu\text{g}/\text{m}^3$ ) was detected in all three of the soil gas samples. 1,1,1-Trichloroethane was not detected in any of the soil gas samples. The TCE, PCE, 1,1,1-Trichloroethane and carbon tetrachloride concentrations are below the monitoring level ranges established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

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

## **2.0 REMEDIAL ACTION OBJECTIVES**

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

### **Soil**

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

### **Groundwater**

- Prevent direct exposure to contaminated groundwater, if found during planned groundwater sampling.
- Prevent exposure to contaminants volatilizing from contaminated groundwater, if found during planned groundwater sampling.

### **Soil Vapor**

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

### **3.0 REMEDIAL ALTERNATIVES ANALYSIS**

The goal of the remedy selection process under is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in 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 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. Based on results of the RI, it is anticipated that excavation of at least 4 feet of soil/fill would be required in order to achieve Unrestricted Use SCOs.

- No Engineering or Institutional Controls are required for a Track 1 cleanup, but a vapor barrier would be installed beneath the cellar of the new building as a part of development to prevent any potential future exposures from off-Site soil vapor.
- As part of development, placement of a final cover over the entire Site.

**Alternative 2 involves:**

- Establishment of Site-Specific (Track 4) SCOs;
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 has been achieved with endpoint sampling. No excavation is planned for the Site. However, if soil/ fill containing VOCs, pesticides, SVOCs or metals at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs;
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a soil vapor barrier to prevent any potential future exposures from off-Site soil vapor;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan 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 this 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 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. The vapor barrier would mitigate any vapor issues. Implementing Institutional Controls including a Site Management Plan would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

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

### **3.2. Balancing Criteria**

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

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

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Groundwater Protection Standards. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier below the new building's cellar.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier below the new building's cellar. 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.

Alternative 1 would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Under Alternative 2 no excavation is planned. However, focused attention to means and methods during the remedial action during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact.

An additional short-term adverse impact and risks to the community associated with Alternative 1 is increased truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.



The effects of these potential adverse impacts to the community, workers and the environment will be minimized through implementation of corresponding control plans including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) will 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 above Track 1 Unrestricted Use SCOs. Installation of a vapor barrier below the building slab and composite cover, as part of new construction, would prevent potential future migration of soil vapors into the new building.

Alternative 2 would provide long-term effectiveness by attaining Track 4 Site-Specific SCOs; placing a vapor barrier and a composite cover system across the Site, establishing use restrictions, establishing an SMP to ensure long-term management of Institutional Controls (ICs) Engineering Controls (ECs), and maintaining continued registration as an E-designated property to memorialize these controls for the long term. Groundwater use restrictions will eliminate potential exposure to groundwater and establishment of an SMP will ensure that this protection

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

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

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

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

Alternative 2 would ensure that remaining on-Site soil beneath the new building would meet Track 4 - Site-Specific SCOs. Alternative 1 would remove a greater total mass of contaminants on Site.

### **Implementability**

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the

selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

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

### **Cost effectiveness**

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

Since historic fill at the Site was found during the RI to extend to a depth of 2 feet and no excavation is planned, the costs associated with Alternative 1 would be greater than Alternative 2. 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 permitting associated with the proposed site development, no adverse community opinion is anticipated for either alternative. This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Attachment B.

### **Land use**

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

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

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

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

While Alternative 2 would result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives have opportunities to implement

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

## **4.0 REMEDIAL ACTION**

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

The preferred remedial action alternative is the Track 4 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 implementation of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of of Site-specific (Track 4) SCOs; Collection and analysis of three end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
5. Installation of one groundwater well to evaluate ground water quality for the Site;
6. No excavation is anticipated to be performed on Site. If project plans change, the remedy will include
  - a. A Waste Characterization Study to be completed prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s);
  - b. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for

handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.

7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;
8. No import of materials to be used for backfill and cover is planned for the Site. If project plans change, import of materials to be used for backfill and cover will be conducted in compliance with this plan and in accordance with applicable laws and regulations;
9. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
10. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
11. Installation of a vapor barrier below the cellar and behind the foundation walls of the proposed building. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins;
12. Construction and maintenance of an engineered composite cover consisting of a 4 inch thick concrete basement slab to prevent human exposure to residual soil/fill remaining under the Site;
13. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site;

14. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency; and
15. The property will continue to be registered with an E-Designation by the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

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

The following Site-Specific (Track 4) SCOs are proposed for this project:

<b><u>Contaminant</u></b>	<b><u>Track 4 SCOs</u></b>
Lead	500 ppm
Cadmium	5 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Attachment D. Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report. Soil and fill management at the Site will include impacted soil removal and disposal within the development cut. The location of planned excavations is shown in Figure 5.

#### **Estimated Soil/Fill Removal Quantities**

The total quantity of soil/fill expected to be excavated and disposed off-Site is 0 tons. Soil excavation is not planned for this redevelopment project. If development plans change, disposal location(s) will be reported promptly to the OER Project Manager prior to the start of the remedial action.



## End-Point Sampling

Removal actions under this plan will be performed in conjunction with remedial end-point sampling. Post-excavation end-point sampling and testing will be performed promptly following materials removal and completed prior to Site development activities. To evaluate attainment of Site-Specific (Track 4) SCOs, 3 post slab removal soil samples will be collected and analyzed for TAL Metals (lead and cadmium) according to analytical methods described below. For comparison to Track 4 Site-Specific SCOs, analytes will only include trigger compounds and elements established on the Track 4 Site-Specific SCO list above. If project plans change and Track 1 Unrestricted Use SCOs are pursued, samples will be analyzed for VOCs, SVOCs, PCBs, pesticides, and metals. The proposed locations of the endpoint soil samples are shown on Figure 6.

Hot-spot removal actions, whether established under this RAWP or identified during the remedial program, will be performed in conjunction with post remedial end-point samples to ensure that hot-spots are fully removed. Analytes for end-point sampling will be those parameters that are driving the hot-spot removal action and will be approved by OER. Hotspot removal end-point sampling frequency will consist of the following:

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

should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

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

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

Soil analytical methods will include:

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

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

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

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

One duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters. One trip blank will be submitted to the laboratory with each shipment of soil samples.

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

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

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

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

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

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

### **4.3 Engineering Controls**

The excavation required for the proposed Site development will achieve Site-Specific (Track 4) SCOs. The following elements below will be incorporated into the foundation design as part of the development: composite cover system consisting of a 4 inch thick concrete slab and a soil vapor barrier. These two elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

#### **Composite Cover System**

Exposure to residual soil/fill will be prevented by an engineered, permanent composite cover system to be built on the Site. This composite cover system will be comprised of 4-inch thick concrete-building slab beneath the area of the proposed building and will act as 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, migration of potential soil vapor from on-Site or off-Site in the future will be mitigated with a combination of the concrete building slab and vapor barrier. A vapor barrier will be installed beneath the cellar slab of the new building. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The extent of the proposed

vapor barrier membrane is provided in Figure 8. Installation details (penetrations, joints, etc.) with respect to the proposed building foundation, footings, slab, and sidewalls are provided in Figure 8. Product specification sheets are provided in Attachment E. The Remedial 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 manufacturers certificate of warranty.

#### **4.4 Institutional Controls**

Institutional Controls (IC) will be utilized in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR.

Institutional Controls for this remedial action are:

- Continued registration of the E-Designation for the property at 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 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;

- 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; and
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

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

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

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

Site management activities, reporting, and EC/IC certification will be scheduled on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 31 of the year following the reporting period.

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

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

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This 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**

Based on the results of the Remedial Investigation Report, historic fill was encountered at the Site only to a depth of approximately 2 feet. The following contaminants of concern were detected within the historic fill:

#### Soil

- Cadmium and silver exceeding Restricted Residential Use SCOs.

#### Soil vapor

- Chlorinated VOCs including carbon tetrachloride, TCE and PCE detected at low concentrations; and
- Petroleum-related VOCs including BTEX were detected at low concentrations.

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

The information compiled during previous investigations has confirmed the presence of contaminated fill material from surface grade to an approximate depth of 2 feet bgs. Pesticides and metals are present in the historic fill materials throughout the Site. The trace levels of petroleum and chlorinated VOCs identified in the soil vapor were well below guidance issued by New York State DOH and were not found in any of the on-Site soil samples collected.

### **Receptor Populations**

On-Site Receptors – The Site building is currently vacant. Potential on-Site receptors are Site representatives and trespassers. During redevelopment of the Site, the on-Site potential receptors

will include construction workers, Site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents 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

### **Potential Routes of Exposure**

The five elements of an exposure pathway are:

- 1) The source of contamination;
- 2) The environmental media and transport mechanisms - direct contact, ingestion, and inhalation;
- 3) The point of exposure;
- 4) The route of exposure;
- 5) The receptor population.

An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential pathway exists when any one or more of the five elements comprising an exposure pathway cannot be determined. 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, or soil.



## **Potential Points of Exposure**

Existing: Exposure to historic fill is not possible as the site is fully covered with a concrete building slab. Groundwater is not accessible at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site. There is potential for soil vapor to enter the existing building.

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 soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. During remedial action, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the implementation of the Soil/Materials Management Plan, stormwater pollution prevention, dust controls, and through the implementation of the Community Air-Monitoring Program and a Construction Health and Safety Plan.

Proposed Future Conditions: Once the remedial actions and redevelopment of the Site has been completed, there will be no potential on-Site or off-Site exposure pathways. Not only will soil/fill exceeding Site Specific SCOs (Track 4) be removed, but the Site will also be fully covered with a basement concrete slab, which will prevent contact with soil. Any exposures to vapors will be prevented by the installation of a vapor barrier. The Site is served by a public water supply, and groundwater is not used at the Site for potable supply. There are no plausible off-Site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

## **Overall Human Health Exposure Assessment**

Based upon this analysis, complete on-Site exposure pathways appear to be present during the current unremediated and remedial action phase. Under current conditions, on-Site exposure pathways exist for site representatives, employees and others that may access the Site. During remedial action, on-Site and off-Site exposure pathways to contaminated dust from historic fill material will be minimized by preventing access to the Site, through storm water pollution

prevention, dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill or groundwater, as all soil above Site Specific SCOs will have been removed and a vapor barrier system and ventilated indoor parking area system will have been installed as part of development. The vapor barrier system will prevent potential vapor intrusion. The composite cover system and use restrictions will prevent contact with residual soil or groundwater. The continued protection after the remedial action will be achieved by the implementation of site management including periodic inspection and certification of the performance of remedial controls. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure with a site-wide cover cover and a subsurface vapor barrier system.

## **5.0 REMEDIAL ACTION MANAGEMENT**

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

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

### **5.2 Site Security**

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

### **5.3 Work Hours**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## **5.6 Agency Approvals**

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

## **5.7 Site Preparation**

### **Pre-Construction Meeting**

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

### **Mobilization**

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

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

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations 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**

Due to the depth of groundwater, dewatering is not anticipated to be necessary. In the event that dewatering of groundwater or surface water during construction will be necessary, the water will be disposed into the New York City combined sanitary/storm sewer system. A permit to discharge will be obtained from the New York City Department of Environmental Protection (NYCDEP). As part of the permit to discharge, the location of discharge will be based on the Site-Specific requirements of the DEP. The need for pretreatment will be determined by DEP's requirements for the discharge permit. If pretreatment is required by the DEP, it will be performed in accordance with the requirements of the DEP.

### **Equipment and Material Staging**

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

### **Stabilized Construction Entrance**

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

### **Truck Inspection Station**

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

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

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, Arker Companies 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 will be west on West 29<sup>th</sup> Street to Route 9A.

## **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 and the disposal locations of exported materials;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

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

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

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff.

Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

### **5.11 Complaint Management**

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

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

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

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

## 6.0 REMEDIAL ACTION REPORT

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

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan;
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Continued 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, [name], am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the [site name (address)] site, site number [VCP site number]. I certify to the following:

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

Name

PE License Number

Signature

Date

PE Stamp

I, [name], am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the [site name (address)] site, site number [VCP site number]. I certify to the following:

- The OER-approved Remedial Action Work Plan dated August 15, 2012 and Stipulations in a letter dated September 10, 2014 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

Date

## 7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 6 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	1	1
Remedial Excavation	2	8
Demobilization	10	1
Submit Remedial Action Report	20	—

# **TABLES**



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

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

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

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

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

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

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

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

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

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

TABLE 2  
211 West 28th Street,  
New York, New York  
Soil Analytical Results  
Volatile Organic Compounds

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1				B2				B3			
			(0-2')		(2-4')		(0-2')		(2-4')		(0-2')		(2-4')	
			1/26/2015		1/26/2015		1/26/2015		1/26/2015		1/26/2015		1/26/2015	
			µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg		µg/Kg	
			Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
1,1,1,2-Tetrachloroethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,1,1-Trichloroethane	680	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,1,2,2-Tetrachloroethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,1,2-Trichloroethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,1-Dichloroethane	270	26,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,1-Dichloroethene	330	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,1-Dichloropropene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2,3-Trichlorobenzene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2,3-Trichloropropane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2,4-Trichlorobenzene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2,4-Trimethylbenzene	3,600	52,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2-Dibromo-3-chloropropane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2-Dibromomethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2-Dichlorobenzene	1,100	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2-Dichloroethane	20	3,100	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,2-Dichloropropane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,3,5-Trimethylbenzene	8,400	52,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,3-Dichlorobenzene	2,400	4,900	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,3-Dichloropropane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
1,4-Dichlorobenzene	1,800	13,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
2,2-Dichloropropane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
2-Chlorotoluene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
2-Hexanone (Methyl Butyl Ketone)			< 29	29	< 33	33	< 29	29	< 31	31	< 29	29	< 30	30
2-Isopropyltoluene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
4-Chlorotoluene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
4-Methyl-2-Pentanone			< 29	29	< 33	33	< 29	29	< 31	31	< 29	29	< 30	30
Acetone	50	100,000	<b>9.4</b>	50	< 50	50	< 50	50	< 50	50	< 50	50	< 50	50
Acrylonitrile			< 12	12	< 13	13	< 12	12	< 13	13	< 11	11	< 12	12
Benzene	60	4,800	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Bromobenzene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Bromochloromethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Bromodichloromethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Bromoform			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Bromomethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Carbon Disulfide			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Carbon tetrachloride	760	2,400	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Chlorobenzene	1,100	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Chloroethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Chloroform	370	49,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Chloromethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
cis-1,2-Dichloroethene	250	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
cis-1,3-Dichloropropene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Dibromochloromethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Dibromomethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Dichlorodifluoromethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Ethylbenzene	1,000	41,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Hexachlorobutadiene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Isopropylbenzene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
m&p-Xylenes	260	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Methyl Ethyl Ketone (2-Butanone)	120	100,000	< 35	35	< 40	40	< 35	35	< 38	38	< 34	34	< 37	37
Methyl t-butyl ether (MTBE)	930	100,000	< 12	12	< 13	13	< 12	12	< 13	13	< 11	11	< 12	12
Methylene chloride	50	100,000	<b>4.2</b>	5.8	<b>4.1</b>	6.7	<b>3.1</b>	5.9	<b>4.6</b>	6.3	<b>3.9</b>	5.7	<b>3.2</b>	6.1
Naphthalene	12,000	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
n-Butylbenzene	12,000	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
n-Propylbenzene	3,900	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
o-Xylene	260	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
p-Isopropyltoluene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
sec-Butylbenzene	11,000	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Styrene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
tert-Butylbenzene	5,900	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Tetrachloroethene	1,300	19,000	< 5.8	5.8	<b>2.2</b>	6.7	< 5.9	5.9	<b>2.1</b>	6.3	< 5.7	5.7	< 6.1	6.1
Tetrahydrofuran (THF)			< 12	12	< 13	13	< 12	12	< 13	13	< 11	11	< 12	12
Toluene	700	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
trans-1,2-Dichloroethene	190	100,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
trans-1,3-Dichloropropene			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
trans-1,4-dichloro-2-butene			< 12	12	< 13	13	< 12	12	< 13	13	< 11	11	< 12	12
Trichloroethene	470	21,000	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Trichlorofluoromethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Trichlorotrifluoroethane			< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Vinyl Chloride	20	900	< 5.8	5.8	< 6.7	6.7	< 5.9	5.9	< 6.3	6.3	< 5.7	5.7	< 6.1	6.1
Total BTEX Concentration			<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>	
Total VOCs Concentration			<b>13.6</b>		<b>6.3</b>		<b>3.1</b>		<b>6.7</b>		<b>3.9</b>		<b>3.2</b>	

Notes:

\* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

**Bold/highlighted-** Indicated exceedance of the NYSDEC UUSCO Guidance Value

**Bold/highlighted-** Indicated exceedance of the NYSDEC RRSO Guidance Value

Table 3  
211 West 28th Street  
New York, New York  
Soil Analytical Results  
Semi Volatile Organic Compounds

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1				B2				B3			
			(0-2') 1/30/2015 µg/Kg		(2-4') 1/30/2015 µg/Kg		(0-2') 1/30/2015 µg/Kg		(2-4') 1/30/2015 µg/Kg		(0-2') 1/30/2015 µg/Kg		(2-4') 1/30/2015 µg/Kg	
			Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
1,2,4,5-Tetrachlorobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
1,2,4-Trichlorobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
1,2-Dichlorobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
1,2-Diphenylhydrazine			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
1,3-Dichlorobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
1,4-Dichlorobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2,4,5-Trichlorophenol			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2,4,6-Trichlorophenol			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2,4-Dichlorophenol			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2,4-Dimethylphenol			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2,4-Dinitrophenol			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
2,4-Dinitrotoluene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2,6-Dinitrotoluene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2-Chloronaphthalene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2-Chlorophenol			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2-Methylnaphthalene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2-Methylphenol (o-cresol)	330	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
2-Nitroaniline			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
2-Nitrophenol			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
3&4-Methylphenol (m&p-cresol)	330	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
3,3'-Dichlorobenzidine			< 740	740	< 760	760	< 750	750	< 770	770	< 740	740	< 800	800
3-Nitroaniline			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
4,6-Dinitro-2-methylphenol			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
4-Bromophenyl phenyl ether			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
4-Chloro-3-methylphenol			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
4-Chloroaniline			< 740	740	< 760	760	< 750	750	< 770	770	< 740	740	< 800	800
4-Chlorophenyl phenyl ether			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
4-Nitroaniline			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
4-Nitrophenol			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
Acenaphthene	20,000	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Acenaphthylene	100,000	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Acetophenone			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Aniline			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
Anthracene	100,000	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Benz(a)anthracene	1,000	1,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Benzidine			< 740	740	< 760	760	< 750	750	< 770	770	< 740	740	< 800	800
Benzo(a)pyrene	1,000	1,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Benzo(b)fluoranthene	1,000	1,000	< 260	260	< 270	270	< 260	260	<b>130</b>	270	< 260	260	< 280	280
Benzo(ghi)perylene	100,000	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Benzo(k)fluoranthene	800	3,900	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Benzoic acid			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
Benzyl butyl phthalate			<b>810</b>	260	< 270	270	<b>970</b>	260	<b>280</b>	270	< 260	260	< 280	280
Bis(2-chloroethoxy)methane			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Bis(2-chloroethyl)ether			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Bis(2-chloroisopropyl)ether			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Bis(2-ethylhexyl)phthalate			<b>1,800</b>	260	< 270	270	<b>3,300</b>	260	<b>1,600</b>	270	<b>300</b>	260	< 280	280
Carbazole			< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1900	1,900	< 1800	1,800	< 2000	2,000
Chrysene	1,000	3,900	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Dibenz(a,h)anthracene	330	330	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Dibenzofuran	7,000	59,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Diethyl phthalate			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Dimethylphthalate			<b>130</b>	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Di-n-butylphthalate			<b>170</b>	260	< 270	270	<b>810</b>	260	<b>420</b>	270	<b>100</b>	260	< 280	280
Di-n-octylphthalate			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Fluoranthene	100,000	100,000	<b>130</b>	260	< 270	270	< 260	260	<b>170</b>	270	< 260	260	< 280	280
Fluorene	30,000	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Hexachlorobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Hexachlorobutadiene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Hexachlorocyclopentadiene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Hexachloroethane			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Indeno(1,2,3-cd)pyrene	500	500	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Isophorone			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Naphthalene	12,000	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Nitrobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
N-Nitrosodimethylamine			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
N-Nitrosodi-n-propylamine			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
N-Nitrosodiphenylamine			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Pentachloronitrobenzene			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Pentachlorophenol	800	6,700	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Phenanthrene	100,000	100,000	< 260	260	< 270	270	< 260	260	<b>170</b>	270	< 260	260	< 280	280
Phenol	330	100,000	< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280
Pyrene	100,000	100,000	<b>170</b>	260	< 270	270	< 260	260	<b>150</b>	270	< 260	260	< 280	280
Pyridine			< 260	260	< 270	270	< 260	260	< 270	270	< 260	260	< 280	280

Notes:

\* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

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Bold/highlighted- Indicated exceedance of the NYSDEC RRSO Guidance Value

Table 4  
211 West 28th Street  
New York, New York  
Soil Analytical Results  
Pesticides and PCBs

	COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1				B2				B3			
				(0-2') 1/30/2015 µg/Kg		(2-4') 1/30/2015 µg/Kg		(0-2') 1/30/2015 µg/Kg		(2-4') 1/30/2015 µg/Kg		(0-2') 1/30/2015 µg/Kg		(2-4') 1/30/2015 µg/Kg	
				Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Pesticides	4,4' -DDD	3.3	13,000	< 3.0	3.0	<b>4.5</b>	2.3	< 2.3	2.3	<b>12</b>	2.3	< 2.2	2.2	< 2.4	2.4
	4,4' -DDE	3.3	8,900	<b>30</b>	2.3	< 2.3	2.3	<b>40</b>	2.3	<b>31</b>	2.3	< 2.2	2.2	< 2.4	2.4
	4,4' -DDT	3.3	7,900	<b>33</b>	2.3	<b>59</b>	2.3	<b>73</b>	11	<b>140</b>	12	<b>3.8</b>	2.2	< 2.4	2.4
	a-BHC	20	480	< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	a-Chlordane	94	4,200	< 3.8	3.8	< 3.8	3.8	< 10	10	< 3.9	3.9	< 3.7	3.7	< 3.9	3.9
	Aldrin	5	97	< 3.8	3.8	< 3.8	3.8	<b>4.1</b>	3.8	< 3.9	3.9	< 3.7	3.7	< 3.9	3.9
	b-BHC	36	360	< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Chlordane	94	4,200	< 38	38	< 38	38	< 38	38	< 39	39	< 37	37	< 39	39
	d-BHC	40	100,000	< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Dieldrin	5	200	< 3.8	3.8	< 3.8	3.8	<b>23</b>	3.8	<b>24</b>	3.9	< 3.7	3.7	< 3.9	3.9
	Endosulfan I	2,400	24,000	< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Endosulfan II	2,400	24,000	< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Endosulfan sulfate	2,400	24,000	< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Endrin	14	11,000	< 7.6	7.6	<b>33</b>	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Endrin aldehyde			< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Endrin ketone			< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	g-BHC			< 2.0	2.0	< 1.5	1.5	< 3.0	3.0	<b>14</b>	2.5	< 3.2	3.2	< 1.6	1.6
	g-Chlordane			< 3.8	3.8	< 3.8	3.8	< 10	10	< 3.9	3.9	< 3.7	3.7	< 3.9	3.9
	Heptachlor	42	2,100	< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
	Heptachlor epoxide			< 7.6	7.6	< 7.6	7.6	< 7.6	7.6	< 7.8	7.8	< 7.4	7.4	< 7.9	7.9
PCBs	Methoxychlor			< 38	38	< 38	38	< 38	38	< 39	39	< 37	37	< 39	39
	Toxaphene			< 150	150	< 150	150	< 150	150	< 160	160	< 150	150	< 160	160
	PCB-1016	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1221	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1232	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1242	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1248	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1254	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1260	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1262	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39
	PCB-1268	100	1,000	< 38	38	< 39	39	< 38	38	< 38	38	< 37	37	< 39	39

**Notes:**

\* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

**Bold/highlighted-** Indicated exceedance of the NYSDEC UUSCO Guidance Value

**Bold/highlighted-** Indicated exceedance of the NYSDEC RRSCO Guidance Value

Table 5  
211 West 28th Street  
New York, New York  
Soil Analytical Results  
Total Metals

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives*	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1				B2				B3			
			(0-2') 1/30/2015 mg/Kg		(2-4') 1/30/2015 mg/Kg		(0-2') 1/30/2015 mg/Kg		(2-4') 1/30/2015 mg/Kg		(0-2') 1/30/2015 mg/Kg		(2-4') 1/30/2015 mg/Kg	
			Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Aluminum			<b>7,840</b>	38	<b>6,050</b>	42	<b>7,810</b>	39	<b>7,510</b>	41	<b>5,530</b>	38	<b>8,400</b>	41
Antimony			< 1.9	1.9	< 2.1	2.1	< 2.0	2.0	<b>2.8</b>	2.1	< 1.9	1.9	< 2.0	2.0
Arsenic	13	16	<b>5.1</b>	0.8	<b>3.3</b>	0.8	<b>4.7</b>	0.8	<b>5.5</b>	0.8	<b>6</b>	0.8	<b>4.7</b>	0.8
Barium	350	350	<b>243</b>	0.8	<b>47.7</b>	0.8	<b>84.9</b>	0.8	<b>88.8</b>	0.8	<b>90.4</b>	0.8	<b>62.7</b>	0.8
Beryllium	7.2	14	<b>0.4</b>	0.31	<b>0.35</b>	0.34	<b>0.41</b>	0.31	<b>0.37</b>	0.33	<b>0.33</b>	0.31	<b>0.44</b>	0.33
Cadmium	2.5	2.5	<b>0.49</b>	0.38	< 0.42	0.42	<b>1.81</b>	0.39	<b>5.01</b>	0.41	<b>0.2</b>	0.38	< 0.41	0.41
Calcium			<b>44,900</b>	38	<b>4,960</b>	4.2	<b>34,500</b>	39	<b>43,400</b>	41	<b>27,200</b>	38	<b>3,170</b>	4.1
Chromium	30	180	<b>22.2</b>	0.38	<b>15.1</b>	0.42	<b>23.4</b>	0.39	<b>33.1</b>	0.41	<b>24.3</b>	0.38	<b>13.5</b>	0.41
Cobalt			<b>6.15</b>	0.38	<b>5.36</b>	0.42	<b>8.04</b>	0.39	<b>6.51</b>	0.41	<b>5.53</b>	0.38	<b>8.25</b>	0.41
Copper	50	270	<b>60.3</b>	0.38	<b>20.4</b>	0.42	<b>64.7</b>	0.39	<b>86.7</b>	0.41	<b>48.7</b>	0.38	<b>21.2</b>	0.41
Iron			<b>12,900</b>	38	<b>10,200</b>	42	<b>14,300</b>	39	<b>17,800</b>	41	<b>9,470</b>	3.8	<b>14,700</b>	41
Lead	63	400	<b>328</b>	7.7	<b>36.5</b>	0.8	<b>77.4</b>	0.8	<b>160</b>	0.8	<b>169</b>	7.7	<b>11.8</b>	0.8
Magnesium			<b>5,350</b>	3.8	<b>3,160</b>	4.2	<b>8,730</b>	39	<b>10,500</b>	41	<b>4,710</b>	3.8	<b>3,890</b>	4.1
Manganese	1,600	2,000	<b>289</b>	3.8	<b>106</b>	4.2	<b>225</b>	3.9	<b>209</b>	4.1	<b>216</b>	3.8	<b>128</b>	4.1
Mercury	0.18	0.81	<b>0.2</b>	0.03	<b>0.05</b>	0.03	<b>0.26</b>	0.03	<b>0.4</b>	0.03	<b>0.17</b>	0.03	< 0.03	0.03
Nickel	30	140	<b>27.1</b>	0.38	<b>21.4</b>	0.42	<b>24</b>	0.39	<b>26.6</b>	0.41	<b>18.9</b>	0.38	<b>22.5</b>	0.41
Potassium			<b>1,690</b>	8	<b>901</b>	8	<b>1,540</b>	8	<b>1,290</b>	8	<b>3,540</b>	8	<b>938</b>	8
Selenium	3.9	36	< 1.5	1.5	< 1.7	1.7	< 1.6	1.6	< 1.7	1.7	< 1.5	1.5	< 1.6	1.6
Silver	2	36	<b>47.4</b>	3.8	<b>1.44</b>	0.42	<b>185</b>	3.9	<b>316</b>	4.1	<b>2.81</b>	0.38	< 0.41	0.41
Sodium			<b>730</b>	8	<b>196</b>	8	<b>665</b>	8	<b>530</b>	8	<b>1,980</b>	8	<b>127</b>	8
Thallium			< 1.5	1.5	< 1.7	1.7	< 1.6	1.6	< 1.7	1.7	< 1.5	1.5	< 1.6	1.6
Vanadium			<b>19.8</b>	0.4	<b>17.5</b>	0.4	<b>19.2</b>	0.4	<b>19.2</b>	0.4	<b>18.2</b>	0.4	<b>17.2</b>	0.4
Zinc	109	2,200	<b>198</b>	7.7	<b>45.4</b>	0.8	<b>175</b>	7.9	<b>264</b>	8.3	<b>115</b>	0.8	<b>39.3</b>	0.8

**Notes:**

\* - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

RL - Reporting Limit

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**Bold/highlighted-** Indicated exceedance of the NYSDEC RRSO Guidance Value

TABLE 6  
211 West 28th Street,  
New York, New York  
Soil Gas - Volatile Organic Compounds

COMPOUNDS	NYSDOH Maximum Sub-Slab Value ( $\mu\text{g}/\text{m}^3$ ) <sup>(a)</sup>	NYSDOH Soil Outdoor Background Levels ( $\mu\text{g}/\text{m}^3$ ) <sup>(b)</sup>	SS-1 ( $\mu\text{g}/\text{m}^3$ )		SS-2 ( $\mu\text{g}/\text{m}^3$ )		SS-3 ( $\mu\text{g}/\text{m}^3$ )	
			Result	RL	Result	RL	Result	RL
1,1,1,2-Tetrachloroethane			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1,1-Trichloroethane	100	<2.0 - 2.8	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1,2,2-Tetrachloroethane		<1.5	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1,2-Trichloroethane		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1-Dichloroethane		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,1-Dichloroethene		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2,4-Trichlorobenzene		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2,4-Trimethylbenzene		<1.0	<b>16.9</b>	1.00	<b>7.42</b>	1.00	<b>10.2</b>	1.00
1,2-Dibromoethane		<1.5	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichlorobenzene		<2.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichloroethane		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichloropropane			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,2-Dichlorotetrafluoroethane			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,3,5-Trimethylbenzene		<1.0	<b>4.27</b>	1.00	<b>1.92</b>	1.00	<b>2.55</b>	1.00
1,3-Butadiene		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,3-Dichlorobenzene		<2.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,4-Dichlorobenzene		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
1,4-Dioxane			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
2-Hexanone			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
4-Ethyltoluene		NA	<b>5.11</b>	1.00	<b>1.13</b>	1.00	<b>1.47</b>	1.00
4-Isopropyltoluene			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
4-Methyl-2-pentanone			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Acetone		NA	<b>18</b>	1.00	<b>8.36</b>	1.00	<b>28.5</b>	1.00
Acrylonitrile			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Benzene		<1.6 - 4.7	<b>7.22</b>	1.00	< 1.00	1.00	<b>3.42</b>	1.00
Benzyl Chloride		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Bromodichloromethane		<5.0	< 1.00	1.00	<b>3.75</b>	1.00	< 1.00	1.00
Bromoform		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Bromomethane		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Carbon Disulfide		NA	<b>1.09</b>	1.00	< 1.00	1.00	<b>1.18</b>	1.00
Carbon Tetrachloride	5	<3.1	<b>0.44</b>	0.25	<b>0.38</b>	0.25	<b>0.31</b>	0.25
Chlorobenzene		<2.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Chloroethane		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Chloroform		<2.4	<b>1.81</b>	1.00	<b>67.3</b>	1.00	< 1.00	1.00
Chloromethane		<1.0 - 1.4	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
cis-1,2-Dichloroethene		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
cis-1,3-Dichloropropene		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Cyclohexane		NA	<b>1.58</b>	1.00	< 1.00	1.00	<b>1.17</b>	1.00
Dibromochloromethane		<5.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Dichlorodifluoromethane		NA	<b>2.82</b>	1.00	<b>1.38</b>	1.00	<b>2.97</b>	1.00
Ethanol			<b>74.9</b>	1.00	<b>27.5</b>	1.00	<b>81</b>	1.00
Ethyl Acetate		NA	<b>1.98</b>	1.00	<b>1.76</b>	1.00	<b>1.91</b>	1.00
Ethylbenzene		<4.3	<b>17.2</b>	1.00	<b>2.26</b>	1.00	<b>3.95</b>	1.00
Heptane		NA	<b>7.62</b>	1.00	< 1.00	1.00	<b>3.11</b>	1.00
Hexachlorobutadiene		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Hexane		<1.5	<b>3.95</b>	1.00	< 1.00	1.00	<b>2.18</b>	1.00
Isopropylalcohol		NA	<b>6.26</b>	1.00	<b>3.86</b>	1.00	<b>18.8</b>	1.00
Isopropylbenzene			<b>1.03</b>	1.00	< 1.00	1.00	< 1.00	1.00
Xylene (m&p)		<4.3	<b>64.7</b>	1.00	<b>8.81</b>	1.00	<b>14.7</b>	1.00
Methyl Ethyl Ketone			<b>1.53</b>	1.00	< 1.00	1.00	<b>2.36</b>	1.00
MTBE		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Methylene Chloride		<3.4	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
n-Butylbenzene			<b>2.3</b>	1.00	< 1.00	1.00	<b>1.54</b>	1.00
Xylene (o)		<4.3	<b>19.4</b>	1.00	<b>3.6</b>	1.00	<b>5.16</b>	1.00
Propylene		NA	< 1.00	1.00	< 1.00	1.00	<b>2.36</b>	1.00
sec-Butylbenzene			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Styrene		<1.0	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Tetrachloroethene	100		<b>2.91</b>	0.25	<b>7.39</b>	0.25	<b>4.95</b>	0.25
Tetrahydrofuran		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Toluene		1.0 - 6.1	<b>55.4</b>	1.00	<b>5.69</b>	1.00	<b>17.6</b>	1.00
trans-1,2-Dichloroethene		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
trans-1,3-Dichloropropene		NA	< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Trichloroethene	5	<1.7	< 0.25	0.25	<b>1.72</b>	0.25	< 0.25	0.25
Trichlorofluoromethane		NA	<b>1.52</b>	1.00	< 1.00	1.00	<b>1.68</b>	1.00
Trichlorotrifluoroethane			< 1.00	1.00	< 1.00	1.00	< 1.00	1.00
Vinyl Chloride		<1.0	< 0.25	0.25	< 0.25	0.25	< 0.25	0.25
<b>BTEX</b>			<b>163.92</b>		<b>20.36</b>		<b>44.83</b>	
<b>Total VOCs</b>			<b>294.24</b>		<b>145.67</b>		<b>205.66</b>	

Notes:

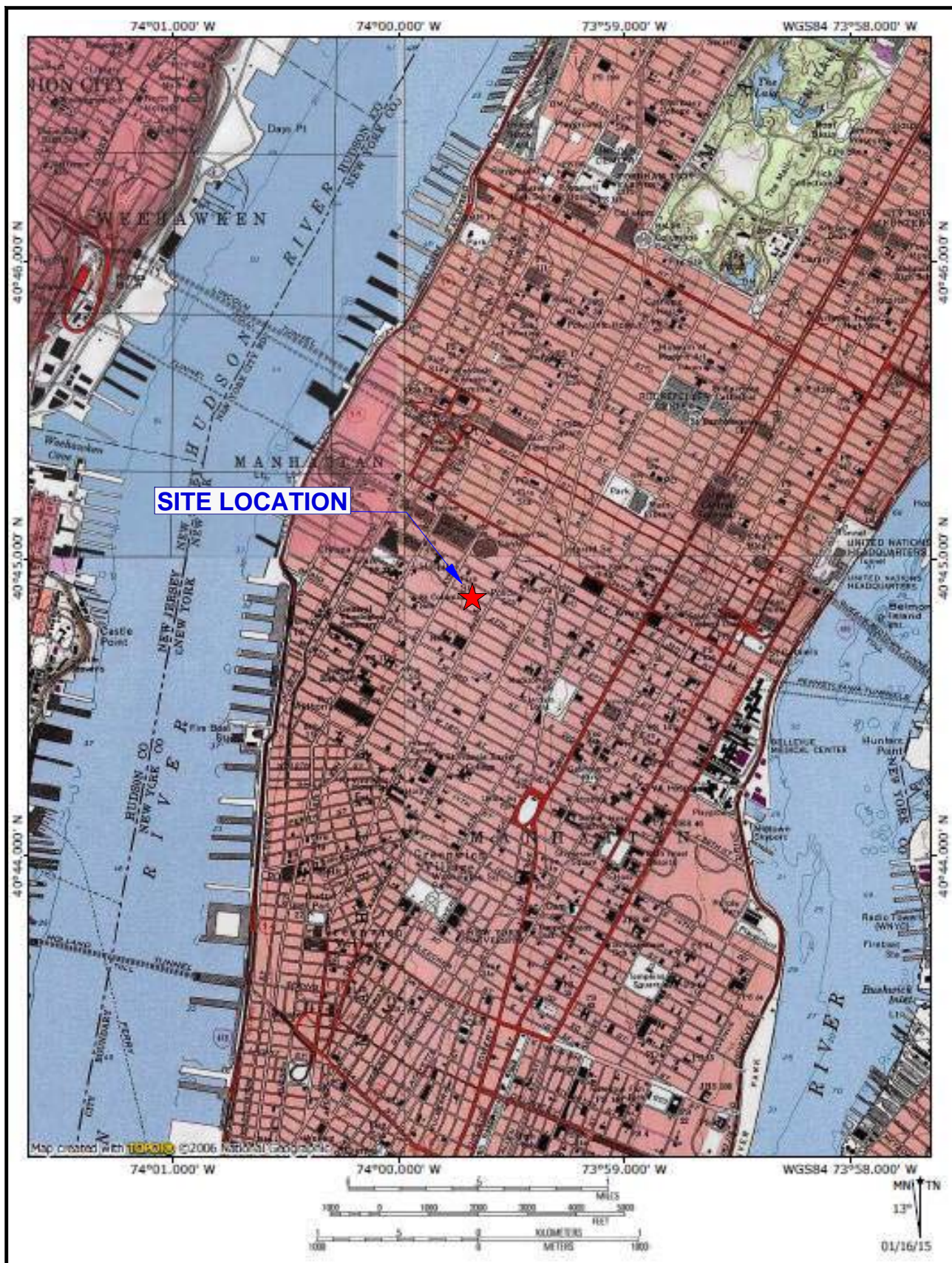
NA No guidance value or standard available

(a) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October 2006. New York State Department of Health.

(b) NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, February 2005, Summary of Background Levels for Selected Compounds (NYSDOH

# **FIGURES**





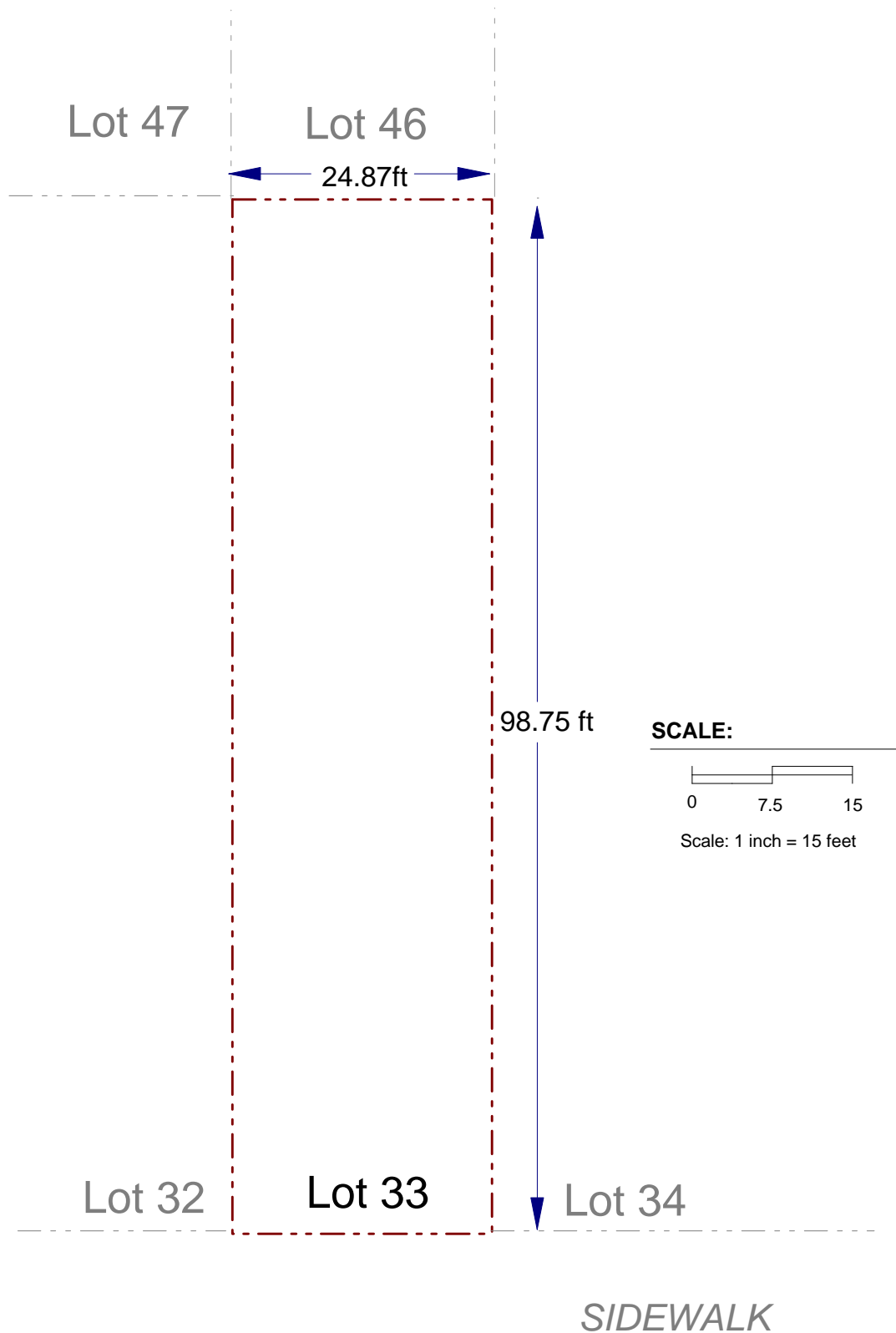
Environmental Business Consultants

Phone 631.504.6000  
Fax 631.924.2870

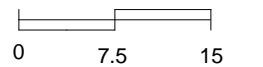
211 West 28th Street, Manhattan, NY

**FIGURE 1**

Site Location Map



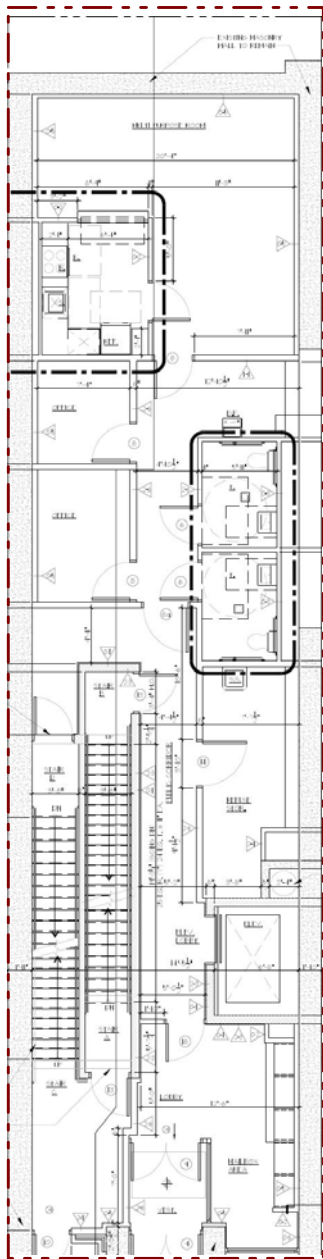
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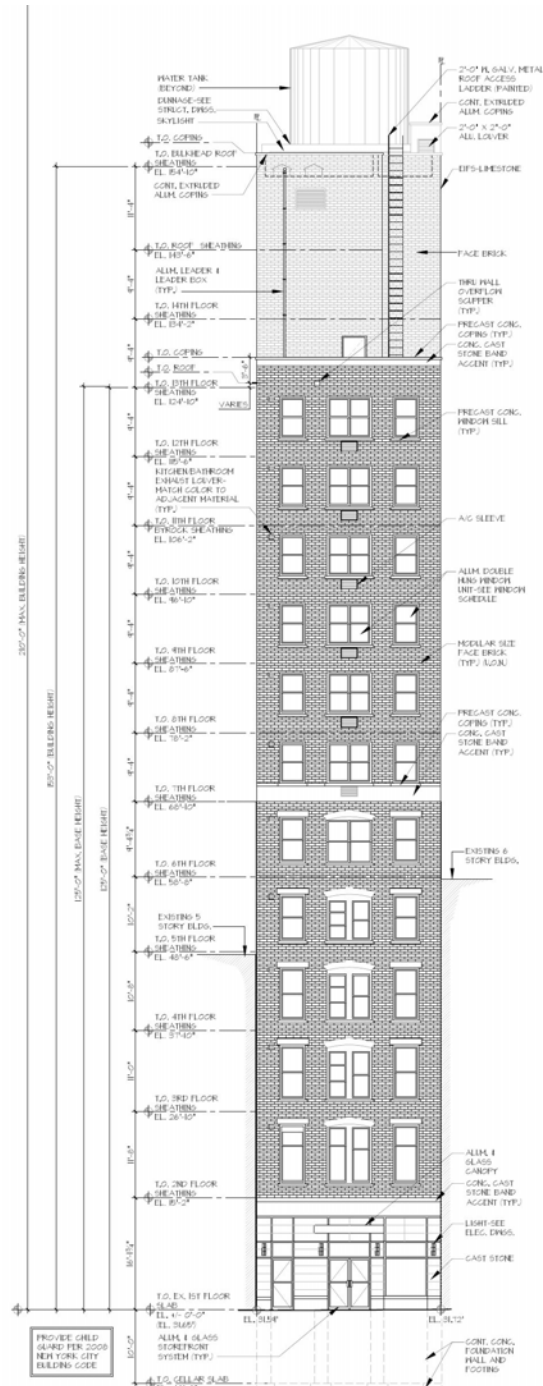
Scale: 1 inch = 15 feet



# CELLAR FLOOR PLAN



# FRONT ELEVATION PLAN



WEST 28th STREET

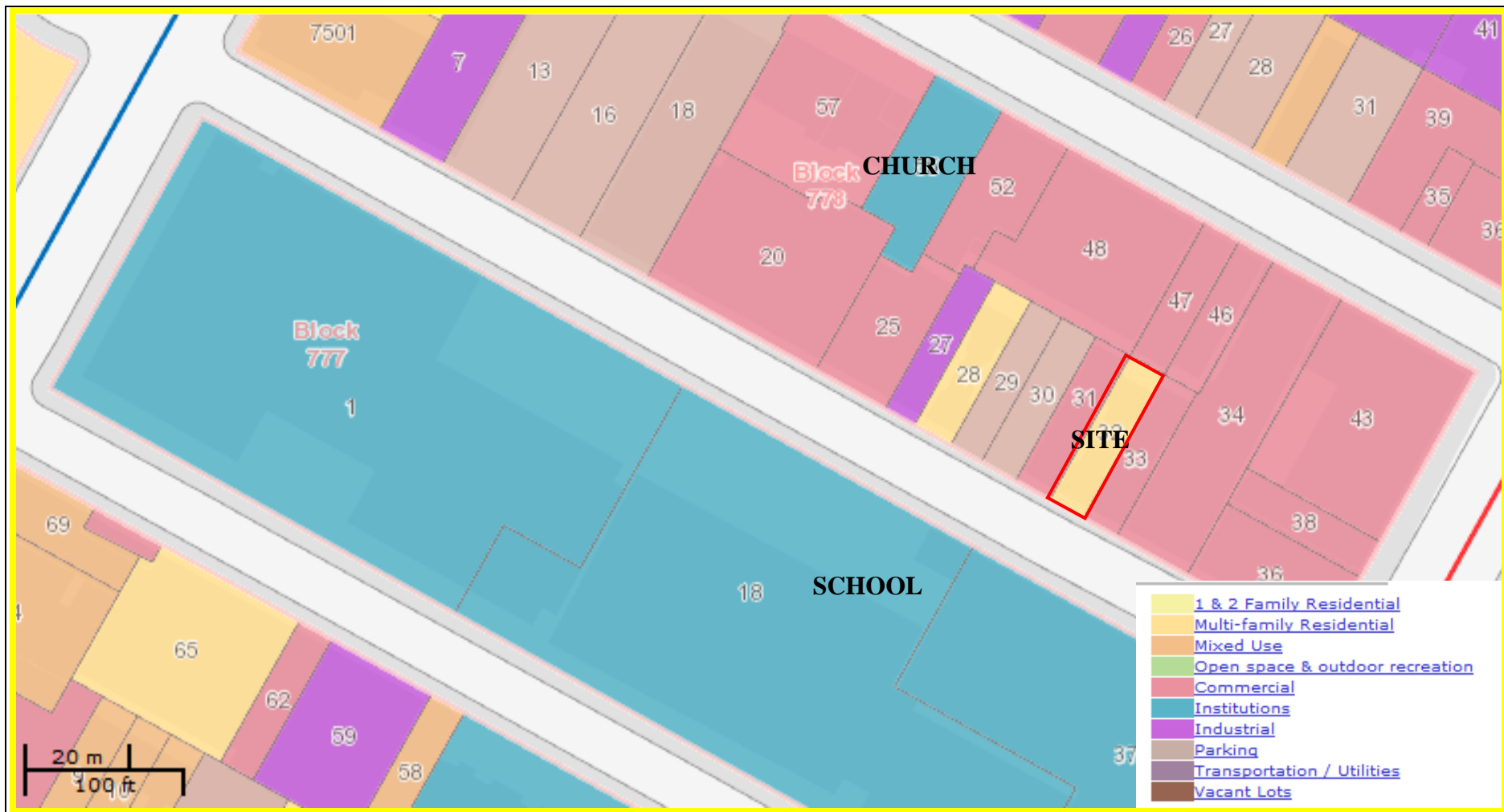


Environmental Business Consultants

Phone 631.504.6000  
Fax 631.924.2870

Figure No.  
**3**

Site Name: **Redevelopment Project**  
Site Address: **211 West 28th Street, Brooklyn, NY**  
Drawing Title: **Redevelopment Plan**



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

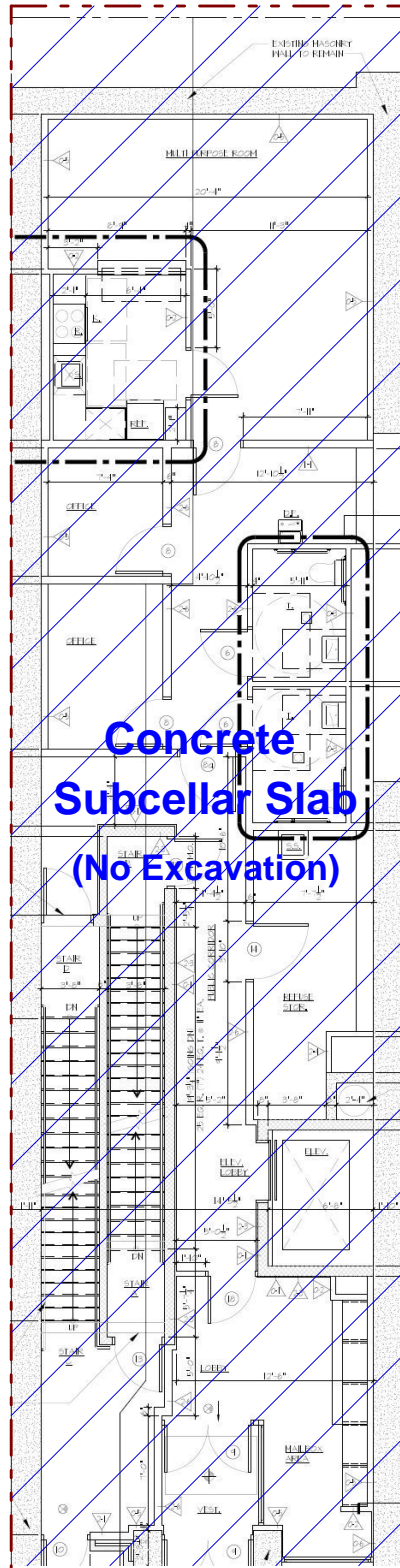
211 WEST 28<sup>th</sup> STREET, MANHATTAN NY 10001  
HAZARDOUS MATERIALS REMEDIAL INVESTIGATION REPORT

**EBC**

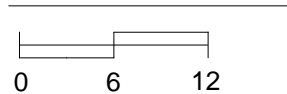
**ENVIRONMENTAL BUSINESSS CONSULTANTS**

1808 Middle Country Road, Ridge, New York 11961

Phone: (631) 504-6000 Fax: (631) 924-2870



**SCALE:**



Scale: 1 inch = 12 feet

SIDWALK

**WEST 28th STREET**

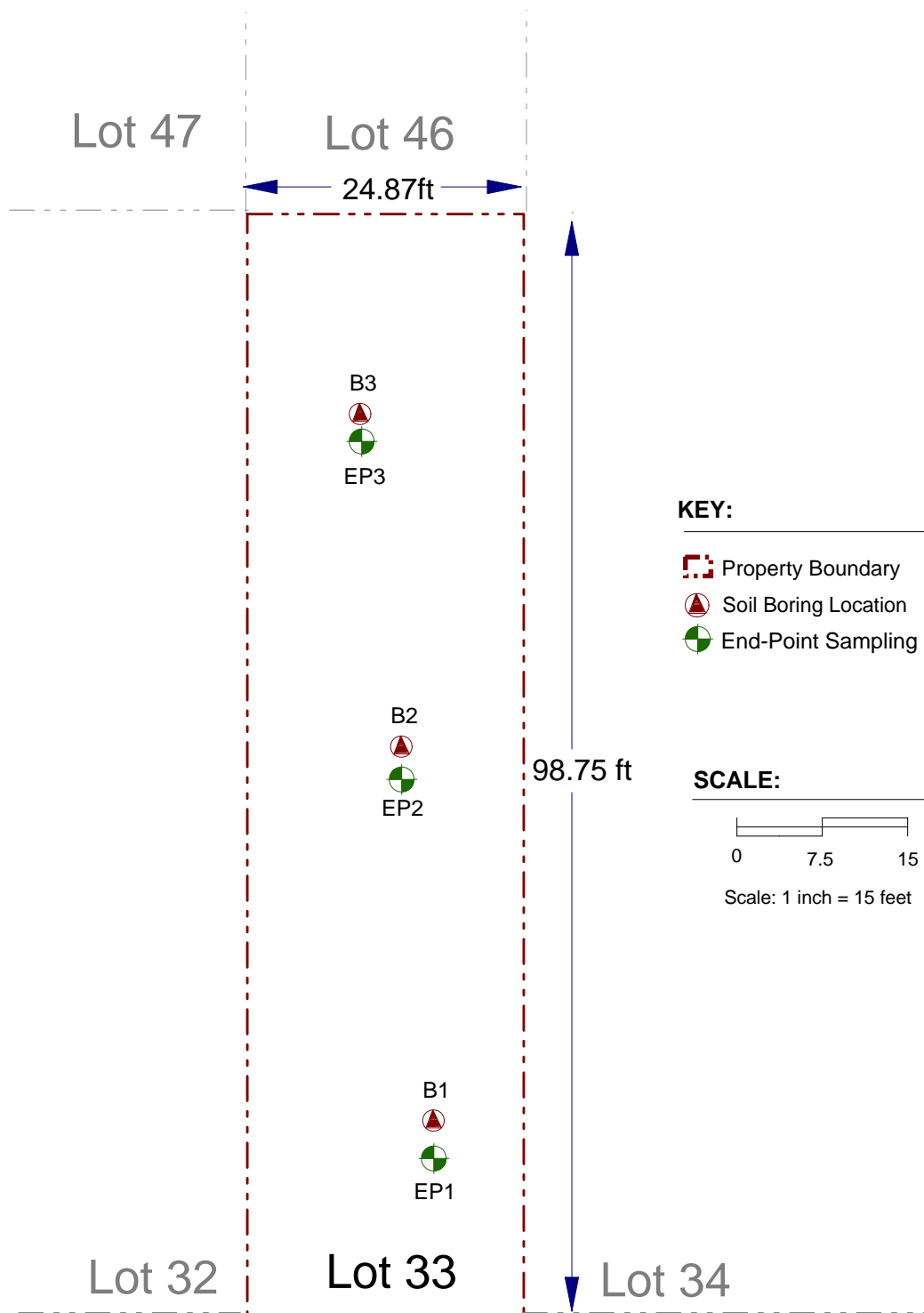
**BC**

ENVIRONMENTAL BUSINESS CONSULTANTS

Phone 631.504.6000  
Fax 631.924.2870

**Figure No.**  
**5**

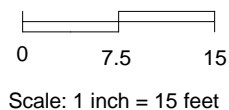
Site Name: **REDEVELOPMENT PROJECT**  
Site Address: **211 WEST 28TH STREET, BROOKLYN, NY**  
Drawing Title: **EXCAVATION & CAPPING PLAN**



**KEY:**

- Property Boundary
- Soil Boring Location
- End-Point Sampling Locations

**SCALE:**



SIDEWALK

WEST 28th STREET

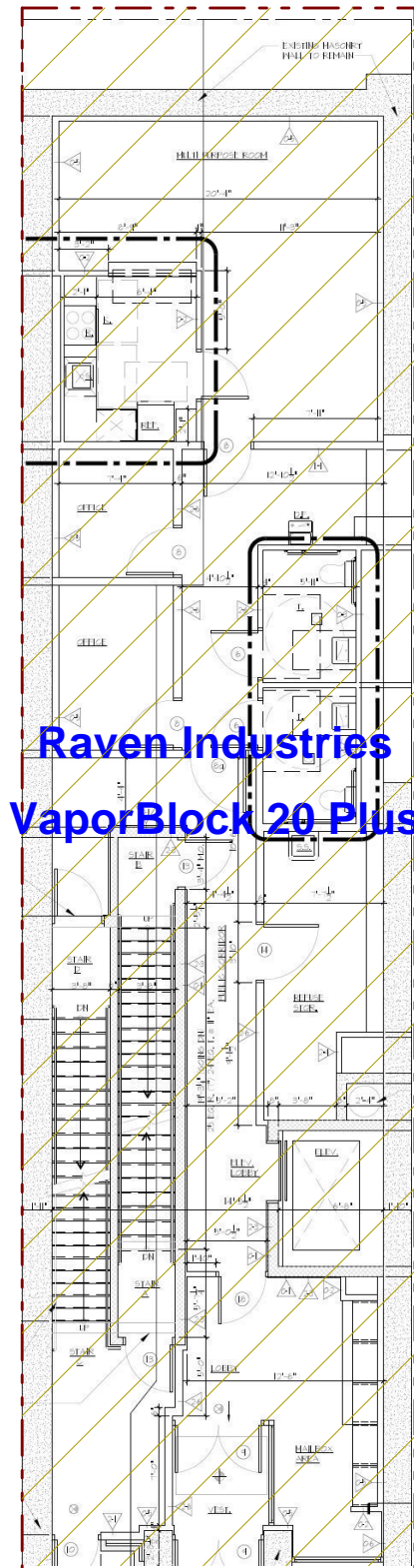


Environmental Business Consultants

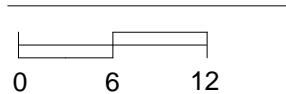
Phone 631.504.6000  
Fax 631.924.2870

Figure No.  
**6**

Site Name:	Redevelopment Project
Site Address:	211 West 28th Street, Manhattan, NY
Drawing Title:	End-Point Sampling Locations



**SCALE:**



Scale: 1 inch = 12 feet

SIDWALK

**WEST 28th STREET**

**BC**

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Phone 631.504.6000  
Fax 631.924.2870

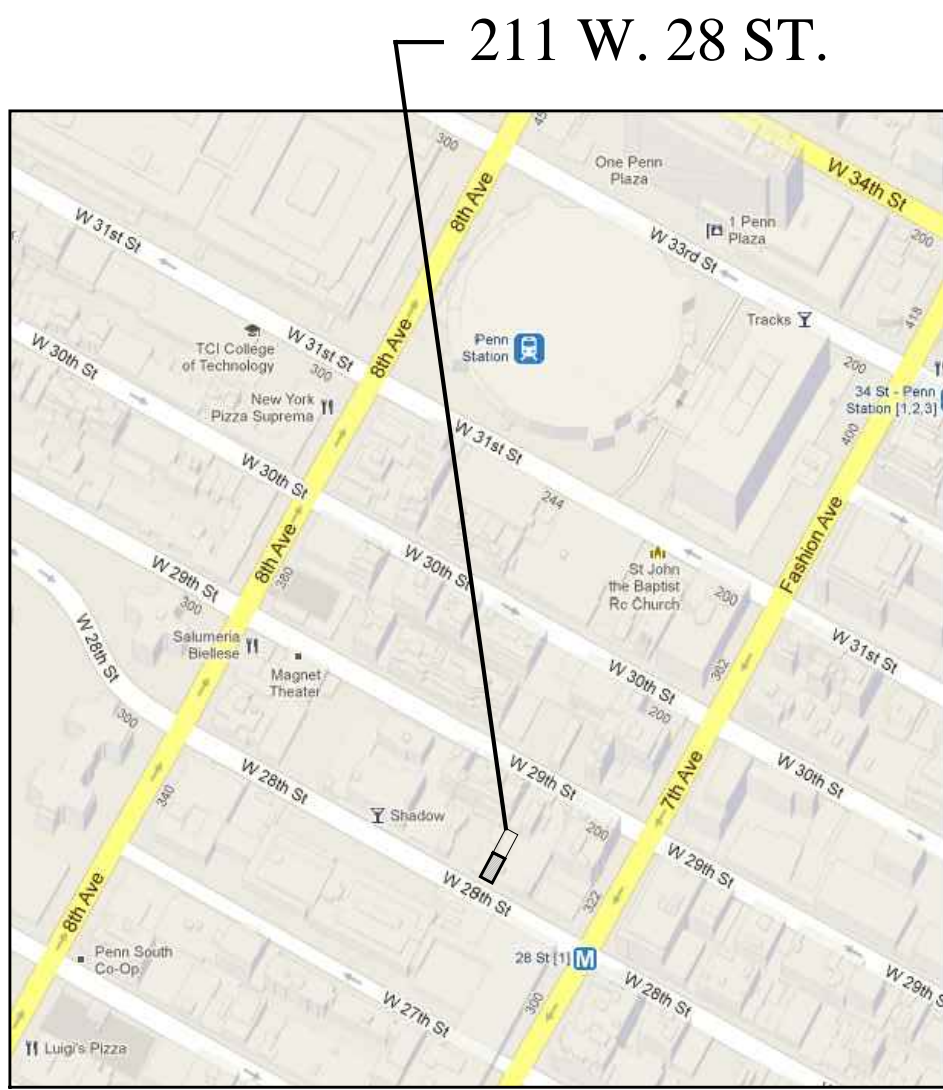
**Figure No.**  
**7**

Site Name:	REDEVELOPMENT PROJECT
Site Address:	211 WEST 28TH STREET, BROOKLYN, NY
Drawing Title:	VAPOR BARRIER PLAN

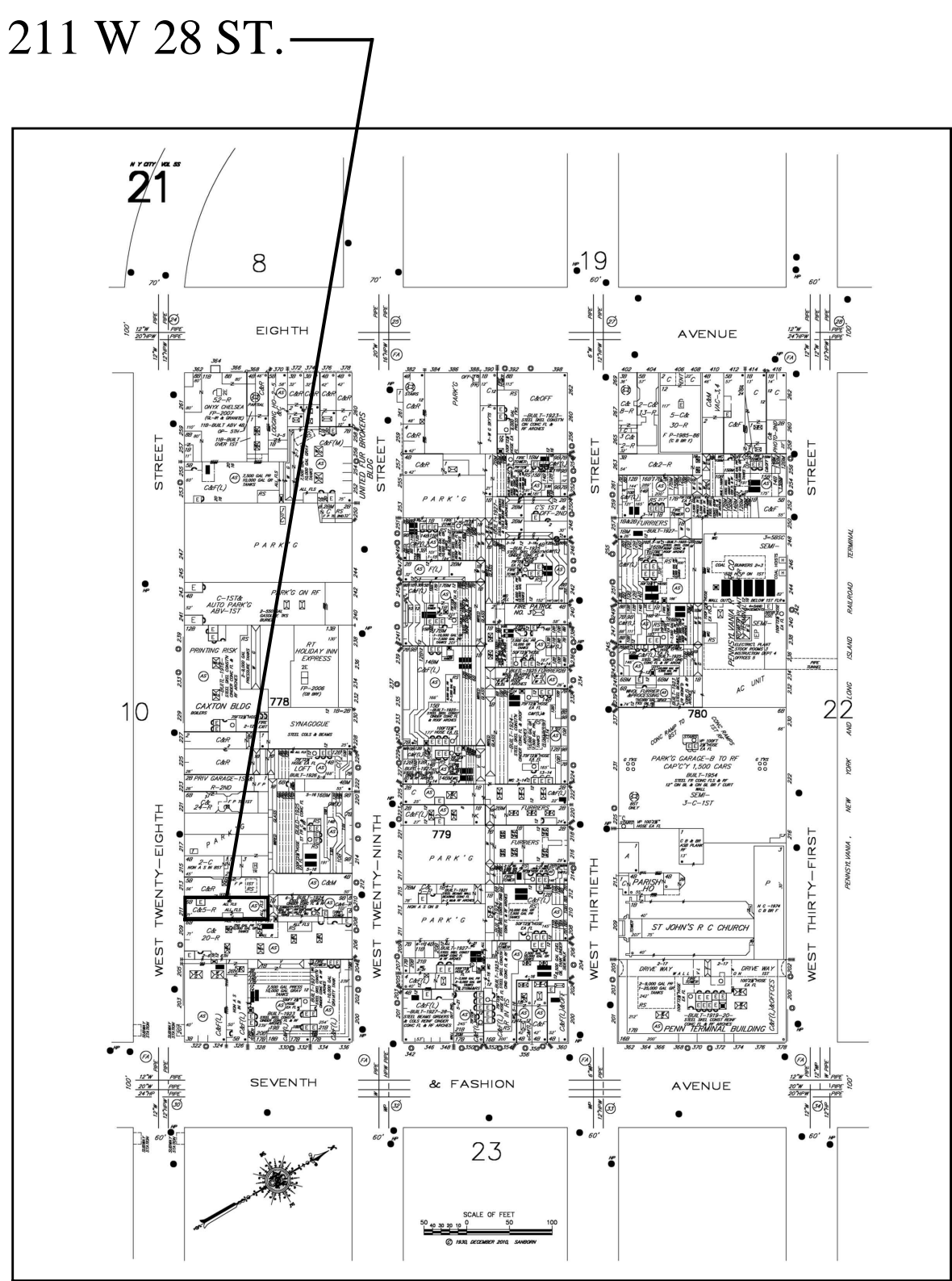
**ATTACHMENT A**  
**PROPOSED DEVELOPMENT PLANS**



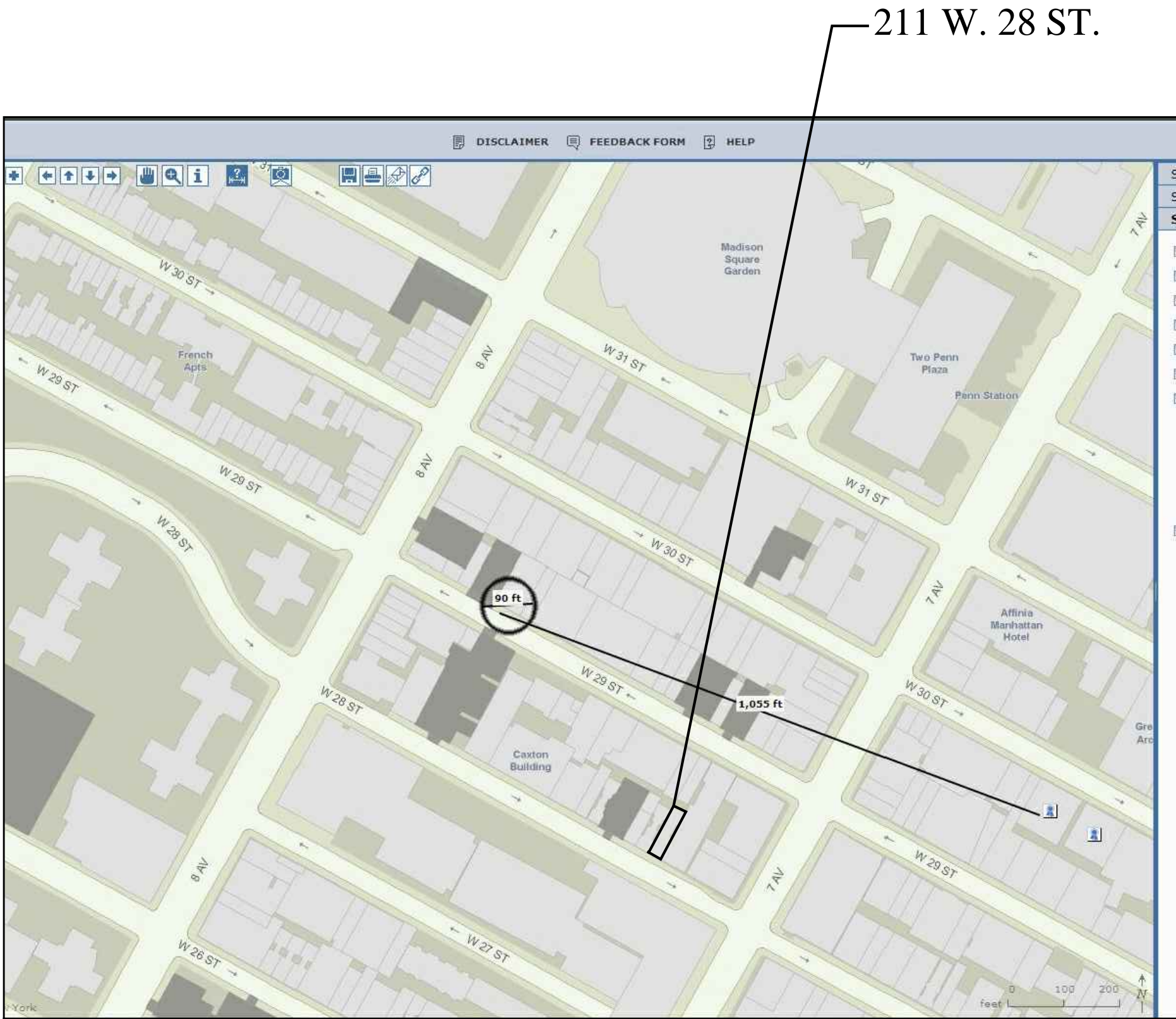
PROPOSED ALTERATION FOR:  
211 WEST 28TH STREET  
NEW YORK , NEW YORK



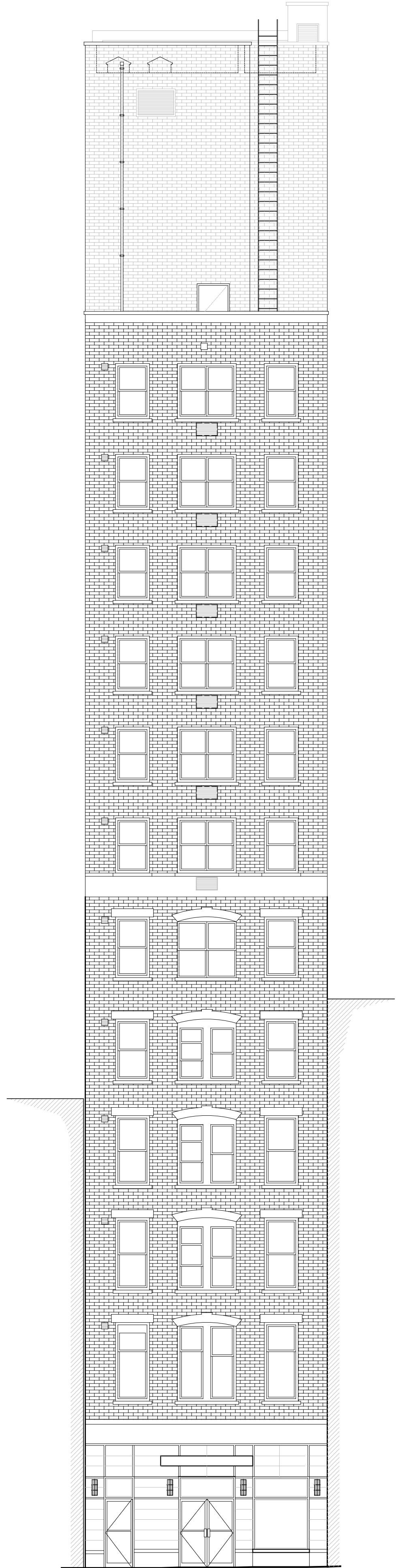
LOCATION MAP  
NOT TO SCALE



SANBORN MAP  
NOT TO SCALE



LANDMARK LOCATION MAP - ALL INFORMATION SHOWN HAS BEEN TAKEN FROM TAKEN FROM THE  
NYC ZONING AND LAND USE MAP



211 W. 28TH ST - BLOCK #778 - LOT #33

DRAWING SCHEDULE:

ARCHITECTURAL:

- T-001 COVER SHEET
- C-001 SURVEY
- C-002 SCHEMATIC SITE PLAN
- Z-001 ZONING ANALYSIS
- EN-001 ENERGY ANALYSIS
- EN-002 ENERGY ANALYSIS
- A-001 GENERAL NOTES
- A-002 ACCESSIBILITY DIAGRAMS & NOTES
- A-003 EGRESS PLANS
- A-004 EGRESS PLANS
- A-005 EGRESS PLANS
- A-006 EGRESS PLANS
- A-100 CELLAR & 1ST FLOOR PLANS
- A-101 2ND, 3RD THRU 12TH FLOOR PLANS
- A-102 13TH & 14TH FLOOR PLANS
- A-103 ROOF & BULKHEAD ROOF PLANS
- A-200 EXTERIOR BUILDING ELEVATIONS
- A-201 EXTERIOR BUILDING ELEVATIONS
- A-202 BUILDING CROSS SECTION
- A-400 TYPICAL WALL SECTION
- A-500 KITCHEN PLANS & ELEVATIONS
- A-501 BATHROOM PLANS & ELEVATIONS

APARTMENT DISTRIBUTION				UFAS COMPLIANCE CHART		
FLOOR	0 BR	1BR	TOTAL	FLOOR	UNIT TYPE	# OF UFAS ACCESSIBLE
1				1		0
2	3		3	2		0
3	3		3	3		0
4	3		3	4	TYPE B (0BR)	1
5	3		3	5		0
6	3		3	6		0
7	3		3	7		0
8	3		3	8	TYPE B (0BR)	0
9	3		3	9		0
10	3		3	10		0
11	3		3	11		0
12	3		3	12	TYPE B (0BR)	1
13	2		2	13		0
14		1	1	14		0
ROOF				ROOF		0
TOTAL	35	1	36	TOTAL		2
				PERCENT		6%



THIS SITE DOES NOT FALL UNDER A FLOOD HAZARD AS PER  
FLOOD INSURANCE RATE MAP #3604970201F

PROPOSED ALTERATION FOR:

211 WEST 28TH  
STREET  
NEW YORK, N.Y.

BLOCK: 778

LOT: 33

ARCHITECT:

AUFGANG ARCHITECTS LLC  
49 NORTH AIRMONT RD.  
SUFFERN, NY  
INFO@AUFANG.COM 845.368.0004

AUFANG  
ARCHITECTS

OWNER:

THE ARBER COMPANIES  
15 VERBENA AVENUE  
FLORAL PARK, NY 11001  
516.277.9300

STRUCTURAL ENGINEER:

BROOKER ENGINEERING, PLLC  
76 LAFAYETTE AVENUE  
SUFFERN, NY 10901  
845.357.4411

MEP ENGINEER:

DIBARI ENGINEERING, P.C.  
99 MAIN STREET  
DOBBS FERRY, NY 10522  
914.479.9705

01-30-15	ISSUED TO HPD FOR REVIEW & COMMENT
01-30-15	ISSUED TO DOB FOR REVIEW & COMMENT
DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:

COVER SHEET

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SEAL & SIGNATURE

ISSUE DATE: PROJECT NO: #1432

DRAWN BY: SJL CHECKED BY:

SCALE: AS NOTED SHEET NO: 1 of 22

DRAWING NO:

T-001.00

NYC DOB NUMBER:



211 WEST 28TH STREET  
NEW YORK, N.Y.

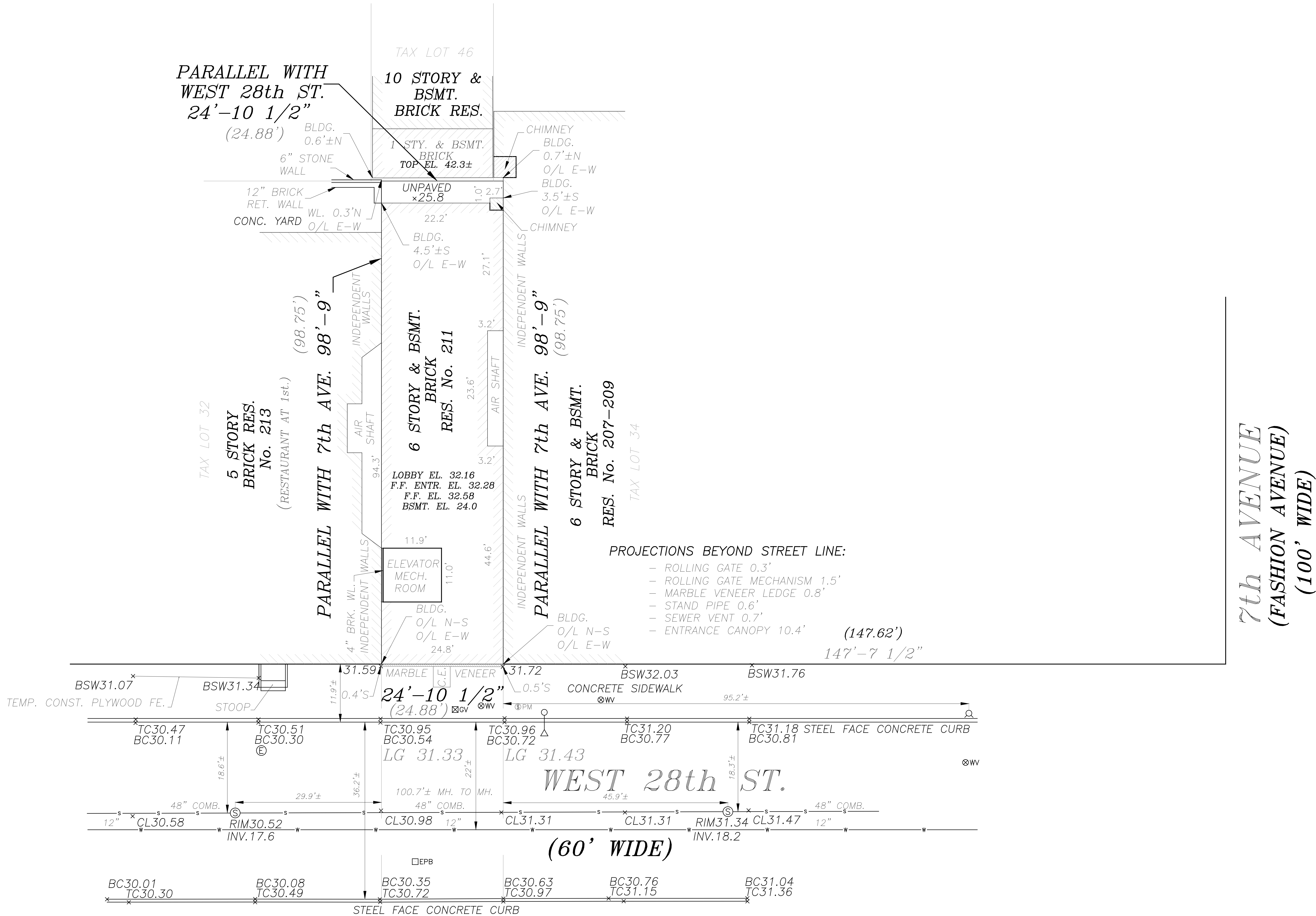
BLOCK: 778 LOT: 33  
ARCHITECT:  
AUFGANG ARCHITECTS LLC  
49 NORTH AIRMONT RD.  
SUFFERN, NY  
INFO@AUFANG.COM 845.368.0004

OWNER:  
THE ARBER COMPANIES  
15 VERBEENA AVENUE  
FLORAL PARK, NY 11001  
516.277.9300

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845.357.4411

MEP ENGINEER:  
DIBARI ENGINEERING, P.C.  
99 MAIN STREET  
DOBBS FERRY, NY 10522  
914.479.9705

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SURVEY  
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01-30-15	ISSUED TO DOB FOR REVIEW & COMMENT
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ISSUE DATE:	PROJECT NO:
01-30-15	#1432
DRAWN BY:	CHECKED BY:
SJL	
SCALE:	SHEET NO:
AS NOTED	2 of 22
DRAWING NO:	

C-001.00

NYC DOB NUMBER:



1. ALL FILL USED BELOW SLABS UNDER BUILDINGS AND IN PAVED AREAS SHALL BE QUALITY SANDY LOESS OF 95% DENSITY TO BE COMPACTED BY 10 LAYERS TO 95% DENSITY TO PREVENT SETTLEMENT AS PER ASTM D1557 METHOD C.
2. CONTRACTOR MUST ALSO FOLLOW ALL REQUIREMENTS FOR EROSION CONTROL, SLOPE STABILIZATION, PROOF ROLLING, AND FILL REPLACEMENT RECOMMENDED BY A REPORT ON SOIL AND FOUNDATION INVESTIGATION.
3. ALL FILL SHALL BE COMPACTED WITH SOIL COMPACTION EQUIPMENT RATHER THAN BY HAND TAMPING (EXCEPT AROUND PIPES ETC.)
4. ALL FILL OF 95% DENSITY OR GREATER SHALL BE COMPATIBLE WITH THE TYPE OF COMPACTION EQUIPMENT USED.
5. ALL AREAS OF SPECIFIED DENSITIES SHALL BE VERIFIED BY FIELD DENSITY TESTS MADE BY AN INDEPENDENT TESTING LABORATORY ON EACH LAYER OF MATERIAL COMPACTED ONE TEST PER 1000 SQ FT OF AREA. TESTS SHALL BE MADE ON EACH LAYER WITHIN THE BUILDING.

- ALL EROSION AND SEDIMENT CONTROL MEASURES EXCLUDING CATCH-BASIN MEASURES SHALL BE IN PLACE PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES OF PROPOSED STRUCTURES AND/OR UTILITIES.
- ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE PRIOR TO THE START OF ANY CONSTRUCTION UNTIL CONSTRUCTION IS COMPLETED AND/OR STABILIZED. INSTALL STABILIZED CONSTRUCTION ENTRANCE AS DESCRIBED IN THE SPECIFICATIONS.
- INSTALL SILT FENCE AND/OR HAY BALE BARRIERS DOWN SLOPE OF ALL AREAS TO BE DISTURBED AND PROTECT ALL AREAS DESIGNATED FOR TOPSOIL STOCKPILING.
- CONSTRUCT BERMS, TEMPORARY SCALES AND PIPES NECESSARY TO PREVENT EROSION TO TEMPORARY SEDIMENTATION ENTRAPMENT AREAS.
- CLEAR EXISTING TREES, VEGETATION AND EXISTING STRUCTURES FROM TEMPORARY RITE GRASS COVER EXCAVATED STRIP AND STOCKPILE TOPSOIL FROM ALL AREAS TO BE DISTURBED. SEED STOCKPILED TOPSOIL WITH TEMPORARY RITE GRASS COVER.
- FERM EXCAVATION TO TOP OF EXISTING TO DESIRED GRADE. ANY DISTURBED AREAS TO REMAIN BARE SHOULD BE SEEDD WITH TEMPORARY RITE GRASS COVER IMMEDIATELY AFTER EXCAVATION.
- CATCH BASINS, GRATES OF CURB AND FIELD INLETS SHOULD BE LEFT AT ELEVATIONS WHICH PERMIT FLOW OF WATER TO THE STREET.
- INSTALL HAY BALE RINGS AROUND ALL CURB AND FIELD INLETS EXCEPT FOR THE BASINS LOCATED AT THE ANTI-SCOUR POINTS OF THE CURB AND FIELD INLETS. TREATED WITH THE CATCH-BASIN-FILTER FABRIC DATED PRIOR TO CONSTRUCTION CURBS AND INSTALL BASE AND BINDER COURSE OF PAVED DRIVE AND THE GRATES OF CURB AND FIELD INLETS ACCORDINGLY.
- COMPLETE FINAL GRADING.
- INSTALL CURBS AND FIELD INLETS TO FINAL ELEVATIONS. INSTALL SURFACE COURSE OF PAVEMENT.

- ALL CONTROL MEASURES FOR EROSION AND SEDIMENTATION SHALL COMPLY WITH THE WORKER POLLUTION PREVENTION ACT (SWPPP) REQUIREMENTS OF THE CONTROL MEASURES PER THE SWPPP
- WEEKLY INSPECTIONS AND DOCUMENTATION OF EROSION CONTROL PRACTICES.
- CONTROL MEASURES SHALL BE INSPECTED BEFORE FORECASTED AND AFTER PERIODS OF HEAVY OR PROLONGED RAIN RESULTING IN MORE THAN 0.5-INCHES
- DURING INSPECTIONS OF ON AND OFF-SITE AREAS DOWNSTREAM FROM CONSTRUCTION ACTIVITIES.
- THE INSPECTIONS SHALL BE CONDUCTED BY THE PROJECT SUPERVISOR, THE CITY ENGINEER, THE SITE ENGINEER, OR THE CONTRACTOR, TO DETERMINE THE FOLLOWING:
  - A) THE CONDITIONS OF THE CONTROL MEASURES AND THE NEED FOR REPAIR OR RE-ALIGNMENT
  - B) THE NEED FOR MAINTENANCE, E.G. REMOVAL OF SEDIMENT FROM BARRIERS, TRAPS, AND BASINS.
  - C) THE NEED FOR ADDITIONAL CONTROL MEASURES.
  - D) THE APPLICATION OF SEEDS, NETTING AND/OR MULCHING.
  - E) THE OVERALL EFFECTIVENESS OF THE CONTROL PLAN.
- CONTROL MEASURES SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL NECESSARY REPAIRS SHALL BE COMPLETED IMMEDIATELY.
- THESE PLANS INDICATE THE CONTROL MEASURES TO BE PUT IN PLACE. ADDITIONAL CONTROL MEASURES WILL BE IMPLEMENTED IF UNEXPECTED AND UNFORESEEN PROBLEMS OCCUR. IMPLEMENTATION OF THE ADDITIONAL CONTROL MEASURES SHALL BE AT THE DISCRETION OF THE DEVELOPER.
- AN EROSION CONTROL SYSTEM WILL BE UTILIZED BY THE DEVELOPER TO MINIMIZE THE PRODUCTION OF SEDIMENT FROM THE SITE. METHODS TO BE UTILIZED TO PREVENT EROSION AND SEDIMENTATION FROM THE SITE AND SHALL INCLUDE ONE OR MORE OF THE FOLLOWING AS APPLICABLE:
  - A) VEGETATION: VEGETATION BARRIERS SHALL BE PROVIDED AT KEY LOCATIONS TO INTERCEPT AND CLARIFY SILT LAIDEN RUNOFF FROM THE SITE. THESE MAY BE EXCAVATED OR MAY BE CREATED UTILIZING EARTHEN BARRIERS, STYRENE OR POLYPROPYLENE GEOTEXTILES, SALES, OR OTHER SUITABLE MATERIALS. DIVERSIONS, SALES, BERRMS, OR OTHER CANALIZATION SHALL BE CONSTRUCTED TO PREVENT EROSION FROM OCCURRING. RUNOFF DIVERTED INTO THE ENTRANCE AREAS WHICH SHALL NOT BE PERMITTED TO FILL IN, BUT SHALL BE CLEARED IMMEDIATELY OF DEBRIS AND SEDIMENT. THE COLLECTED SILT SHALL BE DEPOSITED IN AREAS SAFE FROM FURTHER EROSION.
  - B) ALL DISTURBED AREAS EXCEPT ROADWAYS WHICH WILL REMAIN UNDESIGNED FOR MORE THAN 30 DAYS SHALL BE TEMPORARILY SEEDDED WITH 1/2 LB. OF RYE GRASS OR MULCHED WITH 100 LBS. OF STRAW OR HAY PER 1,000 SQ. YD. OF DISTURBED AREA. SEEDING SHALL BE DONE RAPIDLY AS PRACTICABLE BY THE INSTALLATION OF THE BASE COURSE.
  - C) SILT THAT LEAVES THE SITE MUST BE THE REQUIRED QUALITY. SEDIMENT SHALL BE COLLECTED AND REMOVED AS DIRECTED BY APPROPRIATE MUNICIPAL AUTHORITIES.



STREET TREE PLANTING CHECK LIST				
IR 26-41 TREE PER 25'	REQUIRED	PROPOSED		
		ON SITE	OFF SITE	TOTAL
25/25 = 1	1	1	0	1
PROJECT COMPLIES				

SCHEMATIC SITE PLAN  
SCALE :  $\frac{1}{8}" = 1'-0"$

**MEP ENGINEER:**  
DIBARI ENGINEERING, P.C.  
99 MAIN STREET  
DOBBS FERRY, NY 10522  
914.479.9705

SHEET TITLE:

## SEAL &amp; SIGNATURE

ISSUE DATE:	PROJECT NO:
01-30-15	#1432
DRAWN BY:	CHECKED BY:
SJL	
SCALE:	SHEET NO:
AS NOTED	3 of 22
DRAWING NO:	

C-002.00

NYC DOB NUMBER



211 WEST 28TH STREET  
NEW YORK, N.Y.

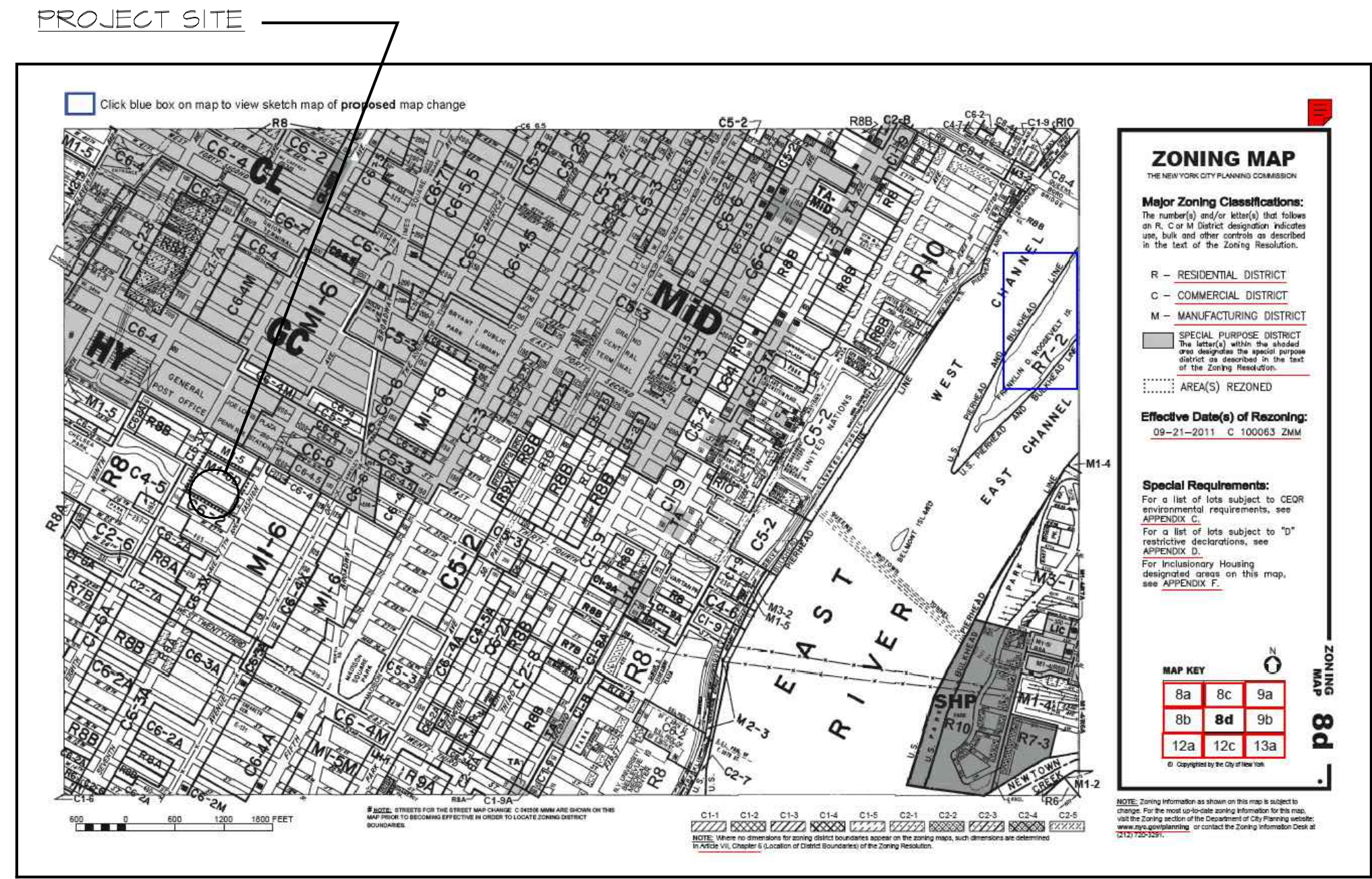
BLOCK: 778 LOT: 33  
ARCHITECT:  
AUFGANG ARCHITECTS LLC  
49 NORTH AIRMONT RD.  
SUFFERN, NY  
INFO@AUFGANG.COM 845.368.0004

AUFGANG  
ARCHITECTS

**OWNER:**  
THE ARBER COMPANIES  
15 VERBEENA AVENUE  
FLORAL PARK, NY 11001  
516.277.9300

**STRUCTURAL ENGINEER:**  
BROOKER ENGINEERING, PLLC  
76 LAFAYETTE AVENUE  
SUFFERN, NY 10901  
845.357.4411

**MEP ENGINEER:**  
DIBARI ENGINEERING, P.C.  
99 MAIN STREET  
DOBBS FERRY, NY 10522  
914.479.9705

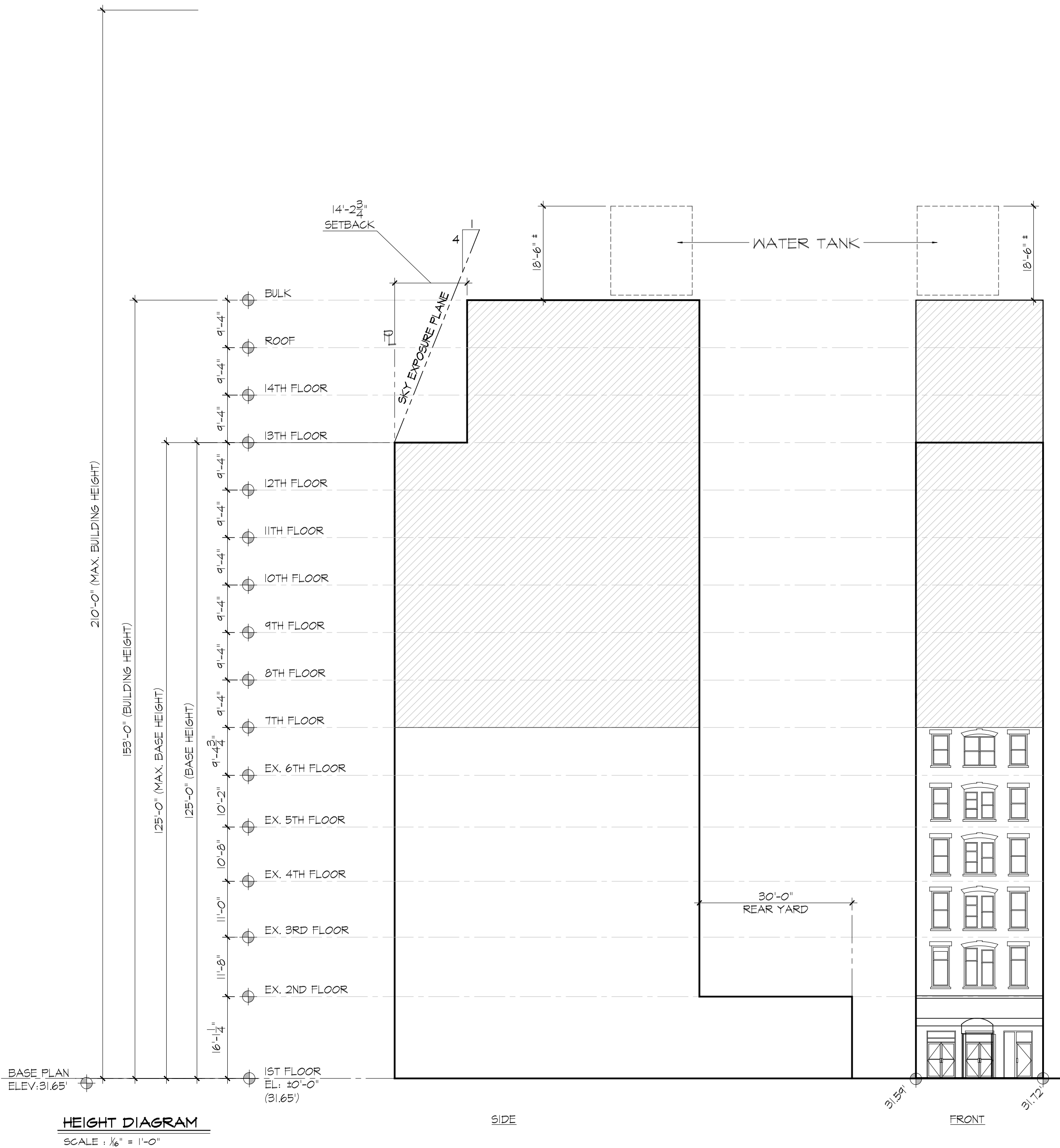


ZONING MAP  
NOT TO SCALE

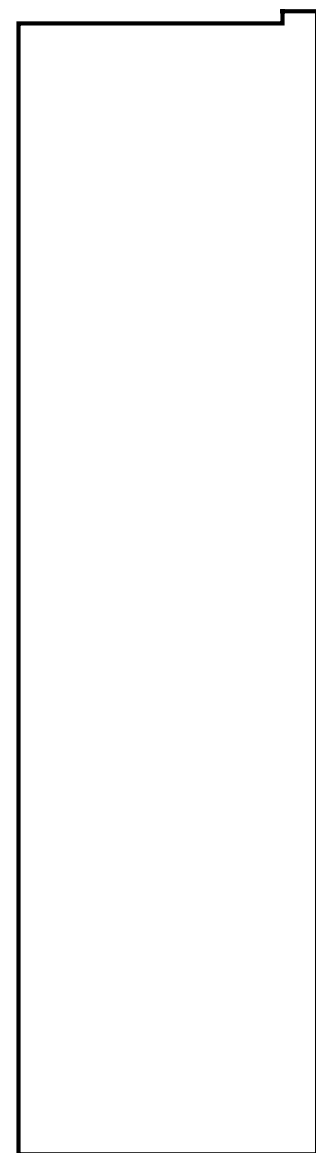
ZONING CALCULATION							
Block:	778	CONST. CLASS 1-B 2HR RATED BUILDING TO BE FULLY SPRINKLERED BUILDING TO BE DESIGNED PER 2008 NYC BUILDING CODE					
Existing lot designation:	33						
Zoning:	M1-6D						
Map:	8d						
		PERMITTED/REQUIRED	PROPOSED		REMARKS	RES.	
COMMUNITY FACILITY WITH SLEEPING ACCOMODATIONS - USE GROUP 3							42-482
ZONING LOT AREA						23-32	
Interior Lot			2,456.40	SQ. FT.			
LOT COVERAGE							
1st Floor		UNRESTRICTED	2456.4		OK	43-622	
2nd-12th Floor		1719.48	1,710.26	SQ.FT.	OK		
		70 percent	69.6	percent	OK		
FLOOR AREA RATIO						43-621(b)(1)	
		10.00	MAX	10.00	SQ.FT.	OK	
GROSS FLOOR AREA						43-621(b)(1)	
		24,564.00	SQ. FT.	24,563.39	SQ. FT.	OK	
MAX DWELLING UNIT						43-623	
DENSITY D.U. FACTOR 790		MAX	NOT APPLICABLE	TOTAL	36	N/A	
HEIGHTS REGULATIONS						12-10	
Base Height		85'-0"	MIN.	125'-0"		43-624(2)	
Base Height		125'-0"	MAX	125'-0"		43-624(2)	
Building Height		210'-0"	MAX	153'-0"		43-624(3)	
SETBACK ABOVE BASE HEIGHT							
SKY EXPOSURE PLANE		4V / 1 H	MIN.	SEE HEIGHT DIAGRAM	OK	43-624(b)(1)(ii)	
YARD REGULATIONS							
Front		NONE	NONE	NONE	NONE	43-624(b)(1)	
Side		NONE	NONE	NONE	NONE	23-46	
Rear		30'-0"	30'-0"	30'-0"	30'-0"	OK	
BICYCLE PARKING		15 X 18 =270 SQ.FT. REQUIRED	287.04 SQ.FT.Provided			25-811(d)	
		18 req.	18 provided				
		PERMITTED/REQUIRED	PROPOSED		REMARKS	RES.	
PARKING		COMMUNITY	NONE	Spaces Req.	NONE	Spaces Prov.	
					OK	44-21	

SQUAREFOOTAGE BREAKDOWN					APARTMENT DISTRIBUTION	
FLOOR	GROSS AREA	AMENITIES SQ. FT.	MECH. DEDUCTIONS	TOTAL ZONING	0 BR	1BR
1	2456.4	1374		2456.4		
2	1710.26			1710.26	3	
3	1710.26			1710.26	3	
4	1710.26			1710.26	3	
5	1710.26			1710.26	3	
6	1710.26			1710.26	3	
7	1710.26			1710.26	3	
8	1710.26			1710.26	3	
9	1710.26			1710.26	3	
10	1710.26			1710.26	3	
11	1710.26			1710.26	3	
12	1710.26			1710.26	3	
13	1360			1360	2	
14	1360			1360		1
ROOF	1360		785.87	574.13		
TOTAL	25349.26	2159.87	785.87	24563.39	35	1

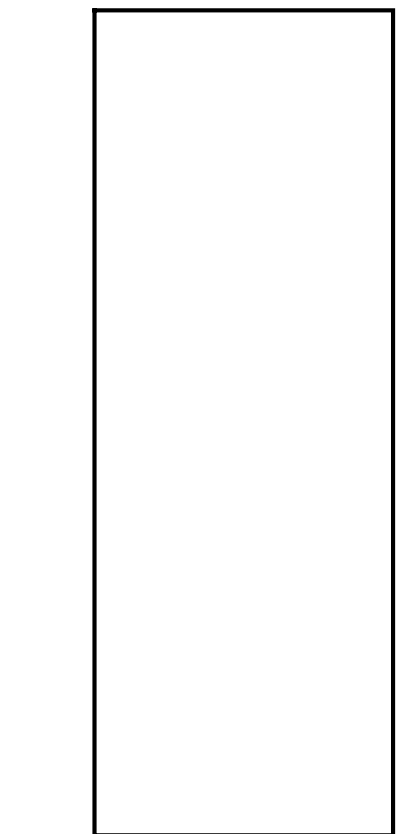
\* NOTE:  
D.U. FACTOR DOES NOT APPLY TO COMMUNITY FACILITY WITH SLEEPING ACCOMMODATIONS AS PER THE ZONING RESOLUTION DEFINITION OF RESIDENCE ZR 12-10



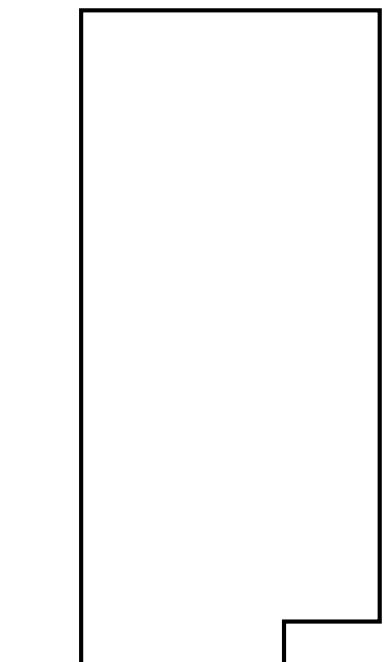
AVERAGE GRADE / BASE PLANE CALCULATION		
EL:	EL:	AVG. EL:
81.54' + 81.17' = 62.31' / 2 = 81.65'		
BASE PLANE ELEV. = 81.65'		



1ST FLOOR PLAN  
SCALE : 1/16" = 1'-0"  
6' F.A. 1,2456.4 SQ. FT.



2ND THRU 12TH  
FLOOR PLAN  
SCALE : 1/16" = 1'-0"  
6' F.A. 1,710.26 SQ. FT.



13TH THRU ROOF  
FLOOR PLAN  
SCALE : 1/16" = 1'-0"  
6' F.A. 1,360 SQ. FT.

NOTE:  
ZR 42-48 Supplemental Use Regulation in M1 6D Districts:  
"For the purposes of this section a "qualifying building" shall be any building that existed on April 25, 2011, and which contained at least 40,000 square feet of floor area on such date.  
(a) Communities Facilities with sleeping accommodations shall be permitted as -of-right on any zoning lot that on April 25, 2011 was not occupied by a qualifying building. Such absence of a qualifying building on the zoning shall be demonstrated to the satisfaction of the department of building as per ZR 42-48"



TAX MAP  
NOT TO SCALE

01-30-15	ISSUED TO HPD FOR REVIEW & COMMENT
01-30-15	ISSUED TO DOB FOR REVIEW & COMMENT
DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:  
ZONING ANALYSIS

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ISSUE DATE:	PROJECT NO:	#1432
DRAWN BY:	CHECKED BY:	ED
SCALE:	SHEET NO:	4 of 22
DRAWING NO:		
Z-001.00		
NYC DOB NUMBER:		





2010 New York Energy Conservation Construction Code

Section 1: Project Information

Project Type: **New Construction**  
Project Title: **1 W 28TH ST**  
Construction Site: **211 W. 28th Street, New York, NY**  
Owner/Agent: **ARIEL AUFANG**  
Designer/Contractor: **ARIEL AUFANG ARCHITECTS, 49 N. ALBANY RD, SUFFERN, NY 10901, 845.368.0004, ariel@aufgang.com**

Section 2: General Information

Building Location (for weather data): **New York, New York**  
Climate Zone: **4a**  
Building Space Conditioning Type(s): **Nonresidential**  
Vertical Glazing / Wall Area Pct: **8%**  
Activity Type(s): **Multifamily**  
Floor Area: **24480**

Section 3: Requirements Checklist

Envelope: **PASSED**, Design 10% better than code.

Climate-Specific Requirements:					
Component Name/Description	Gross Area or Perimeter	Cavity R-Value	Cent. R-Value	Proposed U-Factor	Budget U-Factor(s)
roof over 14 ft floor: Insulation Entirely Above Deck	2473	---	45.0	0.022	0.048
14th floor: Steel-Framed, 16" o.c. window: Metal Frame Curtain Wall/Storefront Double Pane with Low-E, Perf. Type: Other testing/cent. Product ID: , SHGC 0.37 (B)	840	19.0	5.0	0.071	0.084
14 floor concrete: Solid Concrete 12" Thickness, Normal Density, Furring: None	78	---	---	0.520	0.500
14 floor concrete: Solid Concrete 12" Thickness, Normal Density, Furring: None	725	---	5.0	0.142	0.104
13th to 2nd floor: Steel-Framed, 16" o.c. w. 2nd to 13 th floor: Metal Frame with Thermal Break/Double Pane with Low-E, Perf. Type: Other testing/cent. Product ID: , SHGC 0.37 (B)	19000	19.0	5.0	0.071	0.084
13th to 2nd concrete: Solid Concrete 12" Thickness, Normal Density, Furring: None	1872	---	---	0.520	0.500
13th to 2nd concrete: Solid Concrete 12" Thickness, Normal Density, Furring: None	1500	---	5.0	0.142	0.104
1st floor: Steel-Framed, 16" o.c. Window 3: Metal Frame Curtain Wall/Storefront Double Pane with Low-E, Perf. Type: Other testing/cent. Product ID: , SHGC 0.37 (B)	1735	19.0	5.0	0.071	0.084
1st floor concrete: Solid Concrete 12" Thickness, Normal Density, Furring: None	108	---	---	0.520	0.500
1st floor concrete: Solid Concrete 12" Thickness, Normal Density, Furring: None	585	---	5.0	0.142	0.104
Basement Wall 1: Solid Concrete 12" Thickness, Normal Density, Furring: None, Wall Ht 10.0, Depth B.G. 10.0	24730	---	10.0	0.086	0.579
Floor 1: Slab-On-Grade Unheated, Horizontal with vertical 2 ft.	2473	---	10.0	---	---

Project Title: **1 W 28TH ST** Report date: **01/29/15**  
Data filename: **L10014 PROJECTS#1432 211 W. 28TH STREET#1432 DOB & CD#Calculations\Energy\01-29-15\_comcheck.ck** Page **2 of 2**

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.  
(b) Fenestrations product performance must be certified in accordance with NFRC and requires supporting documentation.

Air Leakage, Component Certification, and Vapor Retarder Requirements:

- 1. All joints and penetrations are caulked, gasketed or covered with a moisture vapor-permeable wrapping material installed in accordance with the manufacturer's installation instructions.
- 2. Windows, doors, and skylights certified as meeting leakage requirements.
- 3. Component R-values & U-factors labeled as certified.
- 4. No roof insulation is installed on a suspended ceiling with removable ceiling panels.
- 5. Other components have supporting documentation for proposed U-Factors.
- 6. Insulation installed according to manufacturer's instructions, in substantial contact with the surface being insulated, and in a manner that achieves the rated R-value without compressing the insulation.
- 7. Stair, elevator shaft vents, and other outdoor air intake and exhaust openings in the building envelope are equipped with motorized dampers.
- 8. Cargo doors and loading dock doors are weather sealed.
- 9. Recessed lighting fixtures installed in the building envelope are Type IC rated as meeting ASTM E283, are sealed with gasket or caulk.
- 10. Building entrance doors have a vestibule equipped with self-closing devices.  
Exceptions:
  - Building entrances with revolving doors.
  - Doors not intended to be used as a building entrance.
  - Doors that open directly from a space less than 3000 sq. ft. in area.
  - Doors used primarily to facilitate vehicular movement or materials handling and adjacent personnel doors.
  - Doors opening directly from a sleeping/ dwelling unit.

Section 4: Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the 2010 New York Energy Conservation Construction Code requirements in COMcheck Version 3.9.4 and to comply with the mandatory requirements in the Requirements Checklist.

When a Registered Design Professional has stamped and signed this page, they are attesting that to the best of his/her knowledge, belief, and professional judgment, such plans or specifications are in compliance with this Code.

ARIEL AUFANG  
Name - Title  
Signature  
2/18/2015  
Date



Project Title: **1 W 28TH ST** Report date: **01/29/15**  
Data filename: **L10014 PROJECTS#1432 211 W. 28TH STREET#1432 DOB & CD#Calculations\Energy\01-29-15\_comcheck.ck** Page **2 of 2**

ENERGY CODE PROGRESS INSPECTIONS		
PROTECTION OF FOUNDATION INSULATION	(IA1), (IA1A)	YES
INSULATION PLACEMENT AND R-VALUE	(IA2), (IA2A)	YES
FENESTRATION THERMAL VALUES AND RATINGS	(IA3), (IA3A)	YES
FENESTRATION RATINGS FOR AIR LEAKAGE	(IA4), (IA4A)	YES
FENESTRATION AREAS	(IA5), (IA5A)	YES
AIR SEALING AND INSULATION -VISUAL	(IA6), (IA6A)	YES
AIR SEALING AND INSULATION -VISUAL	(IA7)	NO
PROTECTION FACTORS	(IA7A)	YES
LOADING DECK WEATHER SEALS	(IA8)	NO
VESTIBULES	(IA9)	YES
FIREPLACE	(IB), (IB1)	NO
DAMPERS INTEGRAL TO BUILDING ENVELOPE	(IB2), (IB2A)	NO
HVAC AND SERVICE WATER HEATING EQUIPMENT	(IB3), (IB3A)	NO
HVAC AND SERVICE WATER HEATING SYSTEM CONTROL	(IB4), (IB4A)	NO
DUCT PLUMB AND PIPING INSULATION AND SEALING	(IB5), (IB5A)	NO
DUCT LEAKAGE TESTING	(IB6), (IB6A)	NO
ELECTRICAL METERING	(IC1), (IC1A)	NO
LIGHTING IN DWELLING UNITS	(IC2), (IC2A)	NO
INTERIOR LIGHTING POWER	(IC3)	NO
EXTERIOR LIGHTING POWER	(IC4)	NO
LIGHTING CONTROLS	(IC5)	NO
EXIT SIGNS	(IC6)	NO
TANDEM MIRRORING	(IC7)	NO
ELECTRICAL MOTORS	(IC8)	NO
MAINTENANCE INFORMATION	(ID), (ID1)	NO
PERMANENT CERTIFICATE	(ID2)	NO

PROPOSED ALTERATION FOR:

211 WEST 28TH STREET  
NEW YORK, N.Y.

BLOCK: 778

LOT: 33

ARCHITECT:

AUFGANG ARCHITECTS LLC  
49 NORTH ALBANY RD.  
SUFFERN, NY  
INFO@AUFANG.COM 845.368.0004

OWNER:  
THE ARBER COMPANIES  
15 VERBEENA AVENUE  
FLORAL PARK, NY 11001  
516.277.9300

STRUCTURAL ENGINEER:  
BROOKER ENGINEERING, PLLC  
76 LAFAYETTE AVENUE  
SUFFERN, NY 10901  
845.357.4411

MEP ENGINEER:  
DIBARI ENGINEERING, P.C.  
99 MAIN STREET  
DOBBS FERRY, NY 10522  
914.479.9705

AUFGANG ARCHITECTS

01-30-15	ISSUED TO HPD FOR REVIEW & COMMENT
01-30-15	ISSUED TO DOB FOR REVIEW & COMMENT
DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:

ENERGY ANALYSIS

THE DRAWING IS AN INSTRUMENT OF SERVICE AND SHALL REMAIN THE PROPERTY OF AUFGANG ARCHITECTS, LLC. WHETHER THE PROJECT FOR WHICH THE DRAWING IS PREPARED OR NOT, THE DRAWING SHALL NOT BE USED BY THE OWNER OR OTHERS ON OTHER PROJECTS FOR ADDITIONS TO THE PROJECT OR FOR CONSTRUCTION OF THE PROJECT BY OTHERS EXCEPT BY AGREEMENT IN WRITING WITH AUFGANG ARCHITECTS, LLC. SUBMITTAL OR DISTRIBUTION TO MEET OFFICIAL REGULATORY REQUIREMENTS OR FOR OTHER PURPOSES SHALL BE WITH THE PROJECT. NO PART OF THIS DRAWING SHALL BE REPRODUCED OR PUBLISHED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF AUFGANG ARCHITECTS, LLC.	SEAL & SIGNATURE
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ISSUE DATE:	PROJECT NO:
01-30-15	#1432
DRAWN BY:	CHECKED BY:
MB	

SCALE:	SHEET NO:
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DRAWING NO: EN-001.00

NYC DOB NUMBER:



**3. Inspection or Test Failure.** In accordance with Section BC 109.9 and ECC 104.2.3, where an inspection or test fails, the construction shall be corrected and must be made available for reinspection and/or retesting by the progress inspector until it complies. For additions and alterations, the applicant must clearly indicate what portions of the altered systems should be inspected and/or tested, and what inspection and/or testing may be outside the scope of the work.

	Inspection/Test	Periodic (minimum)	Reference Standard or Other Criteria	EC or Other Citation
IIA1	<b>Protection of exposed foundation insulation:</b> Insulation shall be visually inspected to verify proper protection where applied to the exterior of basement or cellar walls, crawl-space walls and/or the perimeter of slab-on-grade floors.	As required during foundation work and prior to backfill	Approved construction documents	303.1.2; ASHRAE 90.1 - 5.8.1.7
IIA2	<b>Insulation placement and R-values:</b> Installed insulation for each component of the conditioned space envelope shall be visually inspected to ensure that at junctions between components shall be visually inspected to ensure that the R-values are marked, that such R-values conform to the R-values identified in the construction documents and that the insulation is properly installed. Certifications for unmarked insulation shall be similarly visually inspected.	As required to verify continuous enclosure while walls, ceilings and floors are open	Approved construction documents	303.1, 303.1.1, 303.1.2, 502.2; ASHRAE 90.1 - 5.5, 5.6 or 11; 5.8.1
IIA3	<b>Fenestration thermal values and product ratings:</b> U-factors and SHGC values of glazing fenestration shall be visually inspected for conformance with the U-factors and SHGC values identified in the construction drawings by verifying the manufacturer's NFRC labels or, where not labeled, using the ratings in EC Tables 303.1.3(1), (2) and (3). Where ASHRAE 90.1 is used, visible light transmittance values shall also be verified.	As required during installation	Approved construction documents; NFRC 100, NFRC 200	303.1, 303.1.3, 502.3; ASHRAE 90.1 - 5.5; 5.6 or 11; 5.8.2
IIA4	<b>Fenestration and door assembly product ratings for air leakage:</b> Windows and sliding or swinging door assemblies, except all-glass windows and/or doors, shall be visually inspected to verify that installed assemblies are listed and labeled by the manufacturer to the referenced standard. For curtain wall, storefront glazing, commercial entrance doors and revolving doors, the testing reports shall be reviewed to verify that the installed assembly complies with the standard cited in the approved plans.	As required during installation; prior to final construction inspection	NFRC 400, AAMA/WDMA/CSA 1011.1/5.2/A440 ASTM E283, ANSI/DASMA 105	502.4; ASHRAE 90.1 - 5.4-3.2
IIA5	<b>Fenestration areas:</b> Dimensions of windows and skylights shall be verified by visual inspection.	Prior to final construction inspection	Approved construction documents	502.3; ASHRAE 90.1 - 5.3.4, 5.6 or 11
IIA6	<b>Sealing:</b> Openings and penetrations in the building envelope, including site-built fenestration and doors, shall be visually inspected to verify that a continuous air barrier around the envelope forms an air-tight enclosure. The progress inspector shall visually inspect to verify that materials and/or assemblies have been tested and meet the requirements of the respective standards, or that the building is tested and meets the requirements of the standard in accordance with the standard's cited in the approved plans.	As required during construction	Approved construction documents; ASTM E2178, ASTM E2357, ASTM E1677, ASTM E779, ASTM E283.	502.4, 502.4.7; ASHRAE 90.1 - 5.4.3
IIA7	<b>Projection factors:</b> Where the energy analysis utilized a projection factor > 0, the projection dimensions of overhangs, eaves or permanently attached shading devices shall be inspected for conformance with approved plans by visual inspection.	Prior to final construction inspection	Approved construction documents, including energy analysis	502.3; ASHRAE 90.1 - 5.3.4, 5.6 or 11
IIA8	<b>Loading dock weathersheds:</b> Weathersheds at loading docks shall be visually verified.	Prior to final construction inspection	Approved construction documents	502.4.5; ASHRAE 90.1 - 5.4.3.3
IIA9	<b>Building entrance vestibules:</b> Required entrance vestibules shall be visually inspected for proper operation.	Prior to final construction inspection	Approved construction documents	502.4.6; ASHRAE 90.1 - 5.4.3.4

IIB1	<b>Fireplaces:</b> Provision of combustion air and tight-fitting fireplace doors shall be verified by visual inspection.	Prior to final construction inspection	Approved construction documents; ANSI Z21.60 (see also MC 90A), ANSI Z21.50	303.1.5, BC 2111; MC Chapters 7, 9; FSC Chapter 6	<p><b>Controls with seasonally dependent functionality:</b> Controls whose complete operation cannot be demonstrated due to prevailing weather conditions typical of the season during which progress inspections will be performed shall be permitted to be signed off for the purpose of a Temporary Certificate of Occupancy with only a visual inspection, provided, however, that the progress inspector shall perform a supplemental inspection where the controls are visually inspected and tested for functionality and proper operation during the next immediate season thereafter.</p> <p>The owner shall provide full access to the progress inspector within two weeks of the progress inspector's request for such access to perform the progress inspection.</p> <p>For such supplemental inspections, the Department shall be notified by the approved progress inspection agency of any unresolved deficiencies in the installed work within 180 days of such supplemental inspection.</p>				
IIB2	<b>Outdoor air intakes and exhaust openings:</b> Dampers for stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be visually inspected to verify that such dampers, except where permitted to be gravity dampers, comply with approved construction drawings. Manufacturer's literature shall be reviewed to verify that the product has been tested and found to meet the standard.	As required during installation	Approved construction documents; AMCA 5000	502.4.4; ASHRAE 90.1-6.4.3.4					
IIB3	<b>HVAC, service water heating and pool equipment sizing and performance:</b> Equipment sizing, efficiencies and other performance factors of all major equipment units, as determined by the applicant of record, and no less than 15% of minor equipment units, shall be verified by visual inspection and, where necessary, review of manufacturer's data. Pool heaters and covers shall be verified by visual inspection.	Prior to final plumbing and construction inspection	Approved construction documents	503.2, 504.2, 504.7; ASHRAE 90.1-6.3, 6.4.1, 6.4.2, 6.8, 7.4, 7.8					
IIB4	<b>HVAC system controls and economizers and service hot water controls:</b> No less than 20% of each type of required controls and economizers shall be verified by visual inspection and tested for functionality and proper operation. Such controls shall include, but are not limited to: Thermostatic Set point overlap restriction Off-hour Shutoff damper Snow-melt system Demand control systems Outdoor heating systems Zones Economizers Air systems Variable air volume fan Hydronic systems Heat rejection equipment fan speed Complex mechanical systems serving multiple zones Ventilation Energy recovery systems Hot gas bypass limitation Temperature Service water heating Hot water system Pool heater and time switches Exhaust hoods Radiant heating systems	After installation and prior to final electrical and construction inspection, except that for controls with seasonally dependent functionality, such testing shall be performed before sign-off for issuance of a Final Certificate of Occupancy	Approved construction documents, including control system narratives; ASHRAE Guideline 1: The HVAC Commissioning Process where applicable	503.2.4, 503.2.5.1, 503.2.11, 503.3, 503.4, 504.3, 504.6, 504.7; ASHRAE 90.1-6.3, 6.4, 6.5, 6.7.2.4, 7.4.4, 7.4.5					
					IIB5	<b>Duct, plenum and piping insulation and sealing:</b> Installed duct and piping insulation shall be visually inspected to verify proper insulation placement and values. Joints, longitudinal and transverse seams and connections in ductwork shall be visually inspected for proper sealing.	After installation and prior to closing shafts, ceilings and walls	Approved construction documents; SMACNA Duct Construction Standards, Metal and Flexible	503.2.7, 503.2.8, 504.5; ASHRAE 90.1-6.3, 6.4.4.2, 6.8.2, 6.8.3, 7.4.3
					IIB6	<b>Air leakage testing for high-pressure duct systems:</b> For duct systems designed to operate at static pressures in excess of 3 inches w.g. (746 Pa), representative sections, as determined by the progress inspector, totaling at least 25% of the duct area, per ECC 503.2.7.1.3, shall be tested to verify that actual air leakage is below allowable amounts.	After installation and sealing and prior to closing shafts, ceilings and walls	Approved construction documents; SMACNA HVAC Air Duct Leakage Test Manual	503.2.7.1.3; ASHRAE 90.1-6.4.4.2

IC1	<b>Electrical metering:</b> The presence and operation of individual meters or other means of monitoring individual apartments shall be verified by visual inspection for all apartments.	Prior to final electrical and construction inspection	Approved construction documents	505.7
IC2	<b>Lighting in dwelling units:</b> Lamps in permanently installed lighting fixtures shall be visually inspected to verify compliance with high-efficiency requirements.	Prior to final electrical and construction inspection	Approved construction documents	505.5.3
IC3	<b>Interior lighting power:</b> Installed lighting power shall be verified for compliance with the lighting power allowance by visual inspection of fixtures, lamps, ballasts and transformers.	Prior to final electrical and construction inspection	Approved construction documents	505.5; ASHRAE 90.1 - 9.1, 9.2, 9.5, 9.6; 18CNY §101-07(c)(3) v)IC4
IC4	<b>Exterior lighting:</b> Installed lighting shall be verified for compliance with lighting with source efficacy and/or the lighting power allowance by visual inspection	Prior to final electrical and construction inspection	Approved construction documents	505.6; ASHRAE 90.1 - 9.4.4, 9.4.5; 18CNY §101-07(c)(3) v)IC4
IC5	<b>Lighting controls:</b> Each type of required lighting controls, including: - occupant sensors - manual interior lighting controls - light-reduction controls - automatic lighting shut-off - daylight zone controls - sleeping unit controls - exterior lighting controls shall be verified by visual inspection and tested for functionality and proper operation	Prior to final electrical and construction inspection	Approved construction documents, including control system narratives	505.2, 505.2.2; ASHRAE 90.1 - 9.4.1, 9.4.1.2 (as modified by section ECC A102)
IC6	<b>Exit signs:</b> Installed exit signs shall be visually inspected to verify that the label indicates that they do not exceed maximum permitted wattage.	Prior to final electrical and construction inspection	Approved construction documents	505.4; ASHRAE 90.1 - 9.4.3
IC7	<b>Tandem wiring:</b> Tandem wiring shall be tested for functionality.	Prior to final electrical and construction inspection	Approved construction documents	505.3; ASHRAE 90.1 - 9.4.2
IC8	<b>Electric motors (including but not limited to fan motors):</b> Where required by the construction documents for energy code compliance, motor listing or labels shall be visually inspected to verify that they comply with the respective energy requirements in the construction documents.	Prior to final electrical and construction inspection	Approved construction documents	503.2.10; ASHRAE 90.1 - 10.4

ID1	<p><b>Maintenance information:</b></p> <p>Maintenance manuals for mechanical, service hot water and electrical equipment and systems requiring preventive maintenance shall be reviewed for applicability to installed equipment and systems before such manuals are provided to the owner. Labels required for such equipment or systems shall be inspected for accuracy and completeness.</p>	<p>Prior to sign-off or issuance of Final Certificate of Occupancy</p>	<p>Approved construction documents, including electrical drawings where applicable; ASHRAE Guideline 4: Preparation of Operating and Maintenance Documentation for Building Systems</p>	<p>303.3, 303.2.3; ASHRAE 90.1-4.2.2.3; 6.7.2.2, 8.7.2</p>
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[illegible]

01-30-15	ISSUED TO HPD FOR REVIEW & COMMENT
01-30-15	ISSUED TO DOB FOR REVIEW & COMMENT
DATE	SUBMISSIONS / REVISIONS

SHEET TITLE: UNIT 11 - MATHS

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DRAWN BY: MB CHECKED BY:

SCALE: AS NOTED SHEET NO: 6 of 22

DRAWING NO: ENL 000 00

NYC DOB NUMBER:



LOT: 33

68.0004

**STRUCTURAL ENGINEER:**  
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A-001.00

NYC DOB NUMBER: \_\_\_\_\_

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[illegible]







211 WEST 28TH STREET  
NEW YORK, N.Y.

BLOCK: 778 LOT: 33

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


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MAXIMUM BUILDING OCCUPANCY						MINIMUM EGRESS WIDTH (BC 1005)	
FLOOR	OCCUPANCY GROUP	NET FLOOR AREA PER OCCUPANT (S.F./P)	NET FLOOR AREA (S.F.)	MAXIMUM NUMBER OF OCCUPANTS		REQUIRED	PROVIDED
CELLAR	RESIDENTIAL R-2	15	190	13	22	22 X 0.2 = 4.4'	X 2 = 6.4'
	BUSINESS (INCIDENTAL) R-2	200 (GROSS)	1,750	4			
	ASSEMBLY (INCIDENTAL) R-2	100	140	2			
	RESIDENTIAL R-2	15	413	28			
1st	RESIDENTIAL R-2	200	2,456	12	46	46 X 0.2 = 9.2'	X 2 = 6.8'
2nd	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
3rd	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
4th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
5th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
6th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
7th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
8th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
9th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
10th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
11th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
12th	RESIDENTIAL R-2	200	1,710	9		9 X 0.2 = 1.8'	X 2 = 6.4'
13th	RESIDENTIAL R-2	200	1,360	6		6 X 0.2 = 1.2'	X 2 = 6.4'
14th	RESIDENTIAL R-2	200	1,360	6		6 X 0.2 = 1.2'	X 2 = 6.4'

SYMBOL LEGEND	
	3 HR RATED WALL
	2 HR RATED WALL
	1 HR RATED WALL
	CEILING MOUNTED EXIT SIGN
	WALL MOUNTED EXIT SIGN
	SIGN AT ELEVATOR LANDING
	3'-0" WIDE DOOR (2 LEAFS) EXIT CAPACITY = $60' / 0.2 = 340$
	3'-0" WIDE DOOR (1 LEAF) EXIT CAPACITY = $34' / 0.2 = 170$

MINIMUM WIDTH OF EGRESS			
	NYC BUILDING CODE SECTION	MIN. REQUIRED	PROVIDED
STAIRWAYS	1009.1	44"	44"
CORRIDOR	1016.2	44"	60"

SPACES WITH ONE MEANS OF EGRESS		
OCCUPANCY GROUP		MAXIMUM OCCUPANT LOAD
ASSEMBLY	A-3	74
RESIDENTIAL	R-2	20
BUSINESS	B	74

MAXIMUM TRAVEL DISTANCE (W/ SPRINKLERS)			
OCCUPANCY GROUP	MAX. PERMITTED (F)	PROVIDED (F)	
RESIDENTIAL	200'-0"	74'-4"	
BUSINESS	300'-0"	96'-0"	

\* SEE NYC BUILDING CODE TABLE 1015.1 FOR MORE INFORMATION

\* DEAD END IN R-2 OCCUPANCY SHALL NOT EXCEED 80'  
ALL FLOORS COMPLY - BC 1016.3

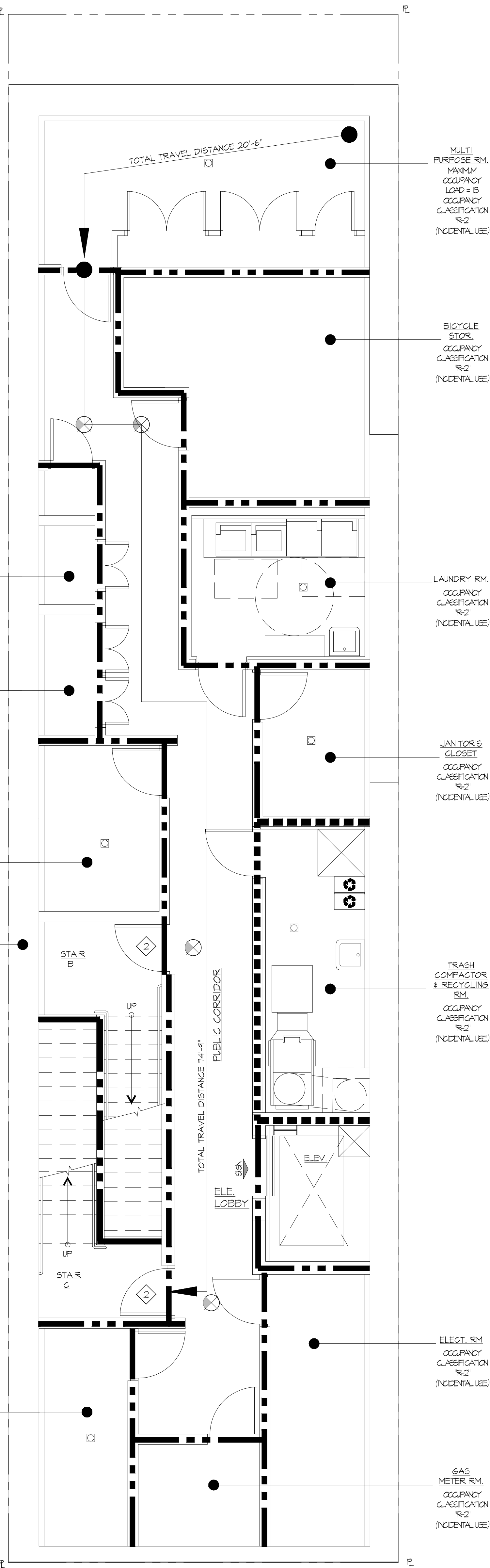
TRAVEL DISTANCE WITHIN DWELLING UNIT	
UNIT TYPE	TRAVEL DISTANCE
A	15'-9"
B	24'-4"
C	20'-4"
D	21'-9"

FIRE PROTECTION

BUILDING IS FULLY SPRINKLERED AND EQUIPPED WITH AN ALTERNATIVE FIRE EXTINGUISHING SYSTEM A STAND PEE SYSTEM SMOKE VENTS A FIRE ALARM AND DETECTION SYSTEM & A FIRE COMMAND CENTER IN COMPLIANCE WITH THE NYC BUILDING CODE, NYC FIRE CODE & LOCAL FIRE DEPARTMENT REQUIREMENTS .

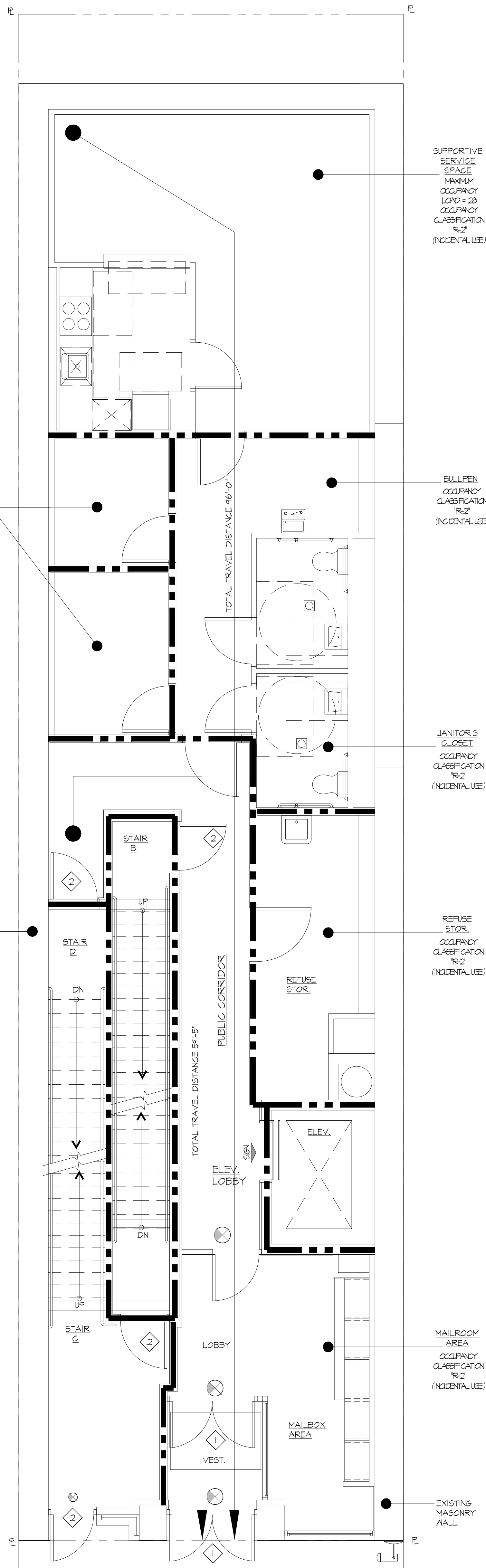
EGRESS NOTES, CHAPTER 10

- MEANS OF EGRESS SHALL HAVE A CEILING HEIGHT NOT LESS THAN 7'-6" (BC 1008)
- OCCUPANT LOAD AS DETERMINED ON TABLE 1004.1.2
- EXIT AND ACCESS REQUIREMENTS ARE TO BE CALCULATED AS PER TABLE 1005.1 AS PER SECTION BC 1005
- EXITS, EXIT DISCHARGES AND PUBLIC CORRIDORS SHALL BE ILLUMINATED AT ALL TIMES, AS PER BC 1006
- A. PUBLIC CORRIDORS AND EXITS SHALL BE PROVIDED WITH ARTIFICIAL LIGHT FIXTURES SURVEILLING AT LEAST TWO FOOT CANDLES MEASURED AT THE FLOOR LEVEL, TO BE MAINTAINED CONTINUOUSLY THROUGHOUT EXITS AND THEIR ACCESS FACILITIES FOR THEIR FULL LENGTH (BC 1006.2)
- B. EXIT LIGHTING, EXIT SIGNS & THE PORTION OF THE EXTERIOR EXIT DISCHARGE IMMEDIATELY ADJACENT TO EXIT DISCHARGE DOORWAYS SHALL BE CONNECTED TO AN EMERGENCY POWER SYSTEM FOR A DURATION NOT LESS THAN 90 MINUTES & SHALL CONSIST OF STORAGE BATTERIES, UNIT EQUIPMENT OR AN ON-SITE GENERATOR, (BC 1006.3)
- ALL EXITS SHALL BE KEPT READILY ACCESSIBLE AND UNOBSTRUCTED AT ALL TIMES AS PER SECTION BC 1007
- DOORS ARE TO COMPLY WITH ALL APPLICABLE REQUIREMENTS SECTION BC 1008 INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - CLEAR OPENING OF 32"(MIN) IS REQUIRED AND SHALL BE MEASURED BETWEEN THE FACE OF THE DOOR AND THE STOP, WITH THE DOOR OPEN 90 DEGREES. (SECTION BC 1008.1.1)
  - DOOR HEIGHT NOT TO BE LESS THAN 6'-8". (BC 1008.1.3)
  - ALL EXIT DOORS ARE TO OPEN IN THE DIRECTION OF EGRESS (1008.2.2) FLOOR LEVELS ON BOTH SIDES OF ALL EXIT AND CORRIDOR DOORS ARE TO BE LEVEL AND AT THE SAME ELEVATION FOR A DISTANCE AT LEAST EQUAL TO THE WIDTH OF THE DOOR. (1008.1.4)
  - EXIT DOORS SHALL BE READILY OPENABLE AT ALL TIMES FROM THE SIDE FROM WHICH EGRESS IS TO BE MADE. DOORS OPENING ONTO INTERIOR ENCLOSED STAIRS SHALL NOT BE LOCKED FROM EITHER SIDE EXCEPT THAT DOORS MAY BE LOCKED TO PREVENT ACCESS TO THE STAIR FROM THE OUTSIDE AT STREET LEVEL AS PER SECTION 1008.1.8
  - PANIC AND FIRE EXIT HARDWARE SHALL BE INSTALLED ON ALL EGRESS DOORS FROM OCCUPANCY GROUP 'A' OR 'E' HAVING AN OCCUPANT LOAD OF 75 PEOPLE OR MORE AS PER SECTION 1008.1.9
  - REQUIRED EXITS & SMOKE DOORS ARE TO BE SELF-CLOSING (BC 115.3.7) WITH A 1-1/2 HOUR FIRE PROTECTION RATING (TABLE 115.3), EXCEPT IN THE FIRST STORY OF EXTERIOR WALLS FACING A STREET THAT HAVE A FIRE SEPARATION DISTANCE OF GREATER THAN 15'-0" (BC 104.8.2) THEN DOORS NEED NOT TO BE RATED.
- STAIRWAYS SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS STATED IN SECTIONS BC 1009 & 1019 INCLUDING, BUT NOT LIMITED TO THE FOLLOWING:
  - STAIR WIDTH SHALL BE DETERMINED AS SPECIFIED IN SECTION 1009.1, BUT SUCH WIDTH SHALL NOT BE LESS THAN 44" (BC 1009.1) OR 36" (BC 1009.1.2)
  - AREA OF RESCUE ASSISTANCE SHALL BE 30' X 48" FOR EACH OCCUPANTS AS PER SECTION 1007.6
  - THE CLEAR HEADROOM SHALL BE AT LEAST 6'-8" MINIMUM, SPECIFIED IN SECTION 1009.2.1 (R-2 OCCUPANCY)
  - LANDINGS AND PLATFORMS PROVIDED AT THE HEAD AND FOOT OF EACH FLIGHT OF STAIRS SHALL HAVE A MINIMUM WIDTH PERPENDICULAR TO THE DIRECTION OF TRAVEL, OF AT LEAST THE WIDTH OF THE STAIR, IN STRAIGHT RUN STAIRS, THE DISTANCE BETWEEN STAIRS WITHIN THE RUN SHALL NEED NOT BE MORE THAN 48". NO DOOR SHALL SWING ONTO A LANDING AND REDUCE THE EGRESS REQUIRED CLEAR WIDTH OF THE STAIR OR STAIR PLATFORM TO BE LESS THAN 75% OF THE REQUIRED WIDTH, OR WHEN FULLY OPEN, THE DOOR SHALL NOT PROJECT MORE THAN 1" INTO THE LANDING AS PER SECTION 1009.4
  - RISERS, TREADS, STRINGERS, LANDINGS, PLATFORMS AND GUARDS EXCLUSIVE OF HANDRAILS, SHALL BE BUILT OF NONCOMBUSTIBLE MATERIALS WHEN TWO STAIRS ARE CONTAINED WITHIN THE SAME ENCLOSURE, EACH STAIR SHALL BE SEPARATED FROM THE OTHER BY NONCOMBUSTIBLE CONSTRUCTION HAVING A FIRE RESISTANCE RATING EQUAL TO THAT REQUIRED FOR THE STAIR ENCLOSURE (BC 1009.5)
  - ALL INTERIOR STAIRS SHALL EXTEND UP TO THE ROOF (BC 1009.12.1)
  - STAIRS SHALL HAVE HANDRAILS ON EACH SIDE (EXCEPT STAIRS LESS THAN 44" IN WIDTH) HAVING FINGER CLEARANCE OF 1-1/2" MIN, PROJECTING NOT MORE THAN 4-1/2" INTO THE REQUIRED STAIR WIDTH, HEIGHT OF HANDRAIL SHALL BE UNIFORM NOT LESS THAN 34" AND NOT MORE THAN 38" MEASURED ABOVE THE STAIR TREAD NOSING, HANDRAILS SHALL BE DESIGNED IN COMPLIANCE WITH SECTION 1009.11
  - THE MAXIMUM VERTICAL RISE OF A SINGLE FLIGHT OF STAIRS BETWEEN FLOORS IS NOT TO EXCEED 12' EXCEPT IN OCCUPANCY GROUP A AND I WHERE THE VERTICAL RISE IS NOT TO EXCEED 8'-0" (SECTION 1009.6)
  - INTERIOR REQUIRED STAIRS EXTENDING TO THE ROOF SHALL BE VENTED AS PER THE REQUIREMENTS OF SECTION 910.5
  - STAIR EXIT DOORS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15'-0" IN R2 OCCUPANCY (SECTION 1014.21.3)
- EGRESS CORRIDORS SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS STATED IN SECTIONS BC 1011, 1013 THRU 1018, 1020 THRU 1023, 1024 & 1026 INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - PROTRUDING OBJECTS ARE PERMITTED TO EXTEND BELOW THE MIN. CEILING HEIGHT REQUIRED PROVIDE THAT A MIN. HEADROOM OF 1'-0" IN HEIGHT IS REQUIRED OVER ANY WALKING SURFACE NOT MORE THAN 50% OF THE CEILING AREA CAN BE REDUCED IN HEIGHT BY PROTRUDING OBJECTS SO AS TO OBSTRUCT FULL VIEW OF EXIT SIGNS. (SECTION 1008.3.1)
  - CORRIDOR WIDTH SHALL BE DETERMINED AS PER SECTION 1005.1, BUT NOT LESS THAN 44".
  - DEAD END CORRIDORS SHALL NOT EXCEED 80'-0" IN LENGTH (BC 1016.3)
  - DOORS WHEN THEY FULLY OPEN & HANDRAILS SHALL NOT REDUCE THE REQUIRED WIDTH BY MORE THAN 1". DOORS IN ANY POSITION SHALL NOT REDUCE THE REQUIRED WIDTH BY MORE THAN 1/2. OTHER NONSTRUCTURAL PROJECTIONS ARE PERMITTED TO PROJECT INTO THE REQUIRED WIDTH 15" ON EACH SIDE (BC 1020.2)
  - THE FINISHES IN ALL EXITS SHALL BE OF NONCOMBUSTIBLE MATERIALS AS PER CHAPTER 8 AND SUB-SECTION 1008.4 OF SECTION BC 1008
  - THE LOCATION OF EVERY EXIT ON EVERY FLOOR SHALL BE CLEARLY INDICATED BY EXIT SIGNS (SECTION BC 1011). EXIT SIGN SHALL BE PLACED APART SO THAT NO POINT IN THE EXIT CORRIDOR IS MORE THAN 100'-0"



CELLAR FLOOR PLAN

SCALE : 1/4" = 1'-0"



1ST FLOOR PLAN

SCALE : 1/4" = 1'-0"

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DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:

EGRESS PLANS

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ISSUE DATE:	PROJECT NO:	#1432
DRAWN BY:	CHECKED BY:	AR
SCALE:	SHEET NO:	9 of 22
DRAWING NO:		

A-003.00

NYC DOB NUMBER:

211 WEST 28TH STREET  
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AUFANG  
ARCHITECTS

FIRE PROTECTION

BUILDING IS FULLY SPRINKLERED AND EQUIPPED WITH AN ALTERNATIVE FIRE EXTINGUISHING SYSTEM. A STAKE LUNGS A FIRE ALARM AND DETECTION SYSTEM & A FIRE COMMAND CENTER IN COMPLIANCE WITH THE NYC BUILDING CODE, NYC FIRE CODE & LOCAL FIRE DEPARTMENT REQUIREMENTS.

EGRESS NOTES: CHAPTER 10

- MEANS OF EGRESS SHALL HAVE A CEILING HEIGHT NOT LESS THAN 7'-6" (BC 1008)
- OCCUPANT LOAD AS DETERMINED ON TABLE 1004.1.2
- EXIT AND ACCESS REQUIREMENTS ARE TO BE CALCULATED AS PER TABLE 1008.1 AS PER SECTION BC 1005
- EXITS, EXIT DISCHARGES AND PUBLIC CORRIDORS SHALL BE ILLUMINATED AT ALL TIMES AS PER BC 1006.
  - PUBLIC CORRIDORS AND EXITS SHALL BE PROVIDED WITH ARTIFICIAL LIGHT FIXTURES SURVEYING AT LEAST TWO FOOT CANDLES MEASURED AT THE FLOOR LEVEL, TO BE MAINTAINED CONTINUOUSLY THROUGHOUT. EXITS AND THEIR ACCESS FACILITIES FOR THEIR FULL LENGTH (BC 1006.2)
  - EXIT LIGHTING EXIT SIGNS & THE PORTION OF THE EXTERIOR EXIT DISCHARGE IMMEDIATELY ADJACENT TO EXIT DISCHARGE DOORWAYS SHALL BE CONNECTED TO AN EMERGENCY POWER SYSTEM FOR A DURATION NOT LESS THAN 90 MINUTES & SHALL CONSIST OF STORAGE BATTERIES, UNIT EQUIPMENT OR AN ON-SITE GENERATOR (BC 1006.3)
- ALL EXITS SHALL BE KEPT READILY ACCESSIBLE AND UNOBSTRUCTED AT ALL TIMES AS PER SECTION BC 1007.
- DOORS ARE TO COMPLY WITH ALL APPLICABLE REQUIREMENTS SECTION BC 1008 INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - CLEAR OPENING OF 32"(MN) IS REQUIRED AND SHALL BE MEASURED BETWEEN THE FACE OF THE DOOR AND THE STOP, WITH THE DOOR OPEN 90 DEGREES. (SECTION BC 1008.1.1)
  - DOOR HEIGHT NOT TO BE LESS THAN 6'-8" (BC 1008.1.1.3)
  - ALL EXIT DOORS ARE TO OPEN IN THE DIRECTION OF EGRESS (1008.1.2.2) FLOOR LEVELS ON BOTH SIDES OF ALL EXIT AND CORRIDOR DOORS ARE TO BE LEVEL AND AT THE SAME ELEVATION FOR A DISTANCE AT LEAST EQUAL TO THE WIDTH OF THE DOOR (1008.1.4)
  - EXIT DOORS SHALL BE READILY OPENABLE AT ALL TIMES FROM THE SIDE FROM WHICH EGRESS IS TO BE MADE. DOORS OPENING ONTO INTERIOR ENCLOSED STAIRS SHALL NOT BE LOCKED FROM EITHER SIDE EXCEPT THAT DOORS MAY BE LOCKED TO PREVENT ACCESS TO THE STAIR FROM THE OUTSIDE AT STREET LEVEL AS PER SECTION 1008.1.6
  - PANIC AND FIRE EXIT HARDWARE SHALL BE INSTALLED ON ALL EGRESS DOORS FROM OCCUPANCY GROUP 'A' OR 'E' HAVING AN OCCUPANT LOAD OF 75 PEOPLE OR MORE AS PER SECTION 1008.1.9
  - REQUIRED EXITS & SMOKE DOORS ARE TO BE SELF-CLOSING (BC 1153.1) WITH A 1-1/2 HOUR FIRE PROTECTION RATING (TABLE 115.3), EXCEPT IN THE FIRST STORY OF EXTERIOR WALLS FACING A STREET THAT HAVE A FIRE SEPARATION DISTANCE OF GREATER THAN 15'-0" (BC 104.6.2) THEN DOORS NEED NOT TO BE RATED.
- STAIRWAYS SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS STATED IN SECTIONS BC 1004 & 1014 INCLUDING, BUT NOT LIMITED TO THE FOLLOWING:
  - STAIR WIDTH SHALL BE DETERMINED AS SPECIFIED IN SECTION 1008.1, BUT SUCH WIDTH SHALL NOT BE LESS THAN 44" (BC 1004.1) OR 36" (BC 1008.1.2)
  - AREA OF RESCUE ASSISTANCE SHALL BE 30' X 48" FOR EACH OCCUPANTS AS PER SECTION 1007.6
  - THE CLEAR HEADROOM SHALL BE AT LEAST 6'-8" MINIMUM SPECIFIED IN SECTION 1009.2.1 (R-2 OCCUPANCY)
  - LANDINGS AND PLATFORMS PROVIDED AT THE HEAD AND FOOT OF EACH FLIGHT OF STAIRS SHALL HAVE A MINIMUM WIDTH PERPENDICULAR TO THE DIRECTION OF TRAVEL, OF AT LEAST THE WIDTH OF THE STAIR. IN STRAIGHT RUN STAIRS, THE DISTANCE BETWEEN STAIRS WITHIN THE RUN SHALL NEED NOT BE MORE THAN 48". NO DOOR SHALL SWING ONTO A LANDING AND REDUCE THE EGRESS REQUIRED CLEAR WIDTH OF THE STAIR OR STAIR PLATFORM. TO BE LESS THAN 75% OF THE REQUIRED WIDTH, OR WHEN FULLY OPEN THE DOOR SHALL NOT PROJECT MORE THAN 1" INTO THE LANDINGS AS PER SECTION 1004.4
  - RISERS, TREADS, STRINGERS, LANDINGS, PLATFORMS AND GUARDS EXCLUSIVE OF HANDRAILS, SHALL BE BUILT OF NONCOMBUSTIBLE MATERIALS. WHEN TWO STAIRS ARE CONTAINED WITHIN THE SAME ENCLOSURE, EACH STAIR SHALL BE SEPARATED FROM THE OTHER BY NONCOMBUSTIBLE CONSTRUCTION HAVING A FIRE RESISTANCE RATING EQUAL TO THAT REQUIRED FOR THE STAIR ENCLOSURE (BC 1004.5)
  - ALL INTERIOR STAIRS SHALL EXTEND UP TO THE ROOF (BC 1004.12.1)
  - STAIRS SHALL HAVE HANDRAILS ON EACH SIDE (EXCEPT STAIRS LESS THAN 44" IN WIDTH) HAVING FINGER CLEARANCE OF 1-1/2" MIN. PROJECTING NOT MORE THAN 4-1/2" INTO THE REQUIRED STAIR WIDTH. HEIGHT OF HANDRAIL SHALL BE UNIFORM, NOT LESS THAN 34" AND NOT MORE THAN 38" MEASURED ABOVE THE STAIR TREAD NOSING. HANDRAILS SHALL BE DESIGNED IN COMPLIANCE WITH SECTION 1009.1
- THE MAXIMUM VERTICAL RISE OF A SINGLE FLIGHT OF STAIRS BETWEEN FLOORS IS NOT TO EXCEED 12' EXCEPT IN OCCUPANCY GROUP A AND I WHERE THE VERTICAL RISE IS NOT TO EXCEED 8'-0" (SECTION 1004.6)
  - INTERIOR REQUIRED STAIRS EXTENDING TO THE ROOF SHALL BE VENTED AS PER THE REQUIREMENTS OF SECTION 910.5
  - STAIR EXIT DOORS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15'-0" IN R2 OCCUPANCY (SECTION 104.2.1.3)
- EGRESS CORRIDORS SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS STATED IN SECTIONS BC 101, 103 THRU 1016, 1020 THRU 1023, 1024 & 1026 INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - PROTRUDING OBJECTS ARE PERMITTED TO EXTEND BELOW THE MIN. CEILING HEIGHT REQUIRED PROVIDE THAT A MIN. HEADROOM OF 7'-0" IN HEIGHT IS REQUIRED OVER ANY WALKING SURFACE NOT MORE THAN 50% OF THE CEILING AREA CAN BE REDUCED IN HEIGHT BY PROTRUDING OBJECTS SO AS TO OBSTRUCT FULL VIEW OF EXIT SIGNS. (SECTION 1003.3.1)
  - CORRIDOR WIDTH SHALL BE DETERMINED AS PER SECTION 1005.1, BUT NOT LESS THAN 44".
  - DEAD END CORRIDORS SHALL NOT EXCEED 80'-0" IN LENGTH (BC 1016.3)
  - DOORS WHEN THEY FULLY OPEN & HANDRAILS SHALL NOT REDUCE THE REQUIRED WIDTH BY MORE THAN 1". DOORS IN ANY POSITION SHALL NOT REDUCE THE REQUIRED WIDTH BY MORE THAN 1/2. OTHER NONSTRUCTURAL PROJECTIONS ARE PERMITTED TO PROJECT INTO THE REQUIRED WIDTH 15" ON EACH SIDE (BC 1020.2)
  - THE FINISHES IN ALL EXITS SHALL BE OF NONCOMBUSTIBLE MATERIALS AS PER CHAPTER 8 AND SUB-SECTION 1003.4 OF SECTION BC 1003.
  - THE LOCATION OF EVERY EXIT ON EVERY FLOOR SHALL BE CLEARLY INDICATED BY EXIT SIGNS (SECTION BC 1011). EXIT SIGN SHALL BE PLACED APART, SO THAT NO POINT IN THE EXIT CORRIDOR IS MORE THAN 100'-0"

MAXIMUM BUILDING OCCUPANCY						MINIMUM EGRESS WIDTH (BC 1005)	
FLOOR	OCCUPANCY GROUP	NET FLOOR AREA PER OCCUPANT (SQU. FT.)	NET FLOOR AREA (SQU. FT.)	MAXIMUM NUMBER OF OCCUPANTS		REQUIRED	PROVIDED
CELLAR	RESIDENTIAL	R-2	15	140	13	22 X 0.2 = 4.4'	◇ X 2 = 64"
	BUSINESS (INCIDENTAL)	R-2	200 (GROSS)	1,750	4		
	ASSEMBLY (INCIDENTAL)	R-2	100	140	2		
1st	RESIDENTIAL	R-2	15	413	28	46 X 0.2 = 9.2'	◇ X 2 = 68"
	RESIDENTIAL	R-2	200	2,456	12		
2nd	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
3rd	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
4th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
5th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
6th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
7th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
8th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
9th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
10th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
11th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
12th	RESIDENTIAL	R-2	200	1,110	4	4 X 0.2 = 1.8'	◇ X 2 = 64"
13th	RESIDENTIAL	R-2	200	1,360	6	6 X 0.2 = 1.2'	◇ X 2 = 64"
14th	RESIDENTIAL	R-2	200	1,360	6	6 X 0.2 = 1.2'	◇ X 2 = 64"

SYMBOL LEGEND	
—	3 HR RATED WALL
—	2 HR RATED WALL
- - -	1 HR RATED WALL
⊙	CEILING MOUNTED EXIT SIGN
⊙	WALL MOUNTED EXIT SIGN
⊙	SIGN AT ELEVATOR LANDINGS
◇	8'-0" WIDE DOOR (2 LEAFS) EXIT CAPACITY = 68' / 0.2 = 340
◇	8'-0" WIDE DOOR (1 LEAF) EXIT CAPACITY = 34' / 0.2 = 170

MINIMUM WIDTH OF EGRESS			
	NYC BUILDING CODE SECTION	MIN. REQUIRED	PROVIDED
STAIRWAYS	1004.1	44"	44"
CORRIDOR	1016.2	44"	60"

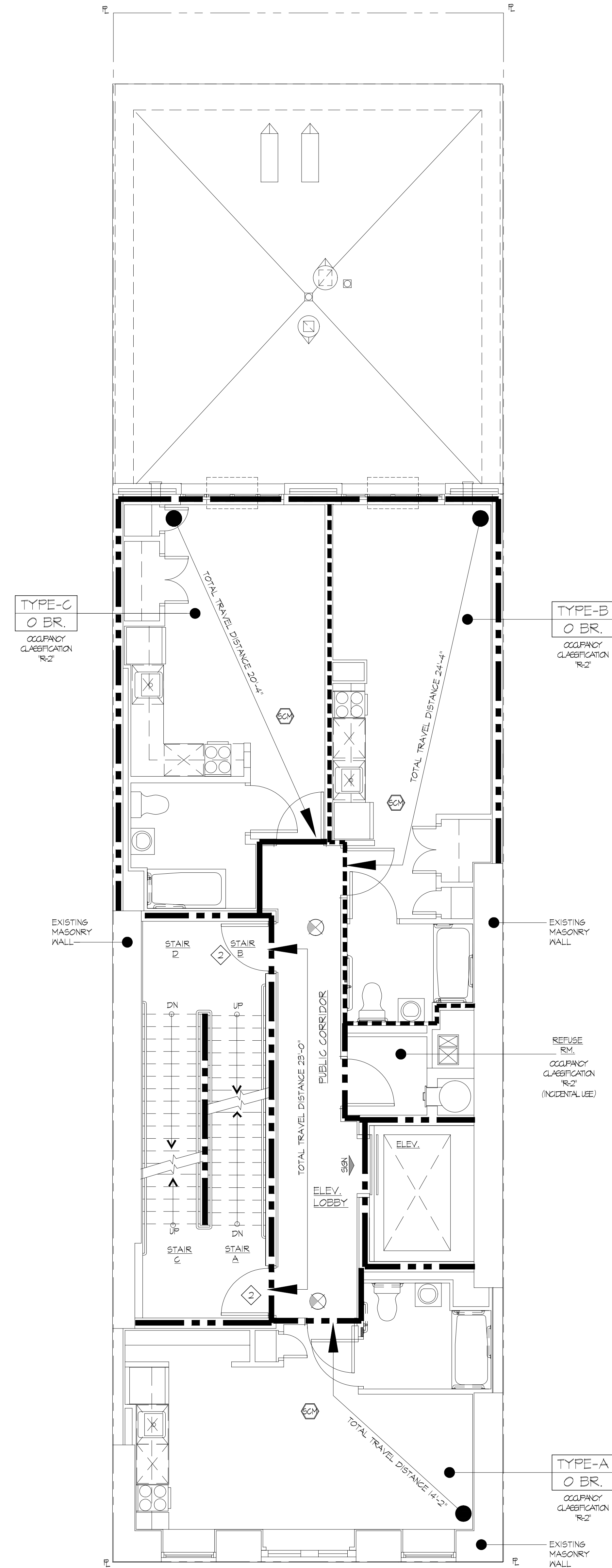
SPACES WITH ONE MEANS OF EGRESS		
OCCUPANCY GROUP		MAXIMUM OCCUPANT LOAD
ASSEMBLY	A-3	74
RESIDENTIAL	R-2	20
BUSINESS	B	74

MAXIMUM TRAVEL DISTANCE (W/ SPRINKLERS)			
OCCUPANCY GROUP	MAX. PERMITTED (FT.)	PROVIDED (FT.)	
RESIDENTIAL	R-2	200'-0"	74'-4"
BUSINESS	B	300'-0"	96'-0"

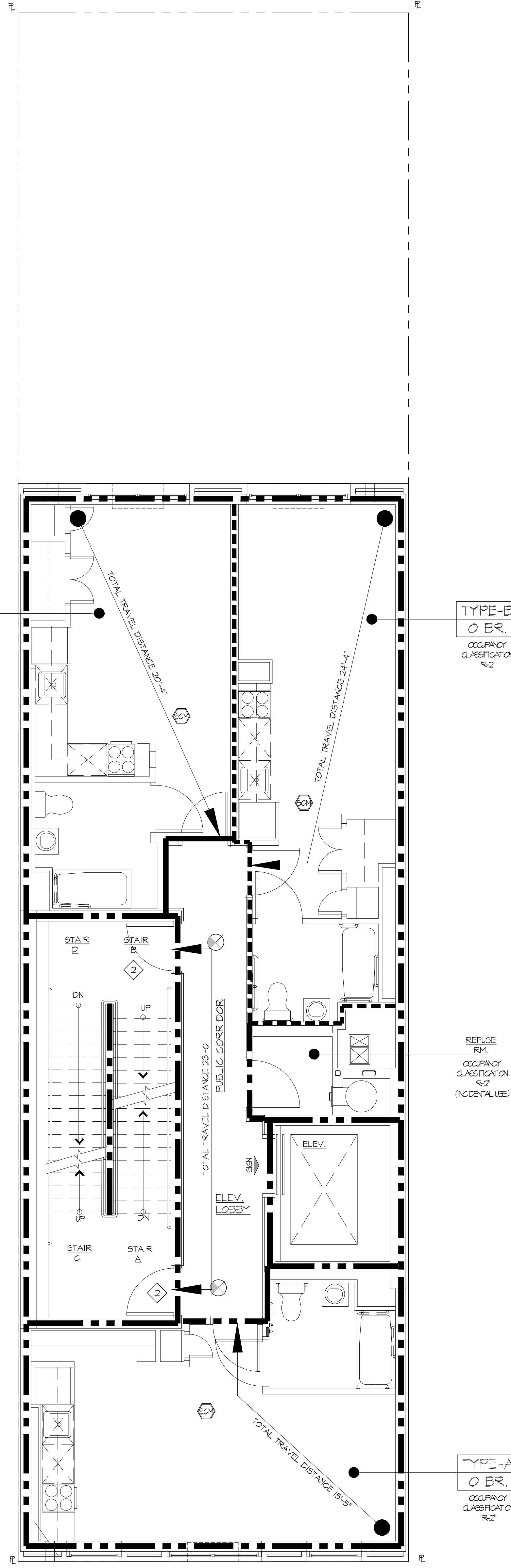
\* SEE NYC BUILDING CODE TABLE 1015.1 FOR MORE INFORMATION

\* DEAD END IN R-2 OCCUPANCY SHALL NOT EXCEED 80'  
ALL FLOORS COMPLY - BC 1016.3

TRAVEL DISTANCE WITHIN DWELLING UNIT	
UNIT TYPE	TRAVEL DISTANCE
A	15'-3"
B	24'-4"
C	20'-4"
D	27'-5"



2nd THRU 6TH FLOOR PLAN  
SCALE : 1/4" = 1'-0"



7TH THRU 12TH FLOOR PLAN  
SCALE : 1/4" = 1'-0"

01-30-15	ISSUED TO HPD FOR REVIEW & COMMENT
01-30-15	ISSUED TO DOB FOR REVIEW & COMMENT
DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:

EGRESS PLANS

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01-30-15	#1432
DRAWN BY:	CHECKED BY:
AR	
SCALE:	SHEET NO:
AS NOTED	10 of 22

DRAWING NO:  
A-004.00  
NYC DOB NUMBER:

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



## **ATTACHMENT B**

### **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and Arker Companies 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, Arker Companies 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, [Amanda Duchesne](#) , who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at [at 212-341-2077](#).

**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. Arker Companies will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Repository Name: Muhlenber Library

Repository Address: 209 West 23<sup>rd</sup> Street, New York, NY

Repository Telephone Number: 212-924-1585

Repository Hours of Operation:

Mon	10:00AM - 6:00PM
Tue	10:00 AM - 7:00 PM
Wed	10:00 AM - 6:00 PM
Thu	10:00 AM -7:00 PM
Fri	10:00 AM - 5:00 PM
Sat	10:00 AM - 5:00 PM
Sun	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).

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

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

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

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

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

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

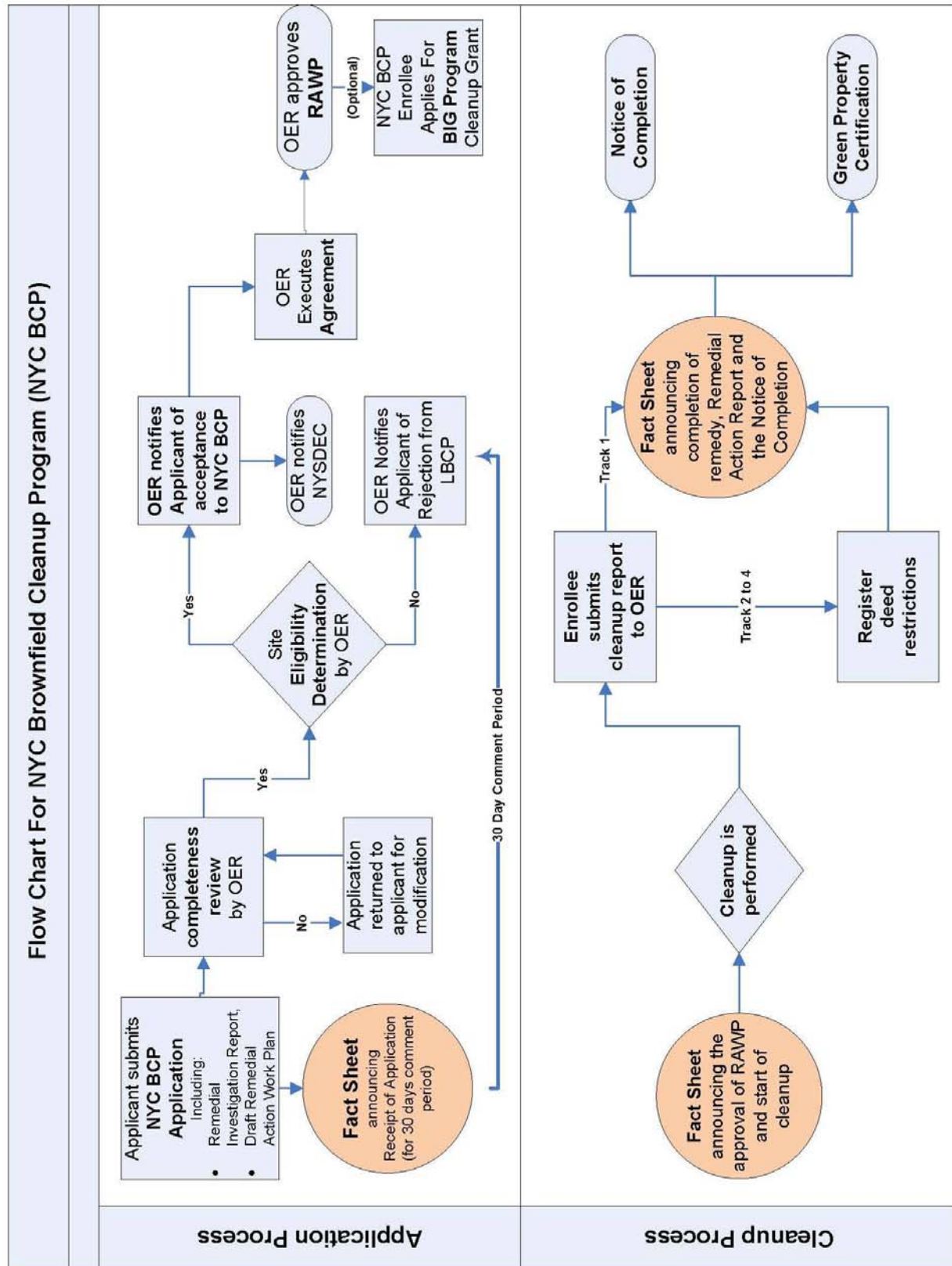
Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

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

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

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

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





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

## **ATTACHMENT C SUSTAINABILITY STATEMENT**

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

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

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

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

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

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

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



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

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

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

## **ATTACHMENT D**

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

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

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

#### **1.2 STOCKPILE METHODS**

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

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

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

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

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

The PE/QEP overseeing the remedial action will:

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

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

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

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

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized. Outbound truck transport routes are west on 29<sup>th</sup> Street to Route 9A.

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 Arker Companies 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 Brooklyn, 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 Arker Companies. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

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

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

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be

reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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

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

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

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

## **1.8 DEMARCATION**

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



SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

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

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

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

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

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

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence

that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

### **Source Screening and Testing**

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

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

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

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

### **1.10 FLUIDS MANAGEMENT**

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

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

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

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

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

### **1.12 CONTINGENCY PLAN**

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

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

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

#### **Odor Control**

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

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

#### **Dust Control**

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

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

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

#### **Other Nuisances**

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

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

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

## HEALTH AND SAFETY PLAN

Site: **Redevelopment Project**

Location: **211 West 28<sup>th</sup> Street, NY, NY**

Prepared By: **ENVIRONMENTAL BUSINESS CONSULTANTS**

Date Prepared: **March- 2015**

Version: **1**

Revision: **0**

### Project Description:

Waste types: **Solid**

Characteristics: **Semi-Volatile Organic Compounds, PCBs, pesticides and metals in historic fill (From grade to depths as great as 4 feet, with hotspots to 14 feet)**

Overall Hazard: **Low**

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

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***FIGURES***

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Figure 1                      Route to Hospital (Appendix D)

***APPENDICES***

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APPENDIX A	SITE SAFETY ACKNOWLEDGMENT FORM
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APPENDIX D	HOSPITAL INFORMATION, MAP AND FIELD ACCIDENT REPORT

## **STATEMENT OF COMMITMENT**

This Construction Health and Safety Plan (CHASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Action at 211 West 28<sup>th</sup> Street, New York, NY.

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

## 1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for the planned Remedial Action at 211 West 28<sup>th</sup> Street, New York, NY to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during remedial activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to excavation, loading and other soil disturbance activities and is based on the best information available. The CHASP may be revised by EBC at the request of the developer and/or a regulatory agency upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's project manager, site safety officer and/or the EBC health and safety consultant.

### 1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e-3).

Additionally all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

## 1.2 Medical Monitoring Requirements

Field personnel and visitors entering the exclusion zone or decontamination zone must have completed appropriate medical monitoring required under OSHA 29 CFR 1910.120(f) if respirators or other breathing related PPE is needed. Medical monitoring enables a physician to monitor each employee's health, physical condition, and his fitness to wear respiratory protective equipment and carry out on-site tasks.

## 1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

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

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

## 1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Mrs. Chawinie Reilly	Health & Safety Manager	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000
Mr. Kevin Waters	Site Safety Officer	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000

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

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

1. Educating personnel about information in this CHASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination

procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.
3. Designating exclusion, decontamination and support zones on a daily basis.
4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.
5. Maintaining the work zone entry/exit log and site entry/exit log.
6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

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

## 2.0 SITE BACKGROUND AND SCOPE OF WORK

The street address for the subject site is 211 West 28<sup>th</sup> Street, and is situated on the north side of West 28th Street between 7th Avenue and 9th Avenue in Manhattan, New York. The Site is located in the City of New York and Borough of Manhattan (New York County). The Site is designated as Block 778, Lot 33 by the City of New York, Department of Assessment.

Lot 44 is a rectangular lot that consists of 24.87 feet of frontage on West 28th Street and is approximately 98.75 feet deep for a total area of 2,456 ft<sup>2</sup>. The entire footprint of the lot is developed with a vacant 6-story commercial building.

### 2.1 Previous Investigations

#### 2.1.1 Phase II Subsurface Investigation Report (EBC January 2015)

In accordance with the approved Phase II Work Plan, a total of three soil borings (B1-B3), two monitoring wells and three subslab soil gas implants were installed on January 26 and 30, 2015 to gain representative soil and subslab soil vapor information across the site.

##### *Soil Borings*

Soil borings SB1-SB3 were advanced manually using a 1.25 AMS soil core sampler with acetate liners and a slap hammer to collect samples from the 0-2 ft and 2-4 ft intervals.

Soil cores from each boring were characterized by an environmental professional (EP) and field screened for the presence of VOCs using a photo-ionization detector (PID). The EP's field observations and PID readings were recorded for each boring in a soil boring log. No petroleum odors, PID readings or physical evidence of petroleum were detected in any of the soil borings.

A total of six soil samples were collected in pre-cleaned, laboratory supplied glassware, stored in a cooler with ice and submitted for analysis to Phoenix Environmental Laboratory, Inc. of Manchester, CT, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301). All soil samples were analyzed for the presence of VOCs by EPA Method 8260, semi-volatile organic compounds (SVOCs) by EPA Method 8270, pesticides/PCBs by EPA Methods 8081/8082 and target analyte list (TAL) metals.

##### *Soil Gas Sampling*

To evaluate the potential for VOC contamination site-wide, three sub-slab sampling points (SG1-SG5) were installed on January 26, 2015. The points were installed by drilling a 0.5 inch diameter hole through the concrete slab using a hammer drill and drill bit. At each drilled location, a length of disposable polyethylene tubing was installed to a depth of approximately 2 to 3 inches below the concrete slab surface. The surface of the drilled hole was sealed with hydrated granular bentonite and a 1 foot square sheet of 2 mil HDPE plastic sheeting.

Samples were then collected following NYSDOH sampling procedures over a 2-hour period using a 6-liter Summa® canister. Samples were submitted to a NYSDOH certified laboratory for analysis of VOCs by EPA method TO15.

##### *Findings*

The Phase II Investigation Report prepared by EBC concluded that the Subsurface soil at the site

consisted of urban fill, which was primarily comprised of brick, concrete, wood and other debris in a brown sandy matrix to a depth of approximately 2 feet, underlain by native grey silt to the termination depth of 4 feet below grade. The 2-4 ft interval contained two samples with tetrachloroethene (PCE) detected below NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives. Several pesticides were detected above Unrestricted Use Soil Cleanup Objectives in all of the 0-2 ft samples and two of the 2-4 ft samples. Several heavy metals were detected above Unrestricted Use SCOs/Residential Restricted Use SCOs in all of 0-2 ft samples and one of the 2-4 ft samples. No VOCs or PCBs were reported above SCOs. The parameters detected and the concentrations reported are consistent with that of urban fill.

Soil vapor samples collected during the 2015 EBC RI were compared to the New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (October 2006) Matrix 1 and Matrix 2 values. Samples indicated petroleum-related VOCs were present at low concentrations and chlorinated VOCs present at low concentrations. The total concentration of petroleum-related VOCs (BTEX) ranged from 20.36  $\mu\text{g}/\text{m}^3$  to 163.92  $\mu\text{g}/\text{m}^3$ . The chlorinated VOC, trichloroethylene (TCE) was detected in one of the soil gas samples at 1.72  $\mu\text{g}/\text{m}^3$ . Tetrachloroethylene (PCE) was detected in all three soil gas samples ranging in concentration from 2.91  $\mu\text{g}/\text{m}^3$  to 7.39  $\mu\text{g}/\text{m}^3$ . The NYSDOH Final Guidance on Soil Vapor Intrusion (October 2006) notes monitoring is the recommended action for a PCE concentration above 100  $\mu\text{g}/\text{m}^3$  in soil gas. Carbon tetrachloride (maximum of 0.44  $\mu\text{g}/\text{m}^3$ ) was detected in all three of the soil gas samples. 1,1,1-Trichloroethane was not detected in any of the soil gas samples. The TCE, PCE, 1,1,1-Trichloroethane and carbon tetrachloride concentrations are below the monitoring level ranges established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

## 2.2 Redevelopment Plans

The property is currently improved with a 6-story commercial building. The current commercial building will be demolished and the Site will be developed with a 14-story commercial and residential building with a cellar level requiring excavation to approximately 5.85 ft below current grade. The building footprint will occupy approximately 100% of the Site.

## 2.3 Description of Remedial Action

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and implementation of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan;
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Selection of Site Specific (Track 4) SCOs;
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
5. Installation of one groundwater well to evaluate ground water quality for the Site.
6. No excavation will be performed on Site;
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;
8. Collection and analysis of three end-point samples to determine the performance of the remedy with respect to attainment of SCOs;
9. No import of materials to be used for backfill and cover is planned for the Site;
10. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
11. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
12. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP;



13. As part of new development, installation of a vapor barrier below the cellar and behind the foundation walls of the proposed building. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins;
14. As part of new development, construction and maintenance of an engineered composite cover consisting of a 4 inch thick concrete basement slab to prevent human exposure to residual soil/fill remaining under the Site;
15. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency; and
20. The property will continue to be registered with an E-Designation by 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.

### **3.0 HAZARD ASSESSMENT**

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

#### **3.1 Physical Hazards**

##### *3.1.1 Tripping Hazards*

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

##### *3.1.2 Climbing Hazards*

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

##### *3.1.3 Cuts and Lacerations*

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

##### *3.1.4 Lifting Hazards*

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

##### *3.1.5 Utility Hazards*

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

##### *3.1.6 Traffic Hazards*

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

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

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

### 3.2.1 Heat Stress

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

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

#### 1. Prevention

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

#### 2. Recognition and Treatment

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

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

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

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

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

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

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

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

##### c. Heat Stroke

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

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

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

### 3.2.2 Cold Exposure

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

## 3.3 Chemical Hazards

“Urban fill” materials, present throughout the New York City area typically contain elevated levels of semi-volatile organic compounds and metals. These “contaminants” are not related to a chemical release occurring on the site, but are inherent in the reworked fill material in the area which contains ash and bits of tar and asphalt. Considering the previous sampling results and the past and present use of the site, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and heavy metals such as cadmium, chromium, lead, copper, mercury, silver and zinc.

The primary routes of exposure to these contaminants are inhalation, ingestion and absorption.

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

### 3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m<sup>3</sup> over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

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

### 3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over 150 µg/m<sup>3</sup> over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

### 3.3.3 Organic Vapors

Elevated levels of VOCs were detected in both soil and soil vapor samples collected during previous investigations at the site. Therefore, excavation activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

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

### 4.1 Level D

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

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

### 4.2 Level C

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

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

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

- chemical resistant coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves;
- disposable outer gloves;
- hard hat; and,
- ankles/wrists taped.

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

### 4.3 Activity-Specific Levels of Personal Protection

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

## 5.0 AIR MONITORING AND ACTION LEVELS

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

### 5.1 Air Monitoring Requirements

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

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

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

### 5.2 Work Stoppage Responses

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

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

### 5.3 Action Levels During Excavation Activities

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

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	<ul style="list-style-type: none"><li>• Continue excavating</li><li>• Level D protection</li><li>• Continue monitoring every 10 minutes</li></ul>



1-5 ppm Above Background, Sustained Reading	1-10%	<ul style="list-style-type: none"> <li>• Continue excavating</li> <li>• Go to Level C protection or employ engineering controls</li> <li>• Continue monitoring every 10 minutes</li> </ul>
5-25 ppm Above Background, Sustained Reading	10-20%	<ul style="list-style-type: none"> <li>• Discontinue excavating, unless PID is only action level exceeded.</li> <li>• Level C protection or employ engineering controls</li> <li>• Continue monitoring for organic vapors 200 ft downwind</li> <li>• Continuous monitoring for LEL at excavation pit</li> </ul>
>25 ppm Above Background, Sustained Reading	>20%	<ul style="list-style-type: none"> <li>• Discontinue excavating</li> <li>• Withdraw from area, shut off all engine ignition sources.</li> <li>• Allow pit to vent</li> <li>• Continuous monitoring for organic vapors 200 ft downwind.</li> </ul>

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

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

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

## **6.0 SITE CONTROL**

### **6.1 Work Zones**

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

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

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

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

## 7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

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

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

### 7.1 Emergency Equipment On-site

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

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

### 7.2 Emergency Telephone Numbers

General Emergencies	911
New York City Police	911
Bellevue Hospital Center	1-212-562-4141
NYSDEC Spills Division	1-800-457-7362
NYSDEC Hazardous Waste Division	1-718-482-4994
NYCDEP	1-718-699-9811
NYC Department of Health	1-212-788-4711
NYC Fire Department	911
National Response Center	1-800-424-8802
Poison Control	1-212-340-4494
Site Safety Officer	1-631-504-6000
Alternate Site Safety Officer	1-631-504-6000

### 7.3 Personnel Responsibilities During an Emergency

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

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;
- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department

should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

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

The following key personnel are planned for this project:

- |                               |                                     |
|-------------------------------|-------------------------------------|
| • Project Manager             | Mrs. Chawinie Reilly (631) 504-6000 |
| • Construction Superintendent | To be added                         |
| • Site Safety Officer         | Mr. Kevin Waters (631) 504-6000     |

#### 7.4 Medical Emergencies

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

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

#### 7.5 Fire or Explosion

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

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

#### 7.6 Evacuation Routes

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

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

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

### **7.7 Spill Control Procedures**

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

### **7.8 Vapor Release Plan**

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

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

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

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

## DAILY BRIEFING SIGN-IN SHEET

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

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

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

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

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3. ATTENDEES (Print Name):

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

# ***APPENDIX B***

## ***SITE SAFETY PLAN AMENDMENTS***





## SITE SAFETY PLAN AMENDMENT FORM

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

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

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Date

# ***APPENDIX C***

## ***CHEMICAL HAZARDS***

### **CHEMICAL HAZARDS**

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

# International Chemical Safety Cards

**TOLUENE**

ICSC: 0078



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

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



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• <b>EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus		Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II

## SEE IMPORTANT INFORMATION ON BACK

ICSC: 0078

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

# International Chemical Safety Cards

TOLUENE

ICSC: 0078

I M P O R T A N T D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.	
	<b>PHYSICAL DANGERS:</b> The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.	<b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.	
	<b>CHEMICAL DANGERS:</b> Reacts violently with strong oxidants causing fire and explosion hazard.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the respiratory tract The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmiaandunconsciousness.	
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 50 ppm 190 mg/m³ H Peak limitation category: II(4) Pregnancy risk group: C (DFG 2004). OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak) NIOSH REL: TWA 100 ppm (375 mg/m³) ST 150 ppm (560 mg/m³) NIOSH IDLH: 500 ppm See: <a href="#">108883</a>	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.	
	<b>PHYSICAL PROPERTIES</b>	Boiling point: 111°C Melting point: -95°C Relative density (water = 1): 0.87 Solubility in water: none Vapour pressure, kPa at 25°C: 3.8 Relative vapour density (air = 1): 3.1	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 4°C c.c. Auto-ignition temperature: 480°C Explosive limits, vol% in air: 1.1-7.1 Octanol/water partition coefficient as log Pow: 2.69
		<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms.
<b>NOTES</b>			
Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect. Transport Emergency Card: TEC (R)-30S1294 NFPA Code: H 2; F 3; R 0;			
<b>ADDITIONAL INFORMATION</b>			
ICSC: 0078		TOLUENE	
(C) IPCS, CEC, 1994			

**IMPORTANT  
LEGAL  
NOTICE:**

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

# International Chemical Safety Cards

## TETRACHLOROETHYLENE

ICSC: 0076



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

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



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

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

### SEE IMPORTANT INFORMATION ON BACK


ICSC: 0076

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

# International Chemical Safety Cards

## TETRACHLOROETHYLENE

ICSC: 0076

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air.</p> <p><b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004). MAK: skin absorption (H); Carcinogen category: 3B; (DFG 2004). OSHA PEL<sup>+</sup>: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours) NIOSH REL: Ca Minimize workplace exposure concentrations. <a href="#">See Appendix A</a> NIOSH IDLH: Ca 150 ppm See: <a href="#">127184</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.</p>
<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 121°C Melting point: -22°C Relative density (water = 1): 1.6 Solubility in water, g/100 ml at 20°C: 0.015</p>	<p>Vapour pressure, kPa at 20°C: 1.9 Relative vapour density (air = 1): 5.8 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09 Octanol/water partition coefficient as log Pow: 2.9</p>
<b>ENVIRONMENTAL DATA</b>	<p>The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p>	
<b>NOTES</b>		
<p>Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61S1897</p> <p style="text-align: right;">NFPA Code: H2; F0; R0;</p>		
<b>ADDITIONAL INFORMATION</b>		
<div> <div>ICSC: 0076</div> <div>TETRACHLOROETHYLENE</div> <div>(C) IPCS, CEC, 1994</div> </div>		

**IMPORTANT  
LEGAL  
NOTICE:**

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only

	modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
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# International Chemical Safety Cards

m-XYLENE

ICSC: 0085



meta-Xylene  
1,3-Dimethylbenzene  
m-Xylol  
 $C_6H_4(CH_3)_2 / C_8H_{10}$   
Molecular mass: 106.2

ICSC # 0085  
CAS # 108-38-3  
RTECS # [ZE2275000](#)  
UN # 1307  
EC # 601-022-00-9  
August 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

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

## SEE IMPORTANT INFORMATION ON BACK

ICSC: 0085

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




# International Chemical Safety Cards

**m-XYLENE**

**ICSC: 0085**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m<sup>3</sup> Peak limitation category: II(2) skin absorption (H); Pregnancy risk group: D (DFG 2005). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL<sup>+</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 139°C Melting point: -48°C Relative density (water = 1): 0.86 Solubility in water: none Vapour pressure, kPa at 20°C: 0.8</p>	<p>Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 27°C c.c. Auto-ignition temperature: 527°C Explosive limits, vol% in air: 1.1-7.0 Octanol/water partition coefficient as log Pow: 3.20</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0086 p-Xylene.

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

## ADDITIONAL INFORMATION

<p><b>ICSC: 0085</b></p>	<p><b>m-XYLENE</b></p>
<p>(C) IPCS, CEC, 1994</p>	

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

**p-XYLENE**

ICSC: 0086



para-Xylene  
1,4-Dimethylbenzene  
p-Xylol  
 $C_6H_4(CH_3)_2 / C_8H_{10}$   
Molecular mass: 106.2

ICSC # 0086  
CAS # 106-42-3  
RTECS # [ZE2625000](#)  
UN # 1307  
EC # 601-022-00-9  
August 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0086**

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


# International Chemical Safety Cards

**p-XYLENE**

**ICSC: 0086**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m<sup>3</sup> Peak limitation category: II(2) skin absorption (H); Pregnancy risk group: D (DFG 2005). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL<sup>+</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 138°C Melting point: 13°C Relative density (water = 1): 0.86 Solubility in water: none Vapour pressure, kPa at 20°C: 0.9</p>	<p>Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 27°C c.c. Auto-ignition temperature: 528°C Explosive limits, vol% in air: 1.1-7.0 Octanol/water partition coefficient as log Pow: 3.15</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0085 m-Xylene.

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

## ADDITIONAL INFORMATION

<p><b>ICSC: 0086</b></p>	<p><b>p-XYLENE</b></p>

(C) IPCS, CEC, 1994

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

**o-XYLENE**

ICSC: 0084



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

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



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

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0084**

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


# International Chemical Safety Cards

**o-XYLENE**

**ICSC: 0084**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m<sup>3</sup> Peak limitation category: II(2) skin absorption (H); Pregnancy risk group: D (DFG 2005). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL<sup>†</sup>: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 144°C Melting point: -25°C Relative density (water = 1): 0.88 Solubility in water: none Vapour pressure, kPa at 20°C: 0.7</p>	<p>Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 32°C c.c. Auto-ignition temperature: 463°C Explosive limits, vol% in air: 0.9-6.7 Octanol/water partition coefficient as log Pow: 3.12</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p> 
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<p><b>NOTES</b></p> <p>Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0086 p-Xylene and 0085 m-Xylene.</p> <p>Transport Emergency Card: TEC (R)-30S1307-III NFPA Code: H 2; F 3; R 0;</p>		
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<p><b>ADDITIONAL INFORMATION</b></p>		
<p><b>ICSC: 0084</b></p>	<p>(C) IPCS, CEC, 1994</p>	<p><b>o-XYLENE</b></p>

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

Normal-Butylbenzene, 99+ %

ACC# 55434

## Section 1 - Chemical Product and Company Identification

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

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

**Synonyms:** 1-Phenylbutane

**Company Identification:**

Acros Organics N.V.

One Reagent Lane

Fair Lawn, NJ 07410

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

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

## Section 2 - Composition, Information on Ingredients

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

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

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

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

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

### Potential Health Effects

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

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

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

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

**Chronic:** No information found.

## Section 4 - First Aid Measures

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

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

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

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

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

## Section 5 - Fire Fighting Measures

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

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

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

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

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

**Upper:** 5.80 vol %

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

## Section 6 - Accidental Release Measures

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

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

## Section 7 - Handling and Storage

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

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

## Section 8 - Exposure Controls, Personal Protection

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

### Exposure Limits

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

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

### Personal Protective Equipment

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

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

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

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

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

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless

**Odor:** None reported.

**pH:** Not available.

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

**Vapor Density:** 4.6

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

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

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

**Decomposition Temperature:** > 183 deg C

**Solubility:** insoluble

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

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

**Molecular Weight:** 134.22

## Section 10 - Stability and Reactivity

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

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

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

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

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

## Section 11 - Toxicological Information

**RTECS#:**

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

**LD50/LC50:**

Not available.

**Carcinogenicity:**

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

**Epidemiology:** No information available.

**Teratogenicity:** No information available.

**Reproductive Effects:** No information available.

**Mutagenicity:** No information available.

**Neurotoxicity:** No information available.

**Other Studies:**

## Section 12 - Ecological Information

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

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



**Physical:** No information available.

**Other:** No information available.

## Section 13 - Disposal Considerations

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

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

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

## Section 14 - Transport Information

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

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

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

#### Health & Safety Reporting List

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

#### Chemical Test Rules

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

#### Section 12b

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

#### TSCA Significant New Use Rule

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

#### CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

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

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

#### Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

#### Clean Water Act:

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

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

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

#### OSHA:

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

#### STATE

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

#### California Prop 65

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

## European/International Regulations

### European Labeling in Accordance with EC Directives

#### Hazard Symbols:

Not available.

#### Risk Phrases:

R 10 Flammable.

#### Safety Phrases:

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

S 24/25 Avoid contact with skin and eyes.

S 33 Take precautionary measures against static discharges.

S 37 Wear suitable gloves.

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

S 9 Keep container in a well-ventilated place.

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

#### WGK (Water Danger/Protection)

CAS# 104-51-8: 1

#### Canada - DSL/NDSL

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

#### Canada - WHMIS

This product has a WHMIS classification of B3, D2B.

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

#### Canadian Ingredient Disclosure List

## Section 16 - Additional Information

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

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

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

# International Chemical Safety Cards

**CUMENE**

ICSC: 0170



(1-Methylethyl)benzene  
2-Phenylpropane  
Isopropylbenzene  
 $C_9H_{12}$  /  $C_6H_5CH(CH_3)_2$   
Molecular mass: 120.2

ICSC # 0170  
CAS # 98-82-8  
RTECS # [GR8575000](#)  
UN # 1918  
EC # 601-024-00-X  
April 13, 2000 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 31°C explosive vapour/air mixtures may be formed.	Above 31°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
• <b>INHALATION</b>	Dizziness. Ataxia. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants, acids. Cool. Keep in the dark. Store only if stabilized.	Marine pollutant. Note: C Xn symbol N symbol R: 10-37-51/53-65 S: 2-24-37-61-62 UN Hazard Class: 3 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0170**

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


# International Chemical Safety Cards

**CUMENE**

**ICSC: 0170**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with acids and strong oxidants causing fire and explosion hazard. The substance can form explosive peroxides.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA (ACGIH 2004). MAK: 50 ppm 250 mg/m<sup>3</sup> Peak limitation category: II(4); skin absorption (H); Pregnancy risk group: C; (DFG 2004). OSHA PEL: TWA 50 ppm (245 mg/m<sup>3</sup>) skin NIOSH REL: TWA 50 ppm (245 mg/m<sup>3</sup>) skin NIOSH IDLH: 900 ppm 10%LEL See: <a href="#">98828</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and through the skin.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system Exposure far above the OEL may result in unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 152°C Melting point: -96°C Relative density (water = 1): 0.90 Solubility in water: none Vapour pressure, Pa at 20°C: 427 Relative vapour density (air = 1): 4.2</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 31°C c.c. Auto-ignition temperature: 420°C Explosive limits, vol% in air: 0.9-6.5 Octanol/water partition coefficient as log Pow: 3.66</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p>	
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## NOTES

<p>Check for peroxides prior to distillation; eliminate if found.</p>	<p>Transport Emergency Card: TEC (R)-30S1918 or 30GF1-III NFPA Code: H2; F3; R1</p>
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## ADDITIONAL INFORMATION

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<p><b>ICSC: 0170</b></p>	<p><b>CUMENE</b></p> <p>(C) IPCS, CEC, 1994</p>
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<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

**ETHYLBENZENE**

ICSC: 0268



Ethylbenzol  
Phenylethane  
EB  
 $C_8H_{10} / C_6H_5C_2H_5$   
Molecular mass: 106.2

ICSC # 0268  
CAS # 100-41-4  
RTECS # [DA0700000](#)  
UN # 1175  
EC # 601-023-00-4  
March 13, 1995 Validated



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

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0268**

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


# International Chemical Safety Cards

## ETHYLBENZENE

ICSC: 0268

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

<p>The odour warning when the exposure limit value is exceeded is insufficient.</p>	<p>Transport Emergency Card: TEC (R)-30S1175 or 30GF1-I+II NFPA Code: H2; F3; R0</p>
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### ADDITIONAL INFORMATION

<b>ICSC: 0268</b>	<b>ETHYLBENZENE</b>
(C) IPCS, CEC, 1994	

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

## DICHLORODIFLUOROMETHANE

ICSC: 0048



Difluorodichloromethane

R 12

CFC 12

CCl<sub>2</sub>F<sub>2</sub>

Molecular mass: 120.9

(cylinder)

ICSC # 0048

CAS # 75-71-8

RTECS # [PA8200000](#)

UN # 1028

July 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			In case of fire: keep cylinder cool by spraying with water.
<b>EXPOSURE</b>			
• <b>INHALATION</b>	Cardiac arrhythmia. Confusion. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
• <b>SKIN</b>	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
• <b>EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Ventilation.		Separated from incompatible materials . See Chemical Dangers. Cool. Ventilation along the floor.	Special insulated cylinder. UN Hazard Class: 2.2

### SEE IMPORTANT INFORMATION ON BACK

ICSC: 0048

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

# International Chemical Safety Cards

## DICHLORODIFLUOROMETHANE

ICSC: 0048

I M P O R T A N T A	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.	
	<b>PHYSICAL DANGERS:</b> The gas is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.	<b>INHALATION RISK:</b> On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas.	
	<b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases(hydrogen chloride ICSC 0163,phosgene ICSC 0007,hydrogen fluoride ICSC 0283,carbonyl fluoride ICSC 0633). Reacts violently with metals such as zinc and powdered aluminium . Attacks magnesium and its alloys.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system and central nervous system , resulting in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.	
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 1000 ppm as TWA A4 (ACGIH 2001). MAK: 1000 ppm; 5000 mg/m³; IV, C (DFG 2001). OSHA PEL: TWA 1000 ppm (4950 mg/m³) NIOSH REL: TWA 1000 ppm (4950 mg/m³) NIOSH IDLH: 15,000 ppm See: <a href="#">75718</a>	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b>	
	<b>PHYSICAL PROPERTIES</b>	Boiling point: -30°C Melting point: -158°C Relative density (water = 1): 1.5 Solubility in water, g/100 ml at 20°C: 0.03	Vapour pressure, kPa at 20°C: 568 Relative vapour density (air = 1): 4.2 Octanol/water partition coefficient as log Pow: 2.16
	<b>ENVIRONMENTAL DATA</b>	This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.	
<b>NOTES</b>			
High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Freon 12, Frigen 12, Halon 122 are trade names.			
Transport Emergency Card: TEC (R)-20G2A			
<b>ADDITIONAL INFORMATION</b>			
<b>ICSC: 0048</b>			
<b>DICHLORODIFLUOROMETHANE</b>			
(C) IPCS, CEC, 1994			
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		



# International Chemical Safety Cards

## CHLOROFORM

ICSC: 0027



Trichloromethane  
Methane trichloride  
Formyl trichloride  
 $\text{CHCl}_3$

Molecular mass: 119.4

ICSC # 0027  
CAS # 67-66-3  
RTECS # [FS9100000](#)  
UN # 1888  
EC # 602-006-00-4  
November 04, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. See Notes. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
• <b>INHALATION</b>	Cough. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
• <b>SKIN</b>	Redness. Pain. Dry skin.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
• <b>EYES</b>	Redness. Pain.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give plenty of water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Separated from food and feedstuffs and incompatible materials, ( see Chemical Dangers ). Ventilation along the floor.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Xn symbol R: 22-38-40-48/20/22 S: 2-36/37 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety &amp; the Commission of the

ICSC: 0027

European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## CHLOROFORM

ICSC: 0027

I M P O R T A N T A D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> VOLATILE COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	<b>PHYSICAL DANGERS:</b> The vapour is heavier than air.	<b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.
	<b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride ICSC0163,phosgene ICSC0007 andchlorine fumes ICSC0126). Reacts violently withstrong bases,strong oxidants, some metals, such as aluminium, magnesium and zinc, causing fire and explosion hazard. Attacks plastic, rubber and coatings.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes . The substance may cause effects on the central nervous system , liver and kidneys . The effects may be delayed. Medical observation is indicated.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 10 ppm as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). MAK: 0.5 ppm, 2.5 mg/m³; Peak limitation category: II(2); skin absorption (H); Carcinogen category: 4; Pregnancy risk group: C; (DFG 2004). OSHA PEL†: C 50 ppm (240 mg/m³) NIOSH REL: Ca ST 2 ppm (9.78 mg/m³) 60-minute <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 ppm See: <a href="#">67663</a>	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the liver and kidneys . This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 62°C Melting point: -64°C Relative density (water = 1): 1.48 Solubility in water, g/100 ml at 20°C: 0.8	Vapour pressure, kPa at 20°C: 21.2 Relative vapour density (air = 1): 4.12 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.7 Octanol/water partition coefficient as log Pow: 1.97
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms.	
NOTES		
Turns combustible on addition of small amounts of a flammable substance or an increase in the oxygen content of the air. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in April 2005. See section Occupational Exposure Limits.		
Transport Emergency Card: TEC (R)-61S1888		
NFPA Code: H 2; F 0; R 0;		
ADDITIONAL INFORMATION		
ICSC: 0027		
CHLOROFORM		
(C) IPCS, CEC, 1994		

**IMPORTANT  
LEGAL  
NOTICE:**

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# International Chemical Safety Cards

## CARBON TETRACHLORIDE

ICSC: 0024



Tetrachloromethane  
Tetrachlorocarbon  
Tetra  
 $\text{CCl}_4$

Molecular mass: 153.8

ICSC # 0024

CAS # 56-23-5

RTECS # [FG4900000](#)

UN # 1846

EC # 602-008-00-5

November 04, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! Redness. Pain.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
• <b>EYES</b>	Redness. Pain.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Diarrhoea. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give one or two glasses of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Separated from food and feedstuffs, metals (see Chemical Dangers). Ventilation along the floor. Cool.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Marine pollutant. T symbol. N symbol. R: 23/24/25-40-48/23-52/53-59. S: 1/2-23-36/37-45-59-61. UN Hazard Class: 6.1. UN Packing Group: II.

SEE IMPORTANT INFORMATION ON BACK

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

ICSC: 0024

OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## CARBON TETRACHLORIDE

ICSC: 0024

I M P O R T A N T D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	<b>PHYSICAL DANGERS:</b> The vapour is heavier than air.	<b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.
	<b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride ICSC0163, chlorine fumes ICSC0126, phosgene ICSC0007). Reacts with some metals such as aluminium, magnesium, zinc causing fire and explosion hazard.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes . The substance may cause effects on the liver , kidneys and central nervous system , resulting in unconsciousness. Medical observation is indicated.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 5 ppm as TWA, 10 ppm as STEL; (skin); A2 (suspected human carcinogen); (ACGIH 2004). MAK: 0.5 ppm, 3.2 mg/m³; Peak limitation category: II(2); skin absorption (H); Carcinogen category: 4; Pregnancy risk group: C; (DFG 2006). OSHA PEL†: TWA 10 ppm C 25 ppm 200 ppm (5-minute maximum peak in any 4 hours) NIOSH REL: Ca ST 2 ppm (12.6 mg/m³) 60-minute <a href="#">See Appendix A</a> NIOSH IDLH: Ca 200 ppm See: <a href="#">56235</a>	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. This substance is possibly carcinogenic to humans.
<b>PHYSICAL PROPERTIES</b>	Boiling point: 76.5°C Melting point: -23°C Relative density (water = 1): 1.59 Solubility in water, g/100 ml at 20°C: 0.1 poor	Vapour pressure, kPa at 20°C: 12.2 Relative vapour density (air = 1): 5.3 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.5 Octanol/water partition coefficient as log Pow: 2.64
<b>ENVIRONMENTAL DATA</b>	The substance is harmful to aquatic organisms. This substance may be hazardous in the environment; special attention should be given to its impact on the ozone layer.	
<b>NOTES</b>		
Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, Emergency Response. Card has been partly updated in October 2006. See sections Occupational Exposure Limits and Ingestion first aid.		
Transport Emergency Card: TEC (R)-61S1846		
NFPA Code: H 3; F 0; R 0;		
<b>ADDITIONAL INFORMATION</b>		
ICSC: 0024		
CARBON TETRACHLORIDE		
(C) IPCS, CEC, 1994		

**IMPORTANT  
LEGAL  
NOTICE:**

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# International Chemical Safety Cards

## BROMODICHLOROMETHANE

ICSC: 0393



Dichlorobromomethane  
Methane, bromodichloro-  
 $\text{CHBrCl}_2$   
Molecular mass: 163.8

ICSC # 0393

CAS # 75-27-4

RTECS # [PA5310000](#)

April 03, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
•INHALATION	See Notes.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Rinse and then wash skin with water and soap.
•EYES		Safety spectacles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
	Separated from strong oxidants, strong bases and magnesium. Ventilation along the floor.	Signal: Warning Excl mark-Health haz Harmful if swallowed Suspected of causing cancer May causes damage to liver and kidneys through prolonged or repeated exposure if swallowed

### SEE IMPORTANT INFORMATION ON BACK

ICSC: 0393

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

# International Chemical Safety Cards

## BROMODICHLOROMETHANE

ICSC: 0393

I	PHYSICAL STATE; APPEARANCE:	ROUTES OF EXPOSURE:
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M P O R T A N T  D A T A	COLOURLESS LIQUID	The substance can be absorbed into the body by ingestion.
	<b>PHYSICAL DANGERS:</b> The vapour is heavier than air.	<b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.
	<b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases, including hydrogen bromide and hydrogen chloride. Reacts with strong bases , strong oxidants and magnesium .	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b>
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK: skin absorption (H); Carcinogen category: 2; Germ cell mutagen group: 3B (DFG 2009).	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the kidneys and liver , by ingestion , resulting in impaired functions . This substance is possibly carcinogenic to humans.
<b>PHYSICAL PROPERTIES</b>	Boiling point: 90°C Melting point: -57°C Density: 1.9 g/cm <sup>3</sup> Solubility in water, g/100 ml at 20°C: 0.45 (poor)	Vapour pressure, kPa at 20°C: 6.6 Relative vapour density (air = 1): 5.6 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3 Octanol/water partition coefficient as log Pow: 2
<b>ENVIRONMENTAL DATA</b>		
<b>NOTES</b>		
Halon 1021 is a trade name. Bromodichloromethane can be found in chlorinated water. Health effects of exposure to the substance have not been investigated adequately other than by ingestion.  Card has been partially updated in August 2007: see GHS classification. Card has been partially updated in April 2010: see Occupational Exposure Limits.		
<b>ADDITIONAL INFORMATION</b>		
<b>ICSC: 0393</b> <div>(C) IPCS, CEC, 1994</div> <b>BROMODICHLOROMETHANE</b>		
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	



# International Chemical Safety Cards

**ACETONE**

ICSC: 0087



2-Propanone  
Dimethyl ketone  
Methyl ketone  
 $C_3H_6O$  /  $CH_3COCH_3$   
Molecular mass: 58.1

ICSC # 0087  
CAS # 67-64-1  
RTECS # [AL3150000](#)  
UN # 1090  
EC # 606-001-00-8  
April 22, 1994 Validated  
Fi, review at IHE: 10/09/89



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, alcohol-resistant foam, water in large amounts, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>			
• <b>INHALATION</b>	Sore throat. Cough. Confusion. Headache. Dizziness. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness. Pain. Blurred vision. Possible corneal damage.	Safety spectacles or face shield . Contact lenses should not be worn.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: self-contained breathing apparatus. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Then wash away with plenty of water.	Fireproof. Separated from strong oxidants. Store in an area without drain or sewer access.	F symbol Xi symbol R: 11-36-66-67 S: 2-9-16-26 UN Hazard Class: 3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0087**

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

# International Chemical Safety Cards

**ACETONE**

**ICSC: 0087**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air and may travel along the ground; distant ignition possible.</p> <p><b>CHEMICAL DANGERS:</b> The substance can form explosive peroxides on contact with strong oxidants such as acetic acid, nitric acid, hydrogen peroxide. Reacts with chloroform and bromoform under basic conditions, causing fire and explosion hazard. Attacks plastic.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 500 ppm as TWA, 750 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued; (ACGIH 2004). MAK: 500 ppm 1200 mg/m<sup>3</sup> Peak limitation category: I(2); Pregnancy risk group: D; (DFG 2006). OSHA PEL<sup>+</sup>: TWA 1000 ppm (2400 mg/m<sup>3</sup>) NIOSH REL: TWA 250 ppm (590 mg/m<sup>3</sup>) NIOSH IDLH: 2500 ppm 10%LEL See: <a href="#">67641</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and through the skin.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The vapour irritates the eyes and the respiratory tract. The substance may cause effects on the central nervous system , liver , kidneys and gastrointestinal tract .</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the blood and bone marrow .</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 56°C Melting point: -95°C Relative density (water = 1): 0.8 Solubility in water: miscible Vapour pressure, kPa at 20°C: 24</p>	<p>Relative vapour density (air = 1): 2.0 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: -18°C c.c. Auto-ignition temperature: 465°C Explosive limits, vol% in air: 2.2-13 Octanol/water partition coefficient as log Pow: -0.24</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	
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## NOTES

<p>Use of alcoholic beverages enhances the harmful effect.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-30S1090</p> <p style="text-align: right;">NFPA Code: H 1; F 3; R 0;</p> <p style="text-align: right;">Card has been partially updated in July 2007: see Occupational Exposure Limits. Card has been partially updated in January 2008: see Storage.</p>
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## ADDITIONAL INFORMATION

<p><b>ICSC: 0087</b></p>	<p><b>ACETONE</b></p> <p style="text-align: center;">(C) IPCS, CEC, 1994</p>
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<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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# International Chemical Safety Cards

**BENZENE**

ICSC: 0015



Cyclohexatriene  
Benzol  
 $C_6H_6$   
Molecular mass: 78.1

ICSC # 0015  
CAS # 71-43-2  
RTECS # [CY1400000](#)  
UN # 1114  
EC # 601-020-00-8  
May 06, 2003 Peer reviewed



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

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Fireproof. Separated from food and feedstuffs oxidants halogens	Do not transport with food and feedstuffs. Note: E F symbol T symbol R: 45-46-11-36/38-48/23/24/25-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0015**

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


# International Chemical Safety Cards

**BENZENE**

**ICSC: 0015**

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 ppm as TWA 2.5 ppm as STEL (skin) A1 BEI (ACGIH 2004). MAK: H Carcinogen category: 1 Germ cell mutagen group: 3A (DFG 2004). OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm <a href="#">See Appendix F</a> NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 ppm See: <a href="#">71432</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation through the skin and by ingestion</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in lowering of consciousness Exposure far above the occupational exposure limit value may result in unconsciousness death</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the bone marrow immune system , resulting in a decrease of blood cells. This substance is carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 80°C Melting point: 6°C Relative density (water = 1): 0.88 Solubility in water, g/100 ml at 25°C: 0.18 Vapour pressure, kPa at 20°C: 10 Relative vapour density (air = 1): 2.7</p> <p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: -11°C c.c. Auto-ignition temperature: 498°C Explosive limits, vol% in air: 1.2-8.0 Octanol/water partition coefficient as log Pow: 2.13</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms.</p> 
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## NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II  
NFPA Code: H2; F3; R0

## ADDITIONAL INFORMATION

<b>ICSC: 0015</b>	<b>BENZENE</b>
(C) IPCS, CEC, 1994	

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

## 1,3,5-TRIMETHYLBENZENE

ICSC: 1155



Mesitylene  
C<sub>9</sub>H<sub>12</sub>  
Molecular mass: 120.2

ICSC # 1155  
CAS # 108-67-8  
RTECS # [OX6825000](#)  
UN # 2325  
EC # 601-025-00-5  
March 06, 2002 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
<b>EXPLOSION</b>	Above 50°C explosive vapour/air mixtures may be formed.	Above 50°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
• <b>INHALATION</b>	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness. Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	Marine pollutant. Xi symbol N symbol R: 10-37-51/53 S: 2-61 UN Hazard Class: 3 UN Packing Group: III

### SEE IMPORTANT INFORMATION ON BACK

ICSC: 1155

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


# International Chemical Safety Cards

## 1,3,5-TRIMETHYLBENZENE

ICSC: 1155

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic and irritating fumes. Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (as mixed isomers): 25 ppm; (ACGIH 2001). MAK (all isomers): 20 ppm; 100 mg/m<sup>3</sup>; class II 1 © (2001) OSHA PEL†: none NIOSH REL: TWA 25 ppm (125 mg/m<sup>3</sup>) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure, resulting in chronic bronchitis. The substance may have effects on the central nervous system blood See Notes.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 165°C Melting point: -45°C Relative density (water = 1): 0.86 Solubility in water: very poor Vapour pressure, kPa at 20°C: 0.25</p>	<p>Relative vapour density (air = 1): 4.1 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 50°C (c.c.) Auto-ignition temperature: 550°C Octanol/water partition coefficient as log Pow: 3.42</p>
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is harmful to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</p>	
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### NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. See ICSC 1433 1,2,4-Trimethylbenzene (Pseudocumene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethylbenzene (mixed isomers).

Transport Emergency Card: TEC (R)-30S2325  
NFPA Code: H0; F2; R0

### ADDITIONAL INFORMATION

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ICSC: 1155

1,3,5-TRIMETHYLBENZENE

(C) IPCS, CEC, 1994

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

## 1,2,4-TRIMETHYLBENZENE

ICSC: 1433



Pseudocumene



Molecular mass: 120,2

ICSC # 1433

CAS # 95-63-6

RTECS # [DC3325000](#)

UN # 1993

EC # 601-043-00-3

March 06, 2002 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
<b>EXPLOSION</b>	Above 44°C explosive vapour/air mixtures may be formed.	Above 44°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
• <b>INHALATION</b>	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness. Dry skin.	Protective gloves.	Rinse skin with plenty of water or shower.
• <b>EYES</b>	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	Xn symbol N symbol R: 10-20-36/37/38-51/53 S: 2-26-61 UN Hazard Class: 3 UN Packing Group: III

### SEE IMPORTANT INFORMATION ON BACK

ICSC: 1433

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


# International Chemical Safety Cards

## 1,2,4-TRIMETHYLBENZENE

ICSC: 1433

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic and irritating fumes Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (as mixed isomers) 25 ppm as TWA (ACGIH 2004). MAK: (as mixed isomers) 20 ppm 100 mg/m<sup>3</sup> Peak limitation category: II(2) Pregnancy risk group: C (DFG 2004). OSHA PEL<sup>†</sup>: none NIOSH REL: TWA 25 ppm (125 mg/m<sup>3</sup>) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure , resulting in chronic bronchitis The substance may have effects on the central nervous system blood See Notes.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 169°C Melting point: -44°C Relative density (water = 1): 0.88 Solubility in water: very poor Relative vapour density (air = 1): 4.1</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 44°C c.c. Auto-ignition temperature: 500°C Explosive limits, vol% in air: 0.9-6.4 Octanol/water partition coefficient as log Pow: 3.8</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish.</p>	
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### NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. See also ICSC 1155 1,3,5-Trimethylbenzene (Mesitylene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethylbenzene (mixed isomers). 1,3,5-Trimethylbenzene (Mesitylene) is classified as a marine pollutant.

Transport Emergency Card: TEC (R)-30GF1-III  
NFPA Code: H0; F2; R0;

### ADDITIONAL INFORMATION

<p><b>ICSC: 1433</b></p>	<p><b>1,2,4-TRIMETHYLBENZENE</b></p>

(C) IPCS, CEC, 1994

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<b>METHYL ETHYL KETONE</b>		<b>ICSC: 0179</b>
		Peer-Review Status: 25.03.1998 Validated
Ethyl methyl ketone 2-Butanone MEK Methyl acetone		
<b>CAS #: 78-93-3</b> RTECS #:                      Formula: C <sub>4</sub> H <sub>8</sub> O / CH <sub>3</sub> COCH <sub>2</sub> CH <sub>3</sub> EL6475000    Molecular mass: 72.1 UN #: 1193 EC #: 606-002-00-3 EINECS #: 201-159-0		

TYPES OF HAZARD / EXPOSURE	ACUTE HAZARDS / SYMPTOMS	PREVENTION	FIRST AID / FIRE-FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks and NO smoking.	Use powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>			
<b>Inhalation</b>	Cough. Dizziness. Drowsiness. Headache. Nausea. Vomiting.	Use ventilation, local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>Skin</b>		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>Eyes</b>	Redness. Pain.	Wear safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.
<b>Ingestion</b>	Unconsciousness. Further see Inhalation.	Do not eat, drink, or smoke	Rinse mouth. Give one or two glasses of water to drink. Refer

	during work.	for medical attention .
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SPILLAGE DISPOSAL	PACKAGING & LABELLING
Personal protection: self-contained breathing apparatus. Do NOT wash away into sewer. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.	<b>EC Classification</b> Symbol: F, Xi; R: 11-36-66-67; S: (2)-9-16; Note: 6 <b>UN Classification</b> UN Hazard Class: 3; UN Pack Group: II <b>GHS Classification</b>

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-30S1193. NFPA Code: H1; F3; R0.	Fireproof. Separated from strong oxidants and strong acids. Cool. Well closed.

IMPORTANT DATA	
<b>Physical State; Appearance</b> COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.  <b>Physical dangers</b> The vapour is heavier than air and may travel along the ground; distant ignition possible.  <b>Chemical dangers</b> Reacts violently with strong oxidants and inorganic acids. This generates fire and explosion hazard. Attacks some plastics.  <b>Occupational exposure limits</b> TLV: 200 ppm as TWA; 300 ppm as STEL; BEI issued; (ACGIH 2004). MAK: 200 ppm, 600 mg/m <sup>3</sup> ; Peak limitation category: I(1); Pregnancy risk group: C; Skin absorption (H); (DFG 2004).	<b>Routes of exposure</b> The substance can be absorbed into the body by inhalation and by ingestion.  <b>Inhalation risk</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.  <b>Effects of short-term exposure</b> The substance is irritating to the eyes and respiratory tract. The substance may cause effects on the central nervous system. Exposure far above the OEL could cause unconsciousness.  <b>Effects of long-term or repeated exposure</b> The substance defats the skin, which may cause dryness or cracking. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES	ENVIRONMENTAL DATA
Boiling point: 80°C Melting point: -86°C Relative density (water = 1): 0.8 Solubility in water, g/100ml at 20°C: 29 Vapour pressure, kPa at 20°C: 10.5 Relative vapour density (air = 1): 2.41 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.1 Flash point: -9°C c.c. Auto-ignition temperature: 505°C Explosive limits, vol% in air: 1.8-11.5 Octanol/water partition coefficient as log Pow: 0.29	

## NOTES

The odour warning when the exposure limit value is exceeded is insufficient.  
Card has been partly updated in October 2004.  
See sections Occupational Exposure Limits, EU classification, Emergency Response.

## ADDITIONAL INFORMATION

### IPCS

International  
Programme on  
Chemical Safety



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# International Chemical Safety Cards

## TRICHLOROFLUOROMETHANE

ICSC: 0047



Trichloromonofluoromethane  
Fluorotrichloromethane  
CFC 11  
R 11  
CCl<sub>3</sub>F  
Molecular mass: 137.4

ICSC # 0047  
CAS # 75-69-4  
RTECS # [PB6125000](#)  
July 03, 2002 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>			
• <b>INHALATION</b>	Cardiac arrhythmia. Confusion. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
• <b>SKIN</b>	ON CONTACT WITH LIQUID: FROSTBITE. Dry skin.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
• <b>EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation.	Separated from incompatible materials . See Chemical Dangers. Cool.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0047


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

# International Chemical Safety Cards

## TRICHLOROFLUOROMETHANE

ICSC: 0047

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS GAS OR HIGHLY VOLATILE	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by
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<p><b>M</b></p> <p><b>P</b></p> <p><b>O</b></p> <p><b>R</b></p> <p><b>T</b></p> <p><b>A</b></p> <p><b>N</b></p> <p><b>T</b></p> <p><b>D</b></p> <p><b>A</b></p> <p><b>T</b></p> <p><b>A</b></p>	<p>LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The gas is heavier than air. The vapour is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen.</p> <p><b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive gases(hydrogen chloride ICSC 0163,phosgene ICSC 0007,hydrogen fluoride ICSC 0283,carbonyl fluoride ICSC 0633). Reacts with powders of aluminium, zinc, magnesium and lithium shavings; granular barium.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 1000 ppm (Ceiling value); A4; (ACGIH 2004). MAK: 1000 ppm; 5700 mg/m<sup>3</sup>; Peak limitation category: II(2); Pregnancy risk group: C; (DFG 2004). OSHA PEL<sup>±</sup>: TWA 1000 ppm (5600 mg/m<sup>3</sup>) NIOSH REL: C 1000 ppm (5600 mg/m<sup>3</sup>) NIOSH IDLH: 2000 ppm See: <a href="#">75694</a></p> <p>inhalation.</p> <p><b>INHALATION RISK:</b> On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The liquid may cause frostbite. The substance may cause effects on the cardiovascular system and central nervous system , resulting in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness. See Notes.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 24°C Melting point: -111°C Relative density (water = 1): 1.49 Solubility in water, g/100 ml at 20°C: 0.1</p> <p>Vapour pressure, kPa at 20°C: 89.0 Relative vapour density (air = 1): 4.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 4.4 Octanol/water partition coefficient as log Pow: 2.53</p>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>This substance may be hazardous to the environment; special attention should be given to its impact on the ozone layer.</p> 
<p><b>NOTES</b></p>	
<p>High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. The occupational exposure limit value should not be exceeded during any part of the working exposure. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Freon 11, Frigen 11, Halon 11 are trade names. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.</p>	
<p><b>ADDITIONAL INFORMATION</b></p>	
<p><b>ICSC: 0047</b> <span style="float: right;"><b>TRICHLOROFLUOROMETHANE</b></span></p> <p style="text-align: center;">(C) IPCS, CEC, 1994</p>	
<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

# International Chemical Safety Cards

## TRICHLOROETHYLENE

ICSC: 0081



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

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



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

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

SEE IMPORTANT INFORMATION ON BACK

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


ICSC: 0081

OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

## TRICHLOROETHYLENE

ICSC: 0081

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

**ICSC: 0081**

**TRICHLOROETHYLENE**

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# International Chemical Safety Cards

DDT

ICSC: 0034



Dichlorodiphenyltrichloroethane  
 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane  
 2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane  
 1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)  
 p,p'-DDT  
 $C_{14}H_9Cl_5$   
 Molecular mass: 354.5



ICSC # 0034

CAS # 50-29-3

RTECS # [KJ3325000](#)

UN # 2761

EC # 602-045-00-7

April 20, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness.	Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.		Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0034

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


# International Chemical Safety Cards

DDT

ICSC: 0034

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS WHITE POWDER. TECHNICAL PRODUCT IS WAXY SOLID.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with aluminium and iron.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 1 mg/m<sup>3</sup> as TWA A3 (ACGIH 2004). MAK: 1 mg/m<sup>3</sup> H Peak limitation category: II(8) (DFG 2003). OSHA PEL: TWA 1 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 mg/m<sup>3</sup> See: <a href="#">50293</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> May cause mechanical irritation. The substance may cause effects on the central nervous system, resulting in convulsions and respiratory depression. Exposure at high levels may result in death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 260°C Melting point: 109°C Density: 1.6 g/cm<sup>3</sup></p> <p>Solubility in water: poor Octanol/water partition coefficient as log Pow: 6.36</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</p>	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

Transport Emergency Card: TEC (R)-61GT7-III

## ADDITIONAL INFORMATION

ICSC: 0034

DDT

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MSDS : 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%  
CAS : 72-55-9  
SYNONYMS : p,p'-DDE ; ethylene,1,1-dichloro-2,2-bis-(p-chlorophenyl)- ; DDT dehydrochloride ; DDE; 1-1'-(Dichloroethenylidene)bis(4-chlorobenzene)

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\*\*\*\* SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS \*\*\*\*

```
+-----+-----+-----+-----+
| CAS# | Chemical Name | % | EINECS# |
|-----|-----|-----|-----|
| 72-55-9 | 2,2-Bis-(4-chlorophenyl)-1,1-dichloro- | 99 | 200-784-6 |
| |ethylene | | |
+-----+-----+-----+-----+
```

Hazard Symbols: XN

Risk Phrases: 22 33

\*\*\*\* SECTION 3 - HAZARDS IDENTIFICATION \*\*\*\*

EMERGENCY OVERVIEW

Harmful if swallowed. Danger of cumulative effects.Cancer suspect  
agent.Possible risks of irreversible effects.

Potential Health Effects

Eye:

May cause eye irritation.

Skin:

May cause skin irritation.

Ingestion:

May cause irritation of the digestive tract. May be harmful if  
swallowed. Ingestion of large amounts may cause liver and/or kidney  
damage.

Inhalation:

May cause respiratory tract irritation.

Chronic:

May cause cancer according to animal studies. Adverse reproductive  
effects have been reported in animals. Laboratory experiments have  
resulted in mutagenic effects.

\*\*\*\* SECTION 4 - FIRST AID MEASURES \*\*\*\*

Eyes:

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

Skin:

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

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water.

Never give anything by mouth to an unconscious person. Get medical  
aid immediately.

Inhalation:

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

Notes to Physician:

Treat symptomatically and supportively.

\*\*\*\* SECTION 5 - FIRE FIGHTING MEASURES \*\*\*\*

General Information:

# MSDS PAGE: MSDS 72-55-9 CAS 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% p,p'-DDE ; ethylene,1,1-di...

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.

#### Extinguishing Media:

For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

#### \*\*\*\* SECTION 6 - ACCIDENTAL RELEASE MEASURES \*\*\*\*

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

#### Spills/Leaks:

Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

#### \*\*\*\* SECTION 7 - HANDLING and STORAGE \*\*\*\*

#### Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Do not ingest or inhale. Use with adequate ventilation.

#### Storage:

Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

#### \*\*\*\* SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION \*\*\*\*

#### Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

#### Exposure Limits

CAS# 72-55-9:

#### Personal Protective Equipment

#### Eyes:

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

#### Skin:

Wear appropriate protective gloves to prevent skin exposure.

#### Clothing:

Wear appropriate protective clothing to prevent skin exposure.

#### Respirators:

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

#### \*\*\*\* SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES \*\*\*\*

Physical State: Crystals

Color: white

Odor: None reported.

pH: Not available.

Vapor Pressure: 6.5106 mm Hg @ 20 C

Viscosity: Not available.

Boiling Point: 336 deg C

Freezing/Melting Point: 88.00 - 90.00 deg C

Autoignition Temperature: Not available.

Flash Point: Not available.

Explosion Limits, lower: Not available.

Explosion Limits, upper: Not available.

Decomposition Temperature:

Solubility in water: 0.010 ppm

Specific Gravity/Density:

Molecular Formula: C14H8Cl4

Molecular Weight: 318.02

#### \*\*\*\* SECTION 10 - STABILITY AND REACTIVITY \*\*\*\*

#### Chemical Stability:

Stable under normal temperatures and pressures.

#### Conditions to Avoid:

Incompatible materials, dust generation, strong oxidants.

#### Incompatibilities with Other Materials:

Strong oxidizing agents - strong bases.

#### Hazardous Decomposition Products:

Hydrogen chloride, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

#### \*\*\*\* SECTION 11 - TOXICOLOGICAL INFORMATION \*\*\*\*

#### RTECS#:

CAS# 72-55-9: KV9450000

#### LD50/LC50:

CAS# 72-55-9: Oral, mouse: LD50 = 700 mg/kg; Oral, rat: LD50 = 880 mg/kg.

#### Carcinogenicity:

2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene -

California: carcinogen, initial date 1/1/89

Other:

See actual entry in RTECS for complete information.

## \*\*\*\* SECTION 12 - ECOLOGICAL INFORMATION \*\*\*\*

### Ecotoxicity:

Estimated BCF value = 8,300 based on water solubility. Estimated Koc value = 8,300. There was no movement of DDE reported in soil column mobility experiments.

## \*\*\*\* SECTION 13 - DISPOSAL CONSIDERATIONS \*\*\*\*

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

## \*\*\*\* SECTION 14 - TRANSPORT INFORMATION \*\*\*\*

### IATA

Not regulated as a hazardous material.

### IMO

Not regulated as a hazardous material.

### RID/ADR

Not regulated as a hazardous material.

USA RQ: CAS# 72-55-9: 1 lb final RQ; 0.454 kg final RQ

## \*\*\*\* SECTION 15 - REGULATORY INFORMATION \*\*\*\*

### European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN

### Risk Phrases:

R 22 Harmful if swallowed.

R 33 Danger of cumulative effects.

### Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 72-55-9: 3

### Canada

None of the chemicals in this product are listed on the DSL/NDL list.

CAS# 72-55-9 is listed on Canada's Ingredient Disclosure List.

### US FEDERAL

### TSCA

CAS# 72-55-9 is not listed on the TSCA inventory.

It is for research and development use only.

## \*\*\*\* SECTION 16 - ADDITIONAL INFORMATION \*\*\*\*

MSDS Creation Date: 9/28/1998 Revision #3 Date: 3/18/2003

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

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## ALL MSDS PAGES IN THIS GROUP

NAME	CAS
<a href="#">M-Benzoyloxybenzyl Alcohol, 97%</a>	1700-30-7
<a href="#">Octaphenylcyclotetrasiloxane, 98%</a>	546-56-5
<a href="#">Cetylpyridinium chloride</a>	123-03-5
<a href="#">3,4-Difluorophenol, 99%</a>	2713-33-9
<a href="#">1-Benzyl-4-Hydroxypiperidine, 97%</a>	4727-72-4
<a href="#">4-tert-Butylbenzoyl chloride</a>	1710-98-1
<a href="#">Borane-morpholine complex, 97%</a>	4856-95-5
<a href="#">Benzyl Ether, 99%</a>	103-50-4
<a href="#">5-Amino-1-Naphtol (Pract)</a>	83-55-6
<a href="#">Pyridinium-P-Toluenesulfonate 98%</a>	24057-28-1
<a href="#">Pyrogallol Red, 98% (Titr.)</a>	32638-88-3
<a href="#">Amberlite ira 416</a>	9002-26-0
<a href="#">3-Methoxybenzonitrile, 98%</a>	1527-89-5
<a href="#">1-Adamantanemethanol, 99%</a>	770-71-8
<a href="#">Inosine, 99%</a>	58-63-9
<a href="#">Pentafluoropropionic Acid</a>	422-64-0
<a href="#">Pyruvic Acid</a>	127-17-3
<a href="#">Potassium hydrogen fluoride, 99+%</a>	7789-29-9
<a href="#">Aluminum Nitride, 98% Particle Size &lt;10 Micron</a>	24304-00-5
<a href="#">Nickel(II) hydroxide, c.p., 60-61% Ni</a>	12054-48-7
<a href="#">1-Adamantanamine sulfate, 99%</a>	31377-23-8
<a href="#">S-(Thiobenzoyl)-Thioglycolic Acid, 97%</a>	942-91-6
<a href="#">N,N-Dimethyl-P-Nitroaniline</a>	100-23-2
<a href="#">Benzofuroxan</a>	480-96-6
<a href="#">cis-2-Aminomethyl-1-cyclohexanol hydrochloride, 99%</a>	24947-68-0
<a href="#">Silver Phosphate, 98% (Titr.)</a>	7784-09-0

<a href="#">4-Cyano-4-Phenylpiperidine Hydrochloride, 99% (TLC)</a>	51304-58-6
<a href="#">Methanesulfonamide</a>	3144-09-0
<a href="#">gamma-Octanoic lactone, 98%</a>	104-50-7
<a href="#">Cis,cis,cis-1,2,3,4-cyclopentane- tetracarboxylic dianhydride,</a>	4802-47-5
<a href="#">Tetrachloroethylene Carbonate, 98+ %</a>	22432-68-4
<a href="#">Oxamic Acid, 98%</a>	471-47-6
<a href="#">10,11-Dihydro-5H-Dibenzo(A,D)-Cycloheptene, 98%</a>	833-48-7
<a href="#">Thallium (I) Sulfate, 99.9+ %</a>	7446-18-6
<a href="#">N-(2,6-Dimethylphenylcarbamoyl-Methyl)-Iminodiacetic Acid, 99%</a>	59160-29-1
<a href="#">P-(Dimethylamino)cinnamic Acid, 99%</a>	1552-96-1
<a href="#">Biebrich Scarlet, 99% (UV-VIS)</a>	4196-99-0
<a href="#">4-Chlorobenzenediazonium hexafluoro- phosphate</a>	1582-27-0
<a href="#">Ammonium hexachloroiridate(IV), 99.99%</a>	16940-92-4
<a href="#">Methylamine-d2 deuteriochloride, 98+ atom % D</a>	593-51-1
<a href="#">2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%</a>	72-55-9
<a href="#">Nitro red</a>	56431-61-9
<a href="#">Methyl 2,3-dichlorobenzoate, 98+ %</a>	2905-54-6
<a href="#">Isopropyl Bromoacetate, 98% (GC)</a>	29921-57-1
<a href="#">1-Iodo-4-Nitrobenzene, 99%</a>	636-98-6
<a href="#">4-Ethylcyclohexanol, 99% cis/trans mixture</a>	4534-74-1
<a href="#">Fluorescamine</a>	38183-12-9
<a href="#">Tris(2,2,6,6-Tetramethyl-3,5-Heptanedionato)Dysprosium(III), 99+ %</a>	15522-69-7
<a href="#">3-Amino-2,2,5,5-Tetramethyl-1-Pyrrolidinyloxy, 99% (Titr.)</a>	34272-83-8
<a href="#">3,4-Dihydroxyphenylacetic Acid,98%</a>	102-32-9

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## Material Safety Data Sheet

Version 4.0

Revision Date 03/12/2010

Print Date 12/09/2011

---

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 :  $C_{14}H_{10}Cl_4$   
Molecular Weight : 320.04 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane</b>			
72-54-8	200-783-0	-	-

---

### 4. FIRST AID MEASURES

#### General advice

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

#### If inhaled

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

#### In case of skin contact

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

#### In case of eye contact

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

#### If swallowed

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

---

### 5. FIRE-FIGHTING MEASURES

#### Suitable extinguishing media

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

#### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

---

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

#### Environmental precautions

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

#### Methods and materials for containment and cleaning up

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

---

### 7. HANDLING AND STORAGE

#### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

#### Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place.



## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection

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

#### Hand protection

Handle with gloves.

#### Eye protection

Face shield and safety glasses

#### Skin and body protection

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

#### Hygiene measures

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

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form                      solid

### Safety data

pH	no data available
Melting point	94.0 - 96.0 °C (201.2 - 204.8 °F)
Boiling point	193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
Density	1.38 g/cm <sup>3</sup>
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.02

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

---

## 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

LD50 Oral - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg

Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg

Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg

Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg

Remarks: Behavioral:Altered sleep time (including change in righting reflex).

LD50 Dermal - rabbit - 1,200 mg/kg

Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

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

Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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

**Reproductive toxicity**

no data available

**Specific target organ toxicity - single exposure (GHS)**

no data available

**Specific target organ toxicity - repeated exposure (GHS)**

no data available

**Aspiration hazard**

no data available

**Potential health effects****Inhalation**

May be harmful if inhaled. May cause respiratory tract irritation.

**Ingestion**

Toxic if swallowed.

**Skin**

Harmful if absorbed through skin. May cause skin irritation.

**Eyes**

May cause eye irritation.

**Signs and Symptoms of Exposure**

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

**Additional Information**

RTECS: KI0700000

---

**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish	LC50 - other fish - 1.18 - 9 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

**Persistence and degradability**

no data available

**Bioaccumulative potential**

Indication of bioaccumulation.

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

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

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

---

**13. DISPOSAL CONSIDERATIONS****Product**

Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN-Number: 2811 Class: 6.1 Packing group: III  
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN-Number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A  
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)  
Marine pollutant: No

**IATA**

UN-Number: 2811 Class: 6.1 Packing group: III  
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)



---

## 15. REGULATORY INFORMATION

### OSHA Hazards

Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

### DSL Status

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8
---	--------------------

### SARA 302 Components

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

### SARA 313 Components

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

### SARA 311/312 Hazards

Acute Health Hazard

### Massachusetts Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

### Pennsylvania Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

### New Jersey Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No. 72-54-8	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane		

---

## 16. OTHER INFORMATION

### Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

# International Chemical Safety Cards

**ENDRIN**
**ICSC: 1023**


$C_{12}H_8Cl_6O$   
Molecular mass: 380.9

ICSC # 1023  
CAS # 72-20-8  
RTECS # [IO1575000](#)  
UN # 2761  
EC # 602-051-00-X  
March 10, 2000 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	IN ALL CASES CONSULT A DOCTOR!
• <b>INHALATION</b>	(See Ingestion).	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! (See Ingestion).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• <b>EYES</b>		Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Dizziness. Weakness. Headache. Nausea. Vomiting. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).	Separated from food and feedstuffs . Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 24-28-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: I

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1023**

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

# International Chemical Safety Cards

**ENDRIN****ICSC: 1023**

I M P O R T A N T D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> WHITE CRYSTALS .	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered.
	<b>CHEMICAL DANGERS:</b> The substance decomposes on heating above 245°C, producing hydrogen chloride , phosgene .	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system , resulting in convulsions and death. The effects may be delayed. Medical observation is indicated.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.1 mg/m³ as TWA; (skin); A4 (not classifiable as a human carcinogen); (ACGIH 2008). MAK: 0.1 mg/m³ (Inhalable fraction); Peak limitation category: II(8); skin absorption (H); Pregnancy risk group: C; (DFG 2008). OSHA PEL: TWA 0.1 mg/m³ skin NIOSH REL: TWA 0.1 mg/m³ skin NIOSH IDLH: 2 mg/m³ See: <a href="#">72208</a>	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b>
PHYSICAL PROPERTIES	Decomposes below boiling point at 245°C Melting point: 200°C Density: 1.7 g/cm³	Solubility in water, g/100 ml at 25°C: none Vapour pressure, Pa at 25°C: negligible Octanol/water partition coefficient as log Pow: 5.34
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees , birds and mammals . It is strongly advised not to let the chemical enter into the environment because it persists in the environment. In the food chain important to humans, bioaccumulation takes place, specifically in fish and seafood . Avoid release to the environment in circumstances different to normal use.	
NOTES		
If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home.		
Transport Emergency Card: TEC (R)-61G41a		
NFPA Code: H3; F0; R; 0		
Card has been partially updated in November 2008: see Occupational Exposure Limits, Storage.		
ADDITIONAL INFORMATION		
ICSC: 1023		ENDRIN
(C) IPCS, CEC, 1994		

**IMPORTANT  
LEGAL  
NOTICE:**

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

# International Chemical Safety Cards

**DIELDRIN**

ICSC: 0787



1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-1,4-exo- 5,8-dimethanonaphthalene  
3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta,7aalpha)-2,7,3,6-  
dimethanonaphth(2,3-b)oxirene

HEOD

$C_{12}H_8Cl_6O$

Molecular mass: 380.9

ICSC # 0787

CAS # 60-57-1

RTECS # [IO1750000](#)

UN # 2761

EC # 602-049-00-9

March 26, 1998 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
• <b>INHALATION</b>	(See Ingestion).	Ventilation (not if powder).	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! See Ingestion.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• <b>EYES</b>		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).		Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 25-27-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II
SEE IMPORTANT INFORMATION ON BACK			


# International Chemical Safety Cards

DIELDRIN

ICSC: 0787

<b>I M P O R T A N T D A T A</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS  <b>PHYSICAL DANGERS:</b>  <b>CHEMICAL DANGERS:</b> The substance decomposes on heating producing toxic fumes including hydrogen chloride. Reacts with oxidants and acids. Attacks metal due to the slow formation of hydrogen chloride in storage.  <b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (as TWA): 0.25 mg/m <sup>3</sup> , A4 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m <sup>3</sup> : Peak limitation category: II(8) skin absorption (H); (DFG 2007). OSHA PEL: TWA 0.25 mg/m <sup>3</sup> skin NIOSH REL: Ca TWA 0.25 mg/m <sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 50 mg/m <sup>3</sup> See: <a href="#">60571</a>	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body through the skin and by ingestion.  <b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.  <b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system, resulting in convulsions. Medical observation is indicated.  <b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.
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<b>PHYSICAL PROPERTIES</b>	Melting point: 175-176°C Density: 1.7 g/cm <sup>3</sup> Solubility in water: none	Vapour pressure, Pa at 20°C: 0.0004 Octanol/water partition coefficient as log Pow: 6.2
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<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees, birds. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Alvit, Dieldrex, Dieldrite, Illoxol, Octalox, Panoram, and Quintox are trade names. Also consult ICSC #0774, Aldrin.

Transport Emergency Card: TEC (R)-61G41b.

Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

## ADDITIONAL INFORMATION

ICSC: 0787

DIELDRIN

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

## ZINC POWDER

ICSC: 1205



Blue powder  
Merrillite  
Zn  
Atomic mass: 65.4  
(powder)

ICSC # 1205  
CAS # 7440-66-6  
RTECS # [ZG8600000](#)  
UN # 1436 (zinc powder or dust)  
EC # 030-001-00-1  
October 24, 1994 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
<b>EXPLOSION</b>	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
<b>EXPOSURE</b>		<b>PREVENT DISPERSION OF DUST! STRICT HYGIENE!</b>	
• <b>INHALATION</b>	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	Fireproof. Separated from acids, bases oxidants Dry.	Airtight. F symbol N symbol R: 15-17-50/53 S: 2-7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1205**

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

# International Chemical Safety Cards

## ZINC POWDER

ICSC: 1205

I M P O R T A N T D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS GREY TO BLUE POWDER.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.
	<b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
	<b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Inhalation of fumes may cause metal fume fever. The effects may be delayed.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established.	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.

<b>PHYSICAL PROPERTIES</b>	Boiling point: 907°C Melting point: 419°C Relative density (water = 1): 7.14	Solubility in water: reaction Vapour pressure, kPa at 487°C: 0.1 Auto-ignition temperature: 460°C
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<b>ENVIRONMENTAL DATA</b>	
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### NOTES

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water. <div>Transport Emergency Card: TEC (R)-43GWS-II+III NFPA Code: H0; F1; R1;</div>
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### ADDITIONAL INFORMATION

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<b>ICSC: 1205</b>	<b>ZINC POWDER</b>
(C) IPCS, CEC, 1994	

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

SILVER

ICSC: 0810



Argentum  
C.I. 77820  
Ag

ICSC # 0810

CAS # 7440-22-4

RTECS # [VW3500000](#)

September 10, 1997 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible, except as powder.		
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Rinse skin with plenty of water or shower.
• <b>EYES</b>		Safety spectacles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Separated from ammonia, strong hydrogen peroxide solutions, strong acids.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0810


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

# International Chemical Safety Cards

SILVER

ICSC: 0810

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b>	<b>ROUTES OF EXPOSURE:</b>
<b>M</b>	WHITE METAL, TURNS DARK ON EXPOSURE TO OZONE, HYDROGEN SULFIDE OR SULFUR.	The substance can be absorbed into the body by inhalation and by ingestion.
<b>P</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b>
<b>O</b>		Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
<b>R</b>	<b>CHEMICAL DANGERS:</b>	
	Shock-sensitive compounds are formed with acetylene.	

T A N T  D A  T A	<p>Reacts with acids causing fire hazard. Contact with strong hydrogen peroxide solution will cause violent decomposition to oxygen gas. Contact with ammonia may cause formation of compounds that are explosive when dry.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b>  TLV (metal): 0.1 mg/m<sup>3</sup> (ACGIH 1997).  EU OEL: 0.1 mg/m<sup>3</sup> as TWA (EU 2000).  OSHA PEL: TWA 0.01 mg/m<sup>3</sup>  NIOSH REL: TWA 0.01 mg/m<sup>3</sup>  NIOSH IDLH: 10 mg/m<sup>3</sup> (as Ag) See: <a href="#">IDLH INDEX</a></p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b>  Inhalation of high amounts of metallic silver vapours may cause lung damage with pulmonary oedema.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b>  The substance may cause a grey-blue discoloration of the eyes, nose, throat and skin (argyria/argyrosis).</p>
<b>PHYSICAL PROPERTIES</b>	Boiling point: 2212°C Melting point: 962°C Relative density (water = 1): 10.5 Solubility in water: none
<b>ENVIRONMENTAL DATA</b>	This substance may be hazardous to the environment; special attention should be given to aquatic organisms. 
<b>NOTES</b>	
Card has been partially updated in March 2008: see Occupational Exposure Limits.	
<b>ADDITIONAL INFORMATION</b>	
<b>ICSC: 0810</b> <div style="float: right;"><b>SILVER</b></div> <div style="clear: both;"></div> <div style="text-align: center;">(C) IPCS, CEC, 1994</div>	
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

# International Chemical Safety Cards

**MERCURY**

ICSC: 0056



Quicksilver  
Liquid silver  
Hg  
Atomic mass: 200.6

ICSC # 0056  
CAS # 7439-97-6  
RTECS # [OV4550000](#)  
UN # 2809  
EC # 080-001-00-0  
April 22, 2004 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
• <b>INHALATION</b>	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• <b>EYES</b>		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0056**

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


# International Chemical Safety Cards

## MERCURY

ICSC: 0056

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.025 mg/m<sup>3</sup> as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 0.1 mg/m<sup>3</sup> Sh Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003). OSHA PEL<sup>†</sup>: C 0.1 mg/m<sup>3</sup> NIOSH REL: Hg Vapor: TWA 0.05 mg/m<sup>3</sup> skin Other: C 0.1 mg/m<sup>3</sup> skin NIOSH IDLH: 10 mg/m<sup>3</sup> (as Hg) See: <a href="#">7439976</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none</p> <p>Vapour pressure, Pa at 20°C: 0.26 Relative vapour density (air = 1): 6.93 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009</p>
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.</p> 
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### NOTES

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

### ADDITIONAL INFORMATION

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<b>ICSC: 0056</b>	<b>MERCURY</b>
(C) IPCS, CEC, 1994	

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

**LEAD**

ICSC: 0052



Lead metal  
Plumbum  
Pb  
Atomic mass: 207.2  
(powder)

ICSC # 0052

CAS # 7439-92-1

RTECS # [OF7525000](#)


October 08, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.		Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:
SEE IMPORTANT INFORMATION ON BACK			
<b>ICSC: 0052</b>		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

# International Chemical Safety Cards



<p><b>I M P O R T A N T T A D A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.05 mg/m<sup>3</sup> A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004). MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004). EU OEL: as TWA 0.15 mg/m<sup>3</sup> (EU 2002). OSHA PEL*: 1910.1025 TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The PEL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH REL*: TWA 0.050 mg/m<sup>3</sup> <a href="#">See Appendix C</a> *Note: The REL also applies to other lead compounds (as Pb) -- <a href="#">see Appendix C</a>. NIOSH IDLH: 100 mg/m<sup>3</sup> (as Pb) See: <a href="#">7439921</a></p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 1740°C Melting point: 327.5°C</p> <p>Density: 11.34 g/cm<sup>3</sup> Solubility in water: none</p>
<b>ENVIRONMENTAL DATA</b>	<p>Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.</p> 

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

**ADDITIONAL INFORMATION**

<p><b>ICSC: 0052</b> <span style="float: right;"><b>LEAD</b></span></p> <p style="text-align: center;">(C) IPCS, CEC, 1994</p>	

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

**COPPER**

ICSC: 0240



Cu  
(powder)

ICSC # 0240

CAS # 7440-50-8

RTECS # [GL5325000](#)

September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0240**

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

# International Chemical Safety Cards

**COPPER**

ICSC: 0240

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
<b>P</b>	<b>CHEMICAL DANGERS:</b>	

O R T A N T  D A T A	Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.		<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Inhalation of fumes may cause metal fume fever. See Notes.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.2 mg/m³ fume (ACGIH 1992-1993). TLV (as Cu, dusts & mists): 1 mg/m³ (ACGIH 1992-1993). Intended change 0.1 mg/m³ Inhal., A4 (not classifiable as a human carcinogen); MAK: 0.1 mg/m³ (Inhalable fraction) Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005). OSHA PEL*: TWA 1 mg/m³ *Note: The PEL also applies to other copper compounds (as Cu) except copper fume. NIOSH REL*: TWA 1 mg/m³ *Note: The REL also applies to other copper compounds (as Cu) except Copper fume. NIOSH IDLH: 100 mg/m³ (as Cu) See: <a href="#">7440508</a>		<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact may cause skin sensitization.
	PHYSICAL PROPERTIES	Boiling point: 2595°C Melting point: 1083°C Relative density (water = 1): 8.9	Solubility in water: none
	ENVIRONMENTAL DATA		
	NOTES		
	The symptoms of metal fume fever do not become manifest until several hours.		
	ADDITIONAL INFORMATION		
	ICSC: 0240		
(C) IPCS, CEC, 1994			
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

# International Chemical Safety Cards

**CHROMIUM**

ICSC: 0029



Chrome  
Cr  
Atomic mass: 52.0  
(powder)

ICSC # 0029  
CAS # 7440-47-3  
RTECS # [GB4200000](#)  
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

**ICSC: 0029**

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

# International Chemical Safety Cards

**CHROMIUM**

ICSC: 0029

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> GREY POWDER	<b>ROUTES OF EXPOSURE:</b>
<b>M</b>	<b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.	<b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed.
<b>P</b>		

O R T A N T D A T A	<b>CHEMICAL DANGERS:</b> Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard.		<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> May cause mechanical irritation to the eyes and the respiratory tract.					
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004). MAK not established.		<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b>					
	OSHA PEL*: TWA 1 mg/m³ <a href="#">See Appendix C</a> *Note: The PEL also applies to insoluble chromium salts.							
	NIOSH REL: TWA 0.5 mg/m³ <a href="#">See Appendix C</a>							
	NIOSH IDLH: 250 mg/m³ (as Cr) See: <a href="#">7440473</a>							
<b>PHYSICAL PROPERTIES</b>		Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm³			Solubility in water: none			
<b>ENVIRONMENTAL DATA</b>								
<b>NOTES</b>								
The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.								
<b>ADDITIONAL INFORMATION</b>								
<b>ICSC: 0029</b>							<b>CHROMIUM</b>	
(C) IPCS, CEC, 1994								
<b>IMPORTANT LEGAL NOTICE:</b>		Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.						

# International Chemical Safety Cards

**CADMIUM**

ICSC: 0020



Cd  
Atomic mass: 112.4

ICSC # 0020  
CAS # 7440-43-9  
RTECS # [EU9800000](#)  
UN # 2570  
EC # 048-002-00-0  
April 22, 2005 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• <b>INHALATION</b>	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.	Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants acids, food and feedstuffs	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T+ symbol N symbol R: 45-26-48/23/25-62-63-68-50/53 S: 53-45-60-61 UN Hazard Class: 6.1

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0020**

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# International Chemical Safety Cards

## CADMIUM

ICSC: 0020

I M P O R T A N T A D D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.
	<b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.	<b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.
	<b>CHEMICAL DANGERS:</b> Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001.) Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium, causing fire and explosion hazard.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The fume is irritating to the respiratory tract Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (Total dust) 0.01 mg/m <sup>3</sup> (Respirable fraction) 0.002 mg/m <sup>3</sup> as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL*: 1910.1027 TWA 0.005 mg/m <sup>3</sup> *Note: The PEL applies to all Cadmium compounds (as Cd). NIOSH REL*: Ca <a href="#">See Appendix A</a> *Note: The REL applies to all Cadmium compounds (as Cd). NIOSH IDLH: Ca 9 mg/m <sup>3</sup> (as Cd) See: <a href="#">IDLH INDEX</a>	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys, resulting in kidney impairment This substance is carcinogenic to humans.

<b>PHYSICAL PROPERTIES</b>	Boiling point: 765°C Melting point: 321°C Density: 8.6 g/cm <sup>3</sup>	Solubility in water: none Auto-ignition temperature: (cadmium metal dust) 250°C
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<b>ENVIRONMENTAL DATA</b>	
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### NOTES

Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

### ADDITIONAL INFORMATION

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ICSC: 0020	CADMIUM
(C) IPCS, CEC, 1994	

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***APPENDIX D***  
***HOSPITAL INFORMATION AND MAP***  
***FIELD ACCIDENT REPORT***

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME \_\_\_\_\_ PROJECT. NO. \_\_\_\_\_

Date of Accident \_\_\_\_\_ Time \_\_\_\_\_ Report By \_\_\_\_\_

Type of Accident (Check One):

☐ ( ) Vehicular

☐ ( ) Personal

☐ ( ) Property

Name of Injured \_\_\_\_\_ DOB or Age \_\_\_\_\_

How Long Employed \_\_\_\_\_

Names of Witnesses \_\_\_\_\_

Description of Accident \_\_\_\_\_

Action Taken \_\_\_\_\_

Did the Injured Lose Any Time? \_\_\_\_\_ How Much (Days/Hrs.)? \_\_\_\_\_

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? \_\_\_\_\_

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

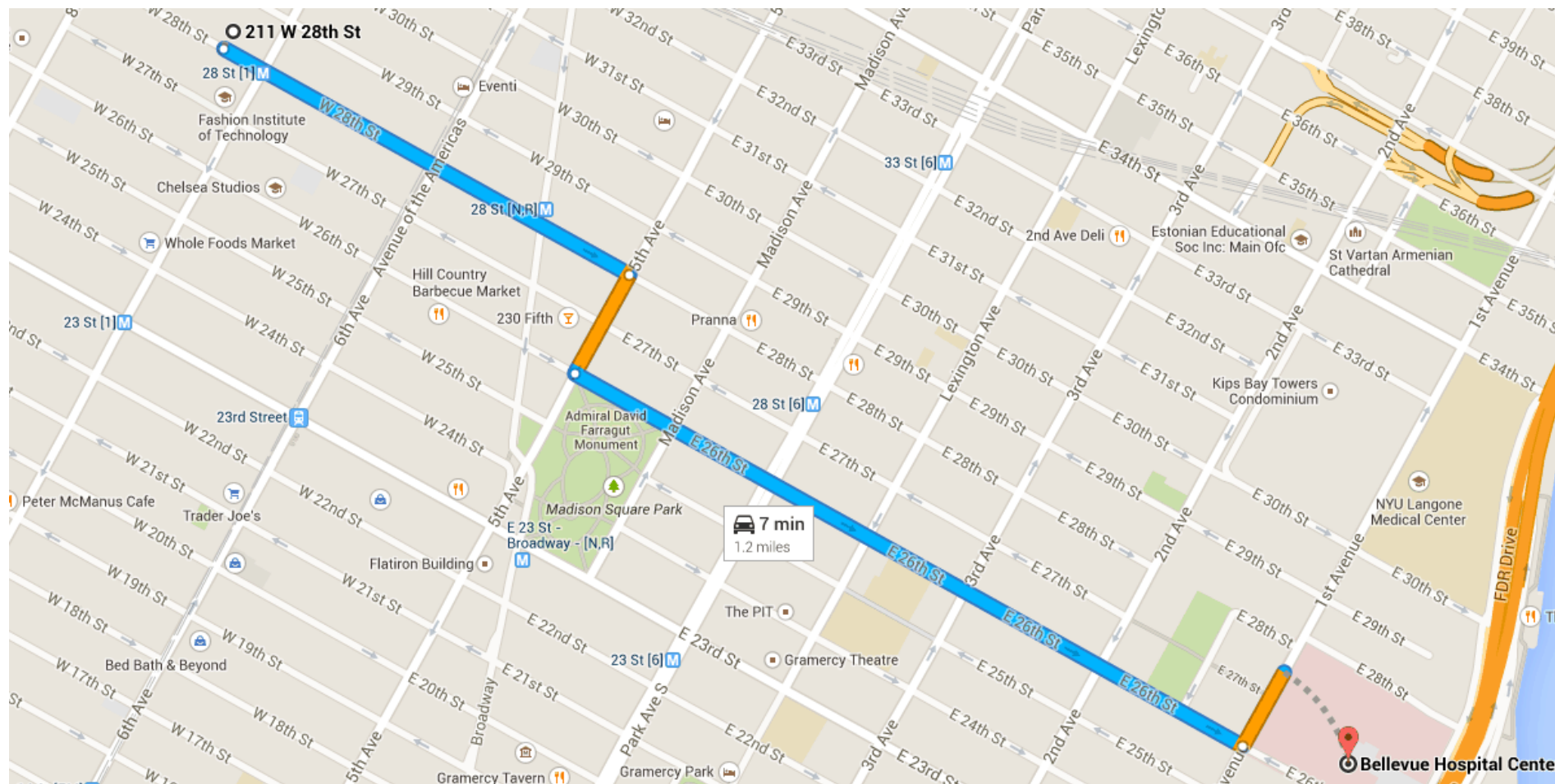
INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW





Drive 1.2 miles, 6 min

Directions from 211 W 28th St to Bellevue Hospital Center



○ 211 W 28th St

New York, NY 10001

1. Head southeast on W 28th St toward 7th Ave



0.4 mi



2. Turn **right** onto **5th Ave**

0.1 mi



3. Turn **left** onto **E 26th St/Madison Square N**



Continue to follow E 26th St

0.7 mi



4. Turn **left** onto **1st Avenue**



Destination will be on the right

387 ft

## Bellevue Hospital Center

462 1st Avenue, New York, NY 10016

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2015 Google

**ATTACHMENT F**  
**VAPOR BARRIER SPECIFICATIONS**

# VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

RAVEN  
INDUSTRIES

## Product Description

VaporBlock® Plus™ 20 is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock® Plus™ 20 is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab. VaporBlock® Plus™ 20 is more than 100 times less permeable than typical high-performance polyethylene vapor retarders against Methane, Radon and other harmful VOCs.

VaporBlock® Plus™ 20 is one of the most effective underslab gas barriers in the building industry today far exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Available in a 20 (Class A) mil thicknesses designed to meet the most stringent requirements. VaporBlock® Plus™ 20 is produced within the strict guidelines of our ISO 9001:2008 Certified Management System.

## Product Use

VaporBlock® Plus™ 20 resists gas and moisture migration into the building envelop when properly installed to provide protection from toxic/harmful chemicals. It can be installed as part of a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive system it is recommended to also include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock® Plus™ 20 works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.

## Size & Packaging

VaporBlock® Plus™ 20 is available in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements. Installation instructions and ASTM E-1745 classifications accompany each roll.



Under-Slab Vapor/Gas Retarder

## Product

## Part #

VaporBlock Plus 20 ..... VBP 20

## APPLICATIONS

Radon Barrier	Under-Slab Vapor Retarder
Methane Barrier	Foundation Wall Vapor Retarder
VOC Barrier	

**VaporBlock® Plus™**  
UNDERSLAB VAPOR RETARDER / GAS BARRIER

PROPERTIES	TEST METHOD	VAPORBLOCK PLUS 20	
		IMPERIAL	METRIC
APPEARANCE		White/Gold	
THICKNESS, NOMINAL		20 mil	0.51 mm
WEIGHT		102 lbs/MSF	498 g/m <sup>2</sup>
CLASSIFICATION	ASTM E 1745	CLASS A, B & C	
TENSILE STRENGTH LBF/IN (N/CM) AVERAGE MD & TD (NEW MATERIAL)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
IMPACT RESISTANCE	ASTM D 1709	2600 g	
MAXIMUM USE TEMPERATURE		180° F	82° C
MINIMUM USE TEMPERATURE		-70° F	-57° C
PERMEANCE (NEW MATERIAL)	ASTM E 154 Section 7  ASTM E 96 Procedure B	0.0051 Perms grains/(ft <sup>2</sup> ·hr·in·Hg)	0.0034 Perms g/(24hr·m <sup>2</sup> ·mm Hg)
RADON DIFFUSION COEFFICIENT	K124/02/95	< 1.1 x 10 <sup>-13</sup> m <sup>2</sup> /s	
METHANE PERMEANCE	ASTM D 1434	< 1.7 x 10 <sup>-10</sup> m <sup>2</sup> /d·atm 0.32 GTR (Gas Transmission Rate) ml/m <sup>2</sup> ·D·ATM	

## VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.

Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.

ASTM E-1643 also provides general installation information for vapor retarders.



VaporBlock® Plus™ is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. RAVEN INDUSTRIES MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage.



### Engineered Films Division

P.O. Box 5107  
 Sioux Falls, SD 57117-5107  
 Ph: (605) 335-0174 • Fx: (605) 331-0333

Limited Warranty available at [www.RavenEFD.com](http://www.RavenEFD.com)

**Toll Free: 800-635-3456**  
**Email: [efdsales@ravenind.com](mailto:efdsales@ravenind.com)**  
**[www.ravenefd.com](http://www.ravenefd.com)**

10/10 EFD 1125