1901 MADISON AVENUE

NEW YORK, NEW YORK

Remedial Action Work Plan

NYC VCP No.: 13CVCP160M

Prepared for:

Love Funding

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REMEDIAL ACTION WORK PLAN
TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC 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

EXECUTIVE SUMMARY

Maple Court Housing Development Fund Corporation is in the process of enrolling in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate an 80,000-square foot property located at 1901 Madison Avenue (the "Site"). The Site, also called "Maple Court Housing", is located in the Harlem section of 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 to applicable laws and regulations.

Site Location and Current Usage

The Site is located at 1901 Madison Avenue in the Harlem neighborhood of Manhattan, New York, and is identified as Block 1748, Lot 1 on the New York City Tax Map. Figure 1 shows the Site location. The Site is approximately 80,000 square feet in area and is bounded by East 123rd Street to the north, Madison Avenue to the west, Park Avenue to the east, and East 122nd Street to the north. The Site is improved with a U-shaped, six-story residential apartment building with ground floor commercial space and a basement level, which occupies the western portion of the Site. An asphalt-paved parking lot is located on the eastern portion of the Site, a landscaped area adjoins the Madison Avenue entrance, and a grass-covered and concrete-paved courtyard occupies the central portion of the Site.

Summary of Proposed Redevelopment Plan

The Site is not currently being considered for redevelopment. The property is undergoing a mortgage refinance to be insured by the United States Department of Housing and Urban Development (HUD), which requires that an environmental regulatory agency issue a release of environmental liability to the owner.

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 standard methods that are well established in the industry. The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP citizen participation activities according to an approved Citizen Participation Plan (CPP).

2. Performance of a Community Air Monitoring Program (CAMP) for particulates and VOCs.

3. Site mobilization involving site security setup, equipment mobilization, utility mark outs and marking excavation areas.

4. Establishment of Track 4 SCOs. Excavation of shallow soil in a small area in the courtyard area that exceeds Track 4 SCOs for barium.

5. Transportation and off-site disposal of excavated soil/fill material at permitted facilities in accordance with applicable laws and requirements for handling, transport, and disposal. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.

6. Establishment of a composite cover system over the entire property, including building slab, pavement and cover soil in open space areas meeting Track 2 Restricted Residential SCOs. For imported cover soil, soil will comply with New York State Restricted Residential SCOs and groundwater protection standards, an OER-approved plan, and all Federal, State, and city laws and regulations.

7. Performance of all activities required for the remedial action, including permitting requirements in compliance with applicable laws and regulations.

8. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.

9. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

10. Recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and Institutional Controls 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

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

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

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

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

and Health Administration (OSHA). This plan includes many protective elements including those discussed below.

Site Safety Coordinator. This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is J. Patrick Diggins and can be reached at (603) 494-7090.

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

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

Odor, Dust and Noise Control. This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager Jennifer Armstrong at (212) 479-5537 or Dr. Daniel Walsh at the NYC Office of Environmental Remediation at (212) 676-0386.

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. Site work performed under this cleanup plan will be limited to landscaped areas in the courtyard of the existing building. 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 7am to 5pm 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 Jennifer Armstrong at (212) 479-5537, Dr. Daniel Walsh at the NYC Office of Environmental Remediation at (212) 676-0386, or call 311.

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

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

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

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

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 125th Street Library.

Long-Term Site Management. To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed. 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

Maple Court Housing Development Fund Corporation (Maple Court HDFC) is enrolling in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate the approximately 1.84-acre site located at 1901 Madison Avenue in Manhattan, New York. The Site is occupied by a six-story residential building (Maple Court Housing) with a parking lot and landscaped areas. Maple Court HDFC, the Site owner, is seeking refinancing for the property through the United States Department of Housing and Urban Development (HUD) 223(f) Mortgage Insurance Program.

An RI was completed to evaluate potential soil, groundwater, and soil vapor contamination as part of the New York City Office of Environmental Remediation (NYC OER) NYC VCP program. This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination within the Site boundary and establishes remedial action objectives, evaluates remedial action alternatives, and selects a remedy that is protective of human health and the environment consistent with the continued use of the property pursuant to Rules of the City of New York (RCNY)§ 43-1407(f).

1.1 SITE LOCATION AND CURRENT USAGE

The Site is located at 1901 Madison Avenue in the Harlem neighborhood of Manhattan, New York, and identified as Block 1748, Lot 1 on the New York City Tax Map. Figure 2 shows the Site layout. The Site is approximately 80,000 square feet in area and bounded by East 122nd Street to the south, Madison Avenue to the west, Park Avenue to the east, and East 123rd Street to the north. The Site is improved with a U-shaped, six-story residential apartment building with a basement level (Maple Court Housing), which occupies the western portion of the Site. An asphalt-paved parking lot is located on the eastern portion of the Site, a landscaped area adjoins the Madison Avenue entrance, and a grass-covered and concrete-paved courtyard occupies the central portion of the Site.

1.2 PROPOSED REDEVELOPMENT PLAN

The Site is not currently being considered for redevelopment. However, the property is undergoing a mortgage refinance to be insured by HUD, which requires that an environmental regulatory agency issue a release of environmental liability to the owner.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is bounded by East 123th Street followed by a multiple-story residential building to the north; East 122nd Street followed by the Helene Fuld Nursing College to the south; Park Avenue followed by elevated Metro North train tracks and commercial buildings to the east; and Madison Avenue followed by Marcus Garvey Park to the west. The surrounding area is comprised primarily of multiple-story residential and commercial buildings.

Surrounding property usage is summarized in the following table:

Direction	Adjacent Properties	Surrounding Properties
North	East 123rd Street followed by a six-story residential building with ground-floor commercial space	Multiple-story commercial and residential buildings
South	East 122nd Street followed by the Helen Fuld Nursing College	Multiple-story commercial and residential buildings
East	Park Avenue followed by the elevated Metro North train tracks and commercial buildings	Multiple-story commercial and residential buildings
West	Madison Avenue followed by Marcus Garvey Park	Multiple-story commercial and residential buildings

According to the New York City Office of Environmental Remediation (NYC OER) Searchable Property Environmental Database (SPEED), sensitive receptors (i.e., schools, hospitals or daycares) are not located within 500 feet of the property. Marcus Garvey Park is located approximately 60 feet west of the Site. Figure 3 shows the surrounding land usage.

1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document titled "*Remedial Investigation Report, 1901 Madison Avenue*", dated July 2013 (RIR).

Summary of Past Uses of Site and Areas of Concern

Fire insurance maps indicate that the Site has been used for residential properties since at least 1897. A filling station was built in the northeastern portion of the property in 1968. A second filling station was added on the southeastern portion of the Site in 1969. The Site contained residential buildings and two filling stations until Maple Court Housing was constructed in the present configuration in 1993. The following Areas of Concern (AOCs) were identified based on previous studies conducted by D3G:

- AOC-1 - Two former gasoline filling stations on the eastern portion of the Site and historical spills associated with those facilities.
- AOC-2 - Historical use of surrounding properties as metal works and automobile repair facilities.
- AOC-3 - Historic fill present beneath the Site.

The objective of the RI was to further investigate the above listed AOCs.

Summary of the Work Performed under the Remedial Investigation

Langan performed the following scope of work:

1. A geophysical survey to clear borings of utilities and investigate for the presence of potential underground storage tanks (USTs), drums, and other suspect buried structures;
2. Advancement of eight soil borings (EB1 through EB8), and collection of 13 soil samples, including 1 duplicate for laboratory analysis;
3. Installation of one permanent groundwater monitoring well (TMW2) and three temporary monitoring wells (TMW1, TMW3, and TMW4) and collection of two groundwater samples for laboratory analysis; and

4. Installation of six soil vapor probes (SV1 through SV6) and collection of 7 soil vapor samples, including 1 duplicate sample, for laboratory analysis.

Summary of Environmental Findings

1. According to the United States Geological Survey (USGS) Central Park, N.Y. Topographic Quadrangle Map, the Site is approximately 25 feet above mean sea level (msl). The Site and surrounding area slope eastward toward the Harlem River.

2. The Site is generally underlain by historic urban fill predominately comprised of coarse to fine sand with varying amounts of silt, gravel, concrete, brick, and coal fragments. The fill layer extends to approximately 7 to 10 feet below grade surface (bgs) and is underlain by medium to coarse sand at some locations.

3. The bedrock surface dips towards the east across the Site, from a depth of approximately 4 feet bgs (EB4) to approximately 14 feet bgs (EB2). The depth to bedrock beneath the building was observed at approximately 6 feet below the basement slab.

4. The depth to groundwater ranged from approximately 3.5 feet bgs in TMW4 to 11 feet bgs in TMW2. Perched groundwater above bedrock likely fluctuates with local recharge, as groundwater was not detected in TMW1 and TMW3. Groundwater beneath the Site is inferred to flow eastward toward the Harlem River.

5. Soil/fill samples collected during the RI showed that two volatile organic compounds (VOCs) including acetone and methylene chloride were detected in one soil sample at concentrations above the NYSDEC Part 375 Track 1 Unrestricted Use SCOs. Their concentrations were well below the Track 2 Restricted Residential SCOs. All other VOCs were either not detected or reported at concentrations below the Part 375 Restricted Residential SCOs. Six SVOCs, specifically polycyclic aromatic hydrocarbons (PAHs), including benzo(a)anthracene (max. of 8.9 mg/Kg), benzo(a)pyrene (max. of 6.7 mg/Kg), benzo(b)fluoranthene (max. of 7.8 mg/Kg), benzo-(k)fluoranthene (max. of 6.2 mg/Kg), chrysene (max. of 8.5 mg/Kg), and indeno(1,2,3-cd)pyrene (max. of 1.7 mg/Kg) were detected at concentrations above

the NYSDEC Part 375 Restricted Residential SCOs. The SVOCs detected above Unrestricted/Restricted Residential SCOs are all PAH compounds and their concentrations and distribution indicate that they are associated with historic fill material observed during the sampling. Of four shallow soil sample taken in the courtyard area, only two SVOC compounds (one in each of two samples) were detected marginally above Track 2 Restricted Residential SCOs in shallow soil. Four metals including copper, barium, lead and zinc were detected at concentrations above the Track 1 Unrestricted Use SCOs, and of these, barium (max. of 1860 mg/Kg) and lead (max. of 517 mg/Kg) also exceeded Restricted Residential SCOs. Of four shallow soil samples taken in the courtyard area, only barium exceeded Track 2 Restricted Residential SCOs in two samples. Lead results were identified in two of these samples at the Track 2 Restricted Residential SCO within the range of analytical error. Metals and SVOC concentrations were typical of historic fill in New York City and not indicative of a release. Four pesticides (4,4-DDD, 4,4-DDE, 4,4-DDT, and Dieldrin) were detected in soil samples at concentrations exceeding Unrestricted Use SCOs. Their concentrations were well below Part 375 Restricted Residential SCOs. PCBs were not detected in the soil samples.

6. Groundwater samples collected during the RI showed methylene chloride detected at low concentrations and below NYSDEC 6NYCRR Part 703.6 Groundwater Quality Standards (GQS) in two samples. No other VOCs were detected in groundwater. Several SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene benzon(k)fluoranthene, and chrysene were detected at concentrations above the respective GQS. The detected SVOCs likely reflect turbidity and the PAH content of the soil matrix (i.e., historic fill). Dissolved metals including selenium and sodium were detected at concentrations above the GQS. Pesticides and PCBs were not detected in groundwater.

7. Soil vapor samples collected during the RI showed low levels of petroleum related compounds and trace level concentrations of chlorinated VOCs. Chlorinated VOCs were not detected in the soil vapor samples at concentrations above the New York State Department of Health (NYSDOH) Air Guideline Values (AGV).

Tetrachloroethylene (max. of 28 μg/m^3), trichloroethylene (max. of 2.6 μg/m^3), and carbon tetrachloride (max. of 1.2 μg/m^3) were detected in one or more soil vapor samples and below DOH guidance values. 1,1,1-trichloroethane (TCA) was not detected in soil vapor. Based on Decision Matrices 1 and 2 in the NYSDOH 2006 Guidance for Evaluating Soil Vapor Intrusion, the detected concentrations of carbon tetrachloride, tetrachloroethene (PCE), trichloroethene (TCE), and 1,1,1-tetrachloroethane (TCA) indicate that monitoring or mitigation of sub-slab vapor is not warranted.

2.0 REMEDIAL ACTION OBJECTIVES

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

Groundwater

- Prevent direct exposure to contaminated groundwater.

Soil

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

3.0 REMEDIAL ALTERNATIVES ANALYSIS

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

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

Two remedial action alternatives are considered in this analysis, one achieving Track 1 SCOs for the Site (Alternative 1) and one achieving Track 4 site-specific SCOs (Alternative 2) (see Table 4).

Alternative 1 would require demolition of the existing site building, complete removal of all concrete and asphalt surfaces, removal of all fill material (i.e., approximately 20,800 cubic yards) to the depth of native soil (i.e., 4 ft to 10 ft bgs), and backfilling of the remedial excavation to development grade. A new residential building would then be constructed.

Alternative 2 involves attainment of Track 4 SCOs and removal of shallow soil one small area in the courtyard that exceeds Track 4 SCO for barium and Track 2 Restricted Residential SCOs for barium and BaP required for cover soil. Establishment of a composite cover system over the entire property, including building slab, pavement and cover soil in open space areas

meeting Track 2 Restricted Residential SCOs. For imported cover soil, soil will comply with New York State Restricted Residential SCOs and groundwater protection standards. A Site Management Plan would be established to ensure long term management of Institutional and Engineering Controls that include periodic inspection and certification that the remedy continues to perform as designed, thus ensuring that the protections achieved for public health and the environment remain in perpetuity. A deed restriction would be placed to memorialize the remedial action and Engineering and Institutional Controls would be implemented to ensure that these controls will be appropriately managed by future owners of the Site.

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 and fill with contaminant concentrations exceeding Track 1 Unrestricted Use SCOs to a depth ranging from 4 ft to 10 ft bgs, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contamination leaching into groundwater. This remedial action is consistent with the RAOs and would provide overall protection of public health and the environment in consideration of current and potential future land use by eliminating the following:

- Risk of ingestion exposures or other direct contact with contaminated on-site soils consistent with remedial action objectives;
- Risk of leaching into groundwater and ingestion exposures or direct contact with groundwater with contamination derived from the Site consistent with remedial action objectives; and

Alternative 2 would achieve comparable protections of human health and the environment by establishing Track 4 SCOs at the Site and by ensuring that soil/fill that remains on-Site is properly managed by establishment of Institutional and Engineering controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan and placement of deed restrictions on the property would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater. Components of Alternative 2 include:

- Excavation of shallow soil in a small area in the courtyard area that exceeds Track 4 SCOs for barium and Track 2 Restricted Residential SCOs for barium and BaP.
- Establishment of a composite cover system over the entire property, including building slab, pavement and cover soil in open space areas meeting Track 2 Restricted Residential SCOs.
- Implementing a Site Management Plan that would provide long term management of Institutional and Engineering Controls to ensure that such controls are inspected periodically and mandate certification that the remedy continues to perform as it was designed, thus ensuring that the protections achieved for public health and the environment remain in perpetuity.
- Placement of a deed restriction to memorialize these controls in order to decrease the risk of future exposures with contaminated media consistent with remedial action objectives.

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil/Materials Management Plan and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations.

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/fill to achieve Track 1 Unrestricted Use SCOs. All soil/fill excavated from the Site would be managed and disposed in accordance with applicable regulations.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil, groundwater and soil vapor through removal of soil to meet Track 4 site-specific SCOs.

Similar to the Track 1 alternative, 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. 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, the alternative is evaluated with respect to its effect on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Both alternatives would result in short-term impacts associated with excavation, handling, load out of materials, and truck traffic. Alternative 1 would yield markedly greater short-term impacts from demolition activities, site-wide excavation, and construction activities.

Both alternatives would employ appropriate measures to prevent short term impacts, 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. It addresses the 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. It includes an 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. Removal of on-Site contaminant sources will prevent future groundwater contamination.

Alternative 2 would provide long-term effectiveness by establishment of Track 4 SCOs and excavation of shallow soil in a small area in the courtyard area that exceeds Track 4 SCOs and Track 2 Restricted Residential SCO required for cover soil. This alternative would eliminate direct contact with soil above Part 375 Restricted Residential SCOs. Establishment of a deed restriction will ensure that this protection remains effective for the long-term (in perpetuity). The SMP would ensure long-term effectiveness of all Engineering and Institutional Controls by

requiring periodic inspection and certification that these controls and use restrictions are maintained and function as intended and 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 the total volume of contaminated media.

Alternative 1 would provide maximum reduction of toxicity, mobility and volume of on-site contaminated material by excavation and removal of all historic fill exceeding Track 1 Unrestricted Use SCOs to depths ranging from 4 ft to 10 ft bgs, and backfilling of the entire Site with imported soil meeting the Part 375 Unrestricted Use SCOs.

Alternative 2 would reduce the toxicity, mobility and volume of on-site contaminated material by achieving Track 4 SCOs for the site and Track 2 Restricted Residential SCOs for exposed cover soil. Because this alternative includes a Track 4 component, a Site Management Plan would be implemented and a deed restriction would be placed to memorialize these controls, and ensure that exposure pathways are eliminated and contaminant mobility is reduced.

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.

Alternative 1 would require temporary eviction of all building residents, demolition of the building, complete removal of all concrete and asphalt-paved surfaces, excavation and removal of soil to depths of 4 ft to 10 ft bgs, backfilling of the excavation to development grade, and construction of a new building. Temporary eviction of the building residents over the required timeframe and the undertaking of a project of this magnitude are not feasible.

Alternative 2 is feasible and implementable. It utilizes standard materials, services and well-established technology. The reliability of the remedy is also high. There are no specific difficulties associated with the proposed activities, which utilize standard industry methods and do not require the eviction of the building residents.

Cost effectiveness

This evaluation criterion addresses the cost of the alternative, 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.

The capital costs associated with Alternative 1 are significantly higher than those for Alternative 2. The additional costs for Alternative 1 are associated with the demolition of a building, complete removal of all concrete and asphalt-paved surfaces, excavation and removal of a significantly larger volume of soil, import of clean soil to backfill the excavation to the existing grade, and new building construction. The magnitude of costs for implementation of Alternative 1 is prohibitive.

The capital costs associated with the Alternative 2 are reasonable, due to the limited volume of excavated material and imported backfill, and the preservation of the structural integrity of the Site building and adjoining structures. The maintenance of Engineering and Institutional Controls ensuring the continued effectiveness of the remedial action (i.e., maintenance of the Site cap) would result in marginal additional management costs. Alternative 2 is a cost effective remedy.

Community Acceptance

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

Based on the overall goals of the remedial program and initial observations by the project team, Alternative 1 would likely be less acceptable to the community than Alternative 2. Alternative 1 would displace middle-income building residents and subject neighbors to a more disruptive and lengthy project requiring demolition, excavation, and construction. Alternative 2 will have limited impact to the on-site residents and surrounding community.

This RAWP will be subject to and undergo public review under the NYC VCP and would provide the opportunity for detailed public input on the remedial alternatives and the selected remedial action. This public comment will be considered by OER prior to approval of this plan.

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.

Both alternatives for remedial action at the Site are comparable with respect to the proposed use (residential) and to land uses in the vicinity of the Site. The proposed use is consistent with the existing zoning designation for the property and is consistent with recent development patterns. The Site is surrounded by commercial and residential properties and both alternatives provide comprehensive protection of public health and the environment for these uses. 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.

Alternative 1 would require significantly higher energy consumption and greenhouse gas emissions than Alternative 2. Building demolition, the excavation, transport, and disposal of all historic fill from the Site, the import of a high volume of clean backfill, and new building construction will require significantly more vehicle and excavation equipment usage. Both remedial alternatives are otherwise comparable with respect to the opportunity to achieve sustainable remedial action. A complete list of green remedial activities considered as part of the VCP is included in the Sustainability Statement, included as Appendix 2.

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

The preferred remedial action alternative for this Site is the remediation achieving Track 4 site-specific SCOs (Alternative 2). This approach achieves protection of public health and the environment for the intended use of the property and allows for continued occupation of the building residents. The alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP citizen participation activities according to an approved Citizen Participation Plan (CPP). The CPP is included as Appendix 1.

2. Performance of a Community Air Monitoring Program (CAMP) for particulates and VOCs.

3. Site mobilization involving site security setup, equipment mobilization, utility mark outs and marking excavation areas.

4. Establishment of Track 4 SCOs. Excavation of shallow soil in a small area in the courtyard area that exceeds Track 4 SCOs for barium.

5. Transportation and off-site disposal of excavated soil/fill material at permitted facilities in accordance with applicable laws and requirements for handling, transport, and disposal. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.

6. Establishment of a composite cover system over the entire property, including building slab, pavement and cover soil in open space areas meeting Track 2 Restricted Residential SCOs. For imported cover soil, soil will comply with New York State

Restricted Residential SCOs and groundwater protection standards, an OER-approved plan, and all Federal, State, and city laws and regulations.

7. Performance of all activities required for the remedial action, including permitting requirements in compliance with applicable laws and regulations.

8. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.

9. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

10. Recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and Institutional Controls and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

Track 4 Site-Specific SCOs are proposed for the Site. Track 4 RCSCOs are summarized in Table 4. Soil and materials management on-site and off-site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 3.

Soil Cleanup Objectives

Track 4 soil cleanup objectives for this project will be:

- Barium 750 ppm

- Total SVOC 250 ppm
- Lead 750 ppm

Estimated Soil/Fill Removal Quantities

With the exception of barium a small area of shallow soil in the courtyard area at location EB-3, Track 4 SCOs are achieved prior to the implementation of any removal action for the property. In addition, shallow soil at this location does not achieve Track 2 Restricted Residential SCOs required for cover soil for barium and BaP. The total quantity of soil/fill expected to be excavated from the site is less than 20 cubic yards, and all from shallow soil the courtyard area Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

End-Point Sampling

Endpoint samples, including one from each sidewall and one sample from the base of the excavation, will be collected during the remedial action following removal of a small area of shallow soil in the area of EB-3. To facilitate timeliness of excavation, endpoint samples may by collected in-situ, in advance of excavation. End point analyses will be performed for barium and BaP. End point goals will be attainment of Track 2 Restricted Residential SCOs required for cover soils.

A contingency end-point sampling program will be implemented if previously undetected contaminated soil (i.e., hotspot) is discovered during remedial activities, and will be approved by OER prior to implementation. A New York State ELAP-certified laboratory will be used for all sample analyses. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detections and applicable standards and/or guidance values. If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and "finger print analysis", and required regulatory reporting (i.e., spills hotline) will be performed.

Quality Assurance/Quality Control

Quality Assurance/Quality Control for the chemical analytical program and assessment of usability of the data will be provided by the laboratory selected for this project.

Import and Reuse of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is less than 20 cubic yards (30 tons).

4.3 ENGINEERING CONTROLS

Engineering Controls employed in the remedial action to address residual contamination remaining at the Site will consist of a ground floor concrete slab within the interior of the structure, asphalt and concrete pavement in sidewalks and the parking lot, and two feet of imported soil that meets Part 375 Restricted Residential SCOs in the courtyard area.

Composite Cover System

Exposure to residual soil/fill that exceeds Part 375 Restricted Residential SCOs will be prevented by the existing concrete ground floor slab within the building, the concrete-paved sidewalks, and the asphalt-paved parking lot. Additionally, exposure will be eliminated in the courtyard areas by attainment of Part 375 Restricted Residential Use SCOs for cover soil.

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

4.4 INSTITUTIONAL CONTROLS

Institutional Controls (IC) have been incorporated into 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 established in a Site Management Plan (SMP) that will be included in the RAR.

Institutional Controls (IC) have been incorporated 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:

- Recording of an OER-approved Declaration of Covenant and Restrictions (DCR) with the City Register or county clerk, as appropriate. The DCR will include a description of all ECs and ICs, summarize the requirements of the Site Management Plan, and note that the property owner and property owner's successors and assigns must comply with the DCR and the approved SMP. The recorded DCR will be submitted in the Remedial Action Report. The DCR will be recorded prior to OER issuance of the Notice of Completion;
- Submittal of an SMP in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. The SMP will require that the property owner and property owner's successors 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 constitutes 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 annually and will comply with RCNY §43-1407(l)(3).
- Vegetable gardens and farming on the Site are prohibited;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

4.5 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the RAR 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 the DCR and 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 DCR and the Site Management Plan are implemented.

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

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

Known and Potential Sources

The Remedial Investigation identified the elevated concentrations of SVOCs and metals in soil and groundwater at the Site.

- SVOCs (PAH compounds) including benzo(a)anthracene, benzo(a)pyrene, benzo(b)-fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene exceeded Track 2 Restricted Residential SCOs;
- Metals including barium and lead exceeded Restricted Residential SCOs; and

- Four pesticides (4,4-DDD, 4,4-DDE, 4,4-DDT, and Dieldrin) were identified in soil samples, but none exceeded Restricted Residential SCOs.

These contaminants appear to be a constituent of the heterogeneous historic fill material and are not related to a spill or separate contaminant source.

Groundwater:

- Several SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene benzon(k)fluoranthene, and chrysene were detected at concentrations above the respective GQS.
- Dissolved metals including selenium and sodium were detected at concentrations above the GQS

Soil Vapor

- Soil vapor samples collected during the RI showed low levels of petroleum related compounds and trace levels concentrations of chlorinated VOCs.
- Tetrachloroethylene , trichloroethylene, carbon tetrachloride and other chlorinated hydrocarbons were below DOH guidance values for monitoring.

Nature, Extent, Fate and Transport of Contaminants

Concentrations of compounds exceeding Part 375 Restricted Residential SCOs are present at the Site but are mostly covered by asphalt or concrete slab with the exception of a small area in the courtyard where exeedence for barium and a marginal exceedence of BaP is observed. These SVOCs and metals are associated with historic fill material that is present to depths of up to 10 feet bgs throughout the property. Metals found in soil were not detected in groundwater and SVOC in groundwater are believed to be associated with sample turbidity. Based on the findings of the RI and current Site conditions, these contaminants are not mobile or migrating within or from the Site. Soil vapor concentrations are low and do not exceed monitor guideline values established by State DOH.

Potential Routes of Exposure

Under future remediated conditions, there are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the Site. Under current conditions there are potential exposure pathways to lightly contaminated soil. During the remedial action, on-site exposure pathways will exist and will be eliminated by preventing access to the site, through implementation of soil/materials management, dust control measures, employment of a CAMP, and implementation of a Health and Safety Plan.

Existence of Human Health Exposure

An exposure pathway begins with a source and mechanism of contaminant release, resulting in the contamination of a receiving matrix (environmental medium). A complete exposure pathway also requires a point of potential contact with the contaminated matrix (i.e., exposure point), an exposure route (i.e., inhalation, ingestion, or dermal contact), and a receptor population. If an exposure pathway is not complete because it does not include a contaminated matrix, a point of potential contact, an exposure route, or a receptor, then no risk exists.

Soil containing compounds at concentrations above Part 375 Restricted Residential Use SCOs will remain on site following the remedial action; however, the Site will be covered with either an impermeable cap (i.e., concrete or asphalt), or with 2 feet of cover soil meeting Part 375 Restricted Residential SCOs, thereby eliminating the exposure pathway.

Groundwater in this area is not a source of drinking water; therefore the pathway is not complete. Based on the analytical results of the Remedial Investigation, soil vapor concentrations are low and mitigation is not required.

Receptor Populations

The receptors identified under the proposed remedy include:

- On-site workers: adult (remediation and construction workers).
- Temporary workers: adult (utility worker/inspector, subcontractors, sampler/remediation inspector).
- Adult and child residents of the apartment units.

The receptors identified under the proposed remedy and continued site use as residential development include:

- Adult and child residents of the apartment units.
- On-site maintenance workers.
- Temporary adult workers: (utility worker/inspector, landscape worker, construction worker).

The receptors identified above are believed to be the primary receptors of interest.

Overall Human Health Exposure Assessment

The proposed remedial action will eliminate exposure to historic fill through impermeable surfaces (i.e., concrete and asphalt) or with 2 feet of cover soil meeting Part 375 Restricted Residential SCOs. An SMP and Deed Restriction will be put in place to eliminate potential future exposure from breaching of the cover materials. Groundwater in this area is not a source of drinking water. The analytical results of soil vapor sampling indicated that soil vapor mitigation is not necessary.

Workers and Residents on site during remedial activities will potentially be exposed to hazardous substances from subsurface media, dust and/or vapors. Excavation for site development may result in short-term exposure to subsurface soils by individuals involved in excavation activities involving these media. Although it is possible for contaminated soil to become airborne in the form of fugitive dust during remedial excavation work, engineering controls will be implemented to mitigate such an exposure. Continuous air monitoring will be conducted during all invasive construction activities.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Jennifer Armstrong, Project Manager and Michael Burke, Associate. The Professional Engineer (PE) for this project is Joel Landes.

5.2 SITE SECURITY

Site access will be controlled by metal security fencing around the work excavation area.

5.3 WORK HOURS

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or specific variances issued by that agency.

5.4 HEALTH AND SAFETY PLAN

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be J. Patrick Diggins. 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. The Site Safety Officer will be responsible for maintaining workers training records.

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

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

5.6 AGENCY APPROVALS

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

5.7 SITE PREPARATION

Pre-Construction Meeting

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

Mobilization

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

Utility Marker Layouts, Easement Layouts

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

Equipment and Material Staging

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

Stabilized Construction Entrance

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

Truck Inspection Station

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

Extreme Storm Preparedness and Response Contingency Plan

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

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; lose 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 NYSDEC 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 by 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 off-site areas may require characterization based on site conditions, at the discretion of OER. If on-site petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYSDEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped it this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYSDEC.

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) 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 NYSDEC; 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 shown on Figure 4.

5.9 DEMOBILIZATION

Demobilization will include:

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

- Equipment decontamination, and;
- General refuse disposal.

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

5.10 REPORTING AND RECORD KEEPING

Daily Reports

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

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

The frequency of the reporting period may be revised in consultation with the 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.

5.13 DATA USABILITY SUMMARY REPORT

The primary objective of a Data Usability Summary Report (DUSR) is to determine whether or not data meets the site specific criteria for data quality and data use. The DUSR provides an evaluation of analytical data without third party data validation. The DUSR for post-remedial

samples, if collected during implementation of this RAWP will be included in the Remedial Action Report (RAR).

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;
- If endpoint samples are collected, a 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.
- 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, Joel Landes, P.E., am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 1901 Madison Avenue Site (NYC VCP Site No. 13CVCP160M).

I certify that the OER-approved Remedial Action Work Plan dated October 2013 and Stipulations in a letter dated TBD; if any were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Joel B. Landes, P.E.
Name

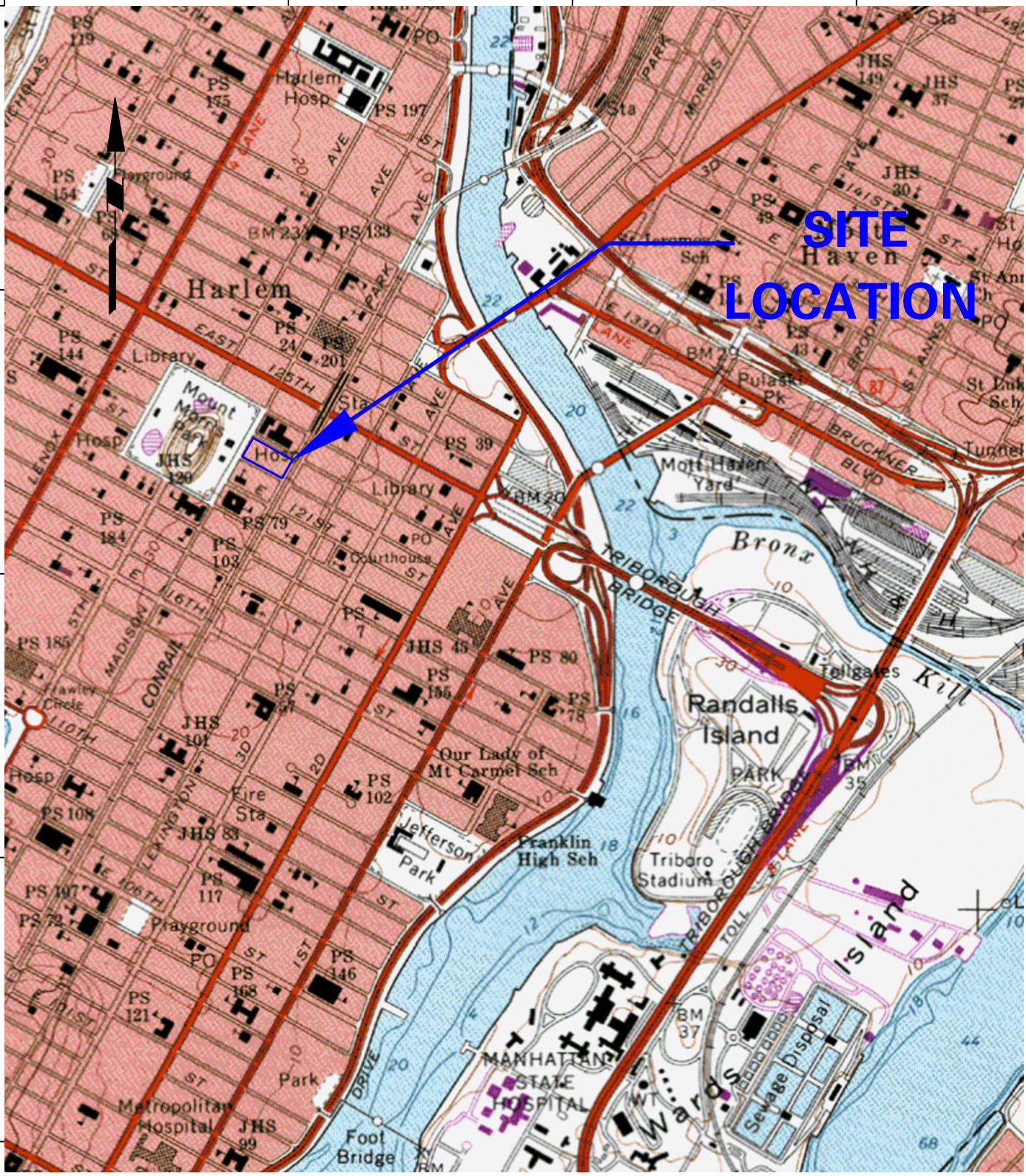
NYS #076348
NYS PE License Number

Signature

10/22/13
Date

7.0 SCHEDULE

The schedule for the proposed remedial action and reporting is not currently known. Once established, the timeline for remediation and development activities will be submitted to OER.



REFERENCE BASE MAP OBTAINED FROM THE U.S.G.S CENTRAL PARK TOPOGRAPHIC QUADRANGLE MAP, DATED 1966, AND PHOTOREVISED FROM 1979

LANGAN

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Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan International LLC

Collectively known as Langan

1901 MADISON AVE

BLOCK No. 1748, LOT No. 001

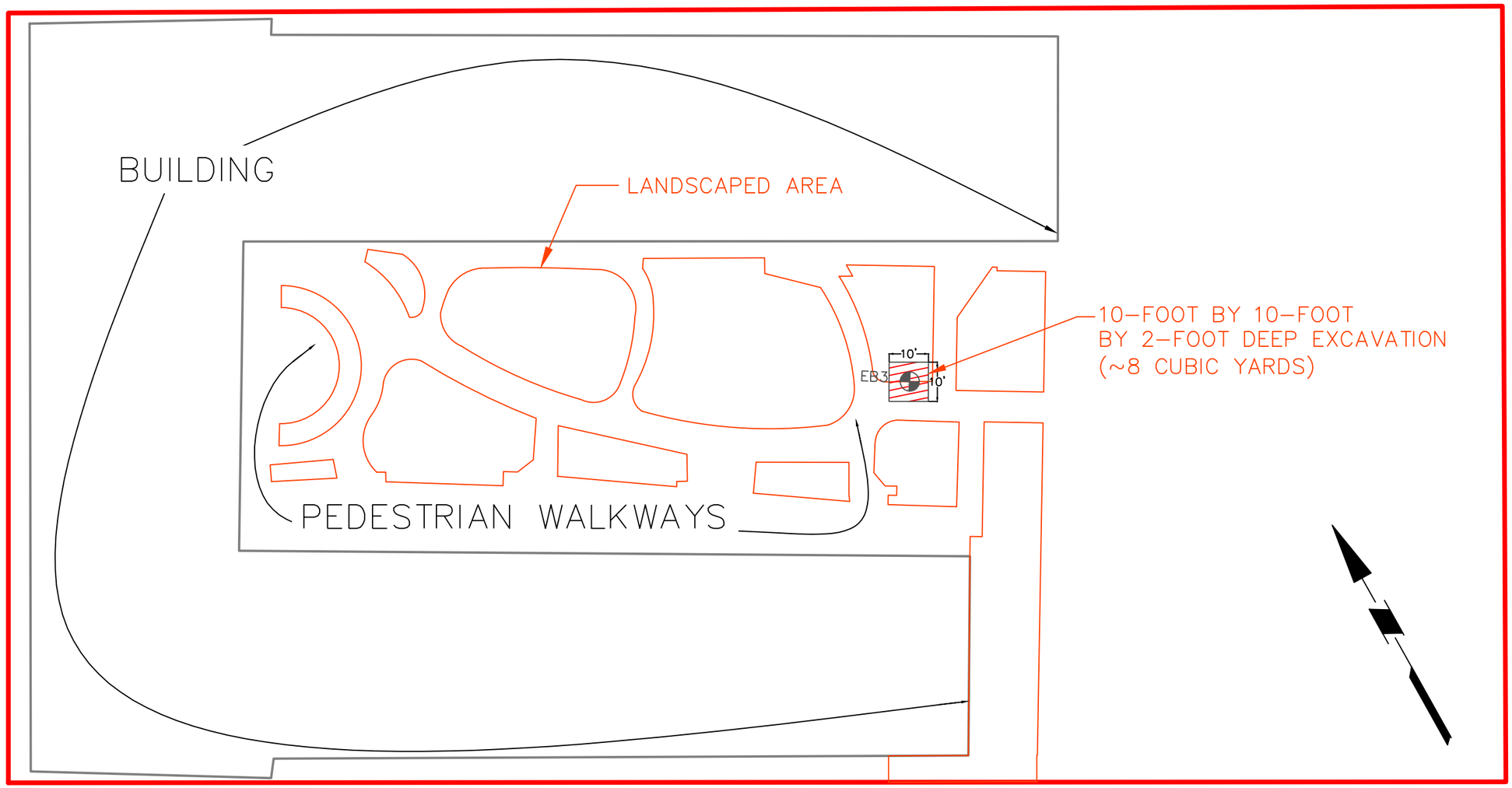
NEW YORK

NEW YORK NEW YORK

SITE LOCATION MAP

Project No. 170167503	Drawing No. 1
Date 07/17/2013	
Scale NTS	
Drawn By SH	
Submission Date 07/17/2013	Sheet 1 of 4

Filename: \\langan.com\data\NY\data1\170242101\Cadd Data - 170242101\2D-DesignFiles\Figure 1-Site Location Map.dwg Date: 7/17/2013 Time: 11:12 User: pdiggins Style Table: Langan.stb Layout: ANSIA-BP



LEGEND :

10 FT X 10 FT X 2 FT AREA TO BE EXCAVATED AND BACKFILLED WITH CLEAN FILL (BELOW RESTRICTED RESIDENTIAL SCOs)

SITE BOUNDARY

EXISTING BUILDING BOUNDARY

50 0 10 25 50

SCALE IN FEET

LANGAN

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Project	Drawing Title	Project No.	Drawing No.
1901 MADISON AVENUE BLOCK No. 748, LOT No. 1 NEW YORK NEW YORK	SITE PLAN	170242101 Date 10/28/2013 Scale Drawn By AR	2

Filename: \\langan.com\data\NY\data1\170242101\Cadd Data - 170242101\2D-DesignFiles\Figure 2-Excavation.dwg Date: 10/28/2013 Time: 15:05 User: sharrison Style Table: Langan.stb Layout: Soil Analytical Results

LEGEND

- SITE BOUNDARY
- COMMERCIAL USE PROPERTY
- RESIDENTIAL USE PROPERTY
- MIXED RESIDENTIAL-COMMERCIAL USE PROPERTY
- INDUSTRIAL-MANUFACTURING USE PROPERTY
- PARK

50 0 10 25 50

SCALE IN FEET

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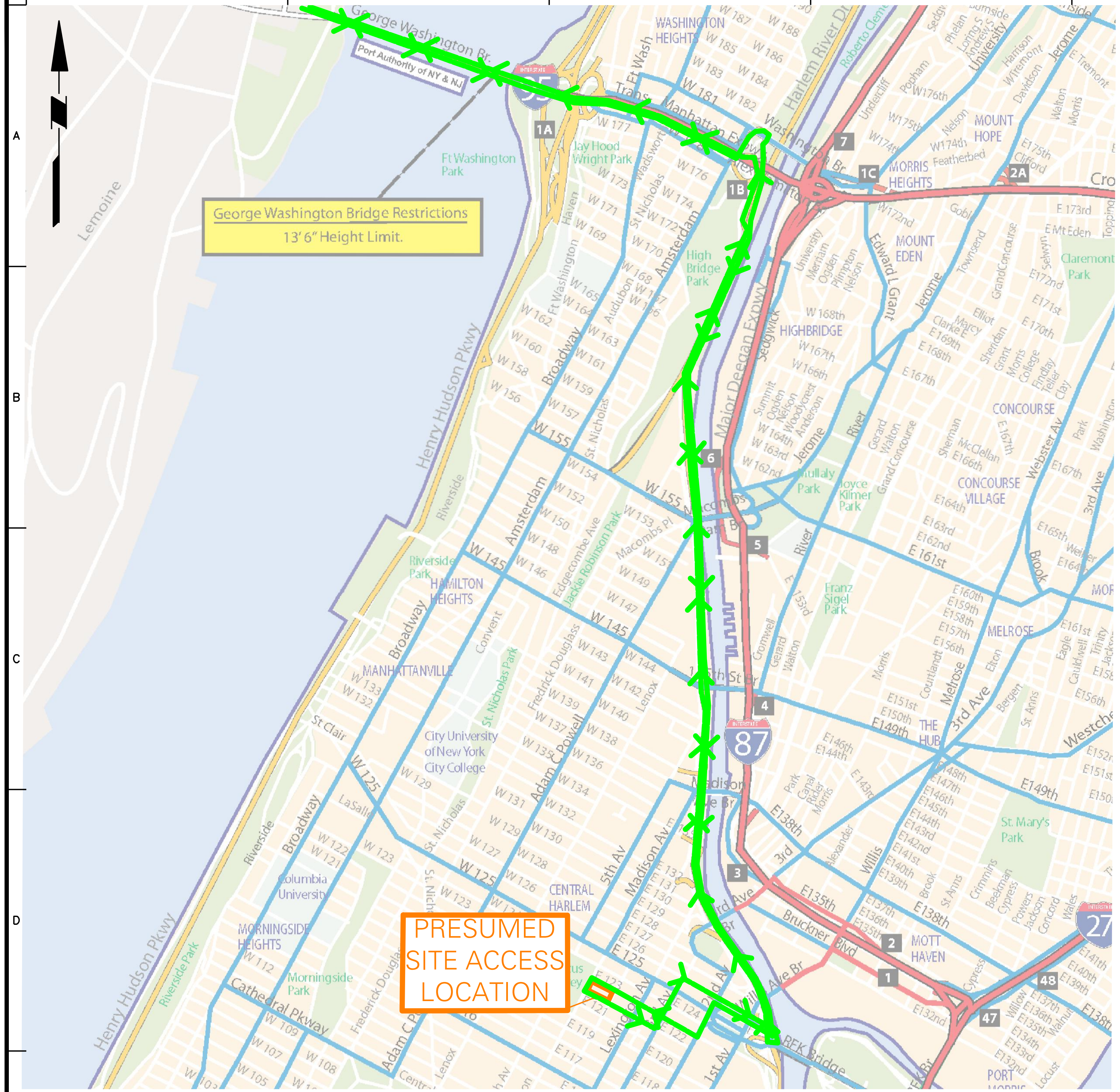
Collectively known as Langan

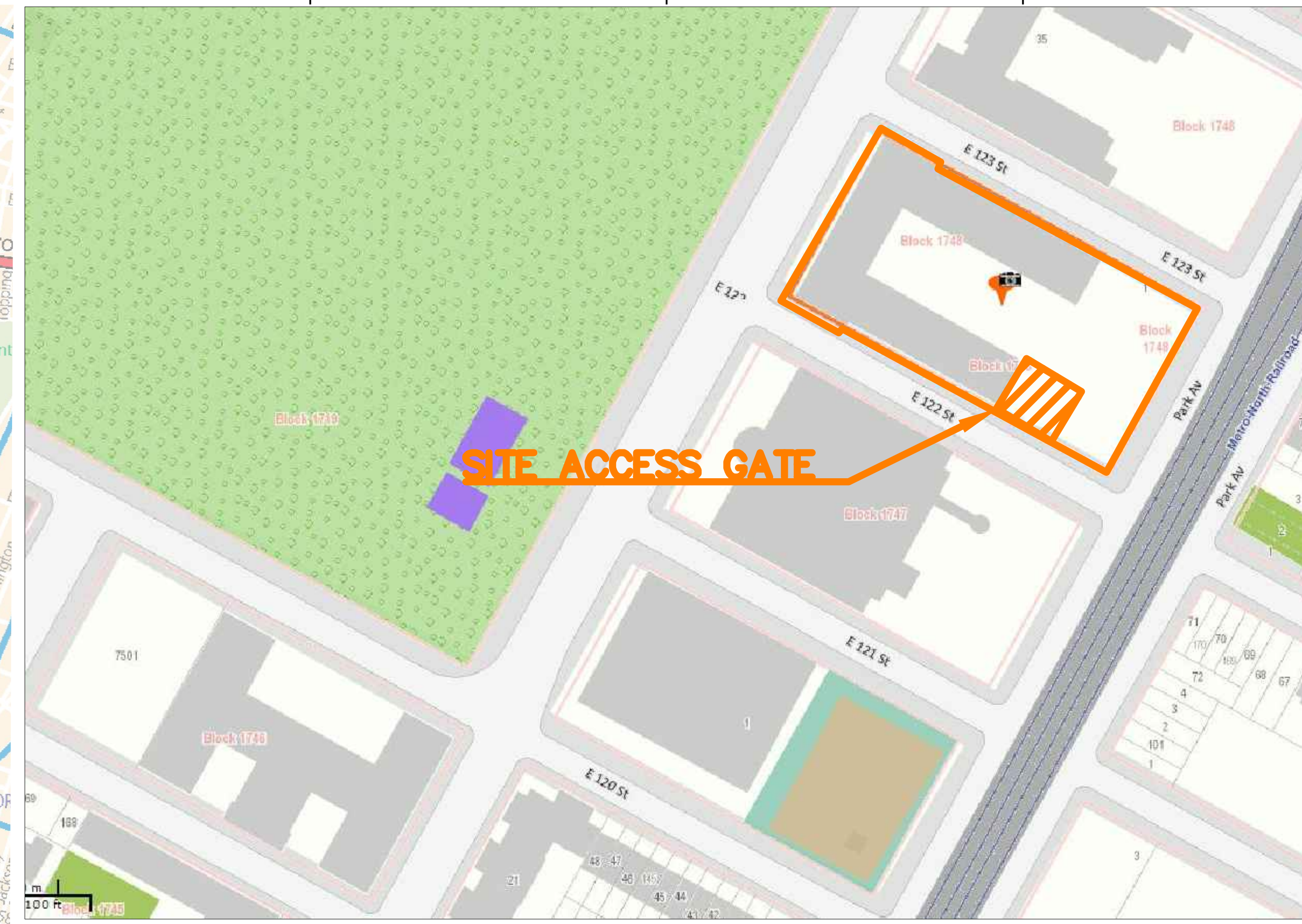
Project
1901 MADISON AVENUE
BLOCK No. 748, LOT No. 1
NEW YORK **NEW YORK**

Drawing Title
SURROUNDING LAND USAGE MAP

Project No.	Drawing No.
170242101	3
Date 07/17/13	
Scale 1" = 100'	
Drawn By AR	Sheet 3 of 4

Filename: \\langan.com\data\NY\data1\170242101\Cadd Data - 170242101\2D-DesignFiles\Figure 4- Surrounding Usage Map.dwg Date: 7/17/2013 Time: 11:33 User: pdiggins Style Table: Langan.stb Layout: Soil Analytical Results





LEGEND

SITE BOUNDARY

TRUCK ROUTE

NOTES

1. AERIAL IMAGE ADAPTED FROM GOOGLE EARTH.
2. TRUCK ROUTE MAP ADAPTED FROM THE NEW YORK CITY DEPARTMENT OF TRANSPORTATION 2011-2012 NEW YORK CITY TRUCK ROUTE MAP.
3. SITE ACCESS GATE LOCATION MAY CHANGE BASED ON CONSTRUCTION LOGISTICS.

LANGAN 21 Penn Plaza, 360 West 31st Street, 8th Floor New York, NY 10001 T: 212.479.5400 F: 212.479.5444 www.langan.com Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan Engineering and Environmental Services, Inc. Langan International LLC Collectively known as Langan	Project 1901 MADISON AVENUE BLOCK No. 748, LOT No. 1 NEW YORK NEW YORK	Drawing Title TRUCK ROUTE MAP	Project No. 170242101 Date 07/17/13 Scale NTS Drawn By AR	Drawing No. 4 Sheet 4 of 4

Filename: \\langan.com\data\NY\data1\170242101\Cadd Data - 170242101\2D-DesignFiles\Figure 4- Trouck Route Map.dwg Date: 7/19/2013 Time: 13:58 User: pdiggins Style Table: Langan.stb Layout: ANSIB-BL

Table 1
VOC, SVOC, Pesticides, PCB and Metals Detected in Soil
Remedial Investigation
1901 Madison Ave
New York, New York
Langan Project No. 170242101

			Asphalt-covered Parking Lot					Grass-covered Courtyard				Building			Front Garden
Location	**NYSDEC Part 375**	**NYSDEC Part 375**	**EB1**	**EB1**	**EB2**	**EB2**	**EB2**	**EB3**	**EB3**	**EB4**	**EB4**	**EB5**	**EB6**	**EB7**	**EB8**
SampleID	**Unrestricted Use**	**Restricted Residential**	**EB1_0-2**	**EB1_7-8**	**EB2_0-2**	**DUP01**	**EB2_10-11**	**EB3_0-2**	**EB3_6-7**	**EB4_0-2**	**EB4_2-3**	**EB5_0-2**	**EB6_2-3**	**EB7_0-2**	**EB8_0-2**
Lab Sample ID	**SCO**	**Use SCO**	**13E0213-01**	**13E0213-02**	**13E0213-03**	**13E0213-04**	**13E0213-05**	**13E0213-06**	**13E0213-07**	**13E0243-01**	**13E0243-02**	**13E0243-03**	**13E0310-01**	**13E0310-02**	**13G0310-01**
Sampling Date			**5/6/2013**	**5/6/2013**	**5/6/2013**	**5/6/2013**	**5/6/2013**	**5/6/2013**	**5/6/2013**	**5/7/2013**	**5/7/2013**	**5/7/2013**	**5/7/2013**	**5/7/2013**	**7/8/2013**
VOC (mg/kg)															
2-Butanone	0.12	~	0.0043 U	0.0045 U	0.0029 U	0.0033 U	*0.32* U	0.0034 U	0.0027 U	0.003 U	0.011	0.0045 J	0.0078 J	0.0055 U	0.0028 U
Acetone	0.05	100	0.023 B	0.01 J,B	0.013 B	0.011 J,B	**0.82** J,D,B	0.0094 J,B	0.0027 U	0.0056 J,B	0.049 B	0.026 B	0.042 B	0.023 B	0.0028 U
Benzene	0.06	4.8	0.0048 J	0.0045 U	0.0029 U	0.0033 U	*0.32* U	0.0034 U	0.0027 U	0.003 U	0.0031 U	0.0032 U	0.0056 U	0.0055 U	0.0028 U
Methylene chloride	0.05	100	0.01 J,B	0.01 J,B	0.0074 J,B	0.0093 J,B	**0.66** J,D,B	0.017 B	0.0098 J,B	0.014 B	0.012 B	0.01 J,B	0.021 J,B	0.019 J,B	0.014
Naphthalene	12	100	0.0043 U	0.0045 U	0.0029 U	0.0033 U	10 D	0.0046 J	0.0027 U	0.003 U	0.0031 U	0.0032 U	0.0056 U	0.0072 J	0.0028 U
SVOC (mg/kg)															
Acenaphthene	20	100	1.3 U	1.03 J,D	0.66 U	0.635 U	2.69 J,D	0.346 U	0.0664 U	0.503 U	0.514 U	0.998 U	0.343 U	0.333 U	0.341 U
Anthracene	100	100	1.97 U	3.12 D	0.995 U	0.958 U	7.75 D	0.522 U	0.1 U	0.759 U	0.775 U	1.51 U	0.518 U	0.502 U	0.514 U
Benzo(a)anthracene	1	1	**3.56** J,D	**8.25** D	0.682 U	0.656 U	**8.97** D	0.903 J,D	0.104 J	**1.14** J,D	0.729 J,D	**1.11** J,D	**1.19** D	0.344 U	0.352 U
Benzo(a)pyrene	1	1	**3.06** J,D	**5.91** D	0.722 U	0.695 U	**6.71** D	**1.46** D	0.084 J	0.973 J,D	0.763 J,D	*1.09* U	**1.45** D	0.364 U	0.48 J,D
Benzo(b)fluoranthene	1	1	*3.02* U	**5.35** D	*1.53* U	*1.47* U	**7.81** D	0.802 U	0.154 U	*1.17* U	*1.19* U	*2.31* U	**1.21** D	0.77 U	0.789 U
Benzo(g,h,i)perylene	100	100	1.2 U	1.07 J,D	0.605 U	0.582 U	1.57 J,D	0.318 U	0.0609 U	0.462 U	0.471 U	0.915 U	0.846 J,D	0.305 U	0.484 J,D
Benzo(k)fluoranthene	0.8	3.9	*3.6* U	**6.22** D	*1.82* U	*1.75* U	**5.82** D	*0.957* U	0.183 U	*1.39* U	*1.42* U	*2.76* U	**1.06** D	*0.919* U	*0.942* U
Benzyl butyl phthalate	~	~	1.99 U	1.04 U	1.01 U	0.968 U	1.98 U	0.528 U	0.101 U	1.03 J,D	0.783 U	6.86 D	0.524 U	0.507 U	0.52 U
Chrysene	1	3.9	**3.78** D	**8.05** D	0.839 U	0.807 U	**7.91** D	**1.44** D	0.134 J	**1.4** D	0.837 J,D	**1.56** J,D	**1.15** D	0.423 U	0.437 J,D
Fluoranthene	100	100	8.17 D	21 D	1.07 U	1.03 U	26.3 D	3.4 D	0.275	2.84 D	1.73 D	3.01 D	2.09 D	0.539 U	0.627 J,D
Fluorene	30	100	1.73 U	0.945 J,D	0.875 U	0.842 U	4.59 D	0.459 U	0.088 U	0.667 U	0.681 U	1.32 U	0.455 U	0.441 U	0.452 U
Indeno(1,2,3-cd)pyrene	0.5	0.5	*1.64* U	**1.3** J,D	*0.831* U	*0.8* U	**1.7** J,D	0.436 U	0.0836 U	*0.634* U	*0.647* U	*1.26* U	**0.82** J,D	0.419 U	0.429 U
Isophorone	~	~	1.24 U	0.65 U	0.715 J,D	0.603 U	1.23 U	0.605 J,D	0.0631 U	0.478 U	0.488 U	0.948 U	0.326 U	0.316 U	0.721 J,D
Naphthalene	12	100	0.886 U	0.465 U	0.448 U	0.432 U	8.78 D	0.235 U	0.0451 U	0.342 U	0.349 U	0.678 U	0.233 U	0.226 U	0.232 U
Phenanthrene	100	100	4.6 D	11 D	0.952 U	0.916 U	7.9 D	2.23 D	0.143 J	1.32 J,D	0.806 J,D	1.51 J,D	0.93 J,D	0.48 U	0.492 U
Pyrene	100	100	7.22 D	20.1 D	0.744 U	0.744 J,D	21.1 D	2.95 D	0.27	2.86 D	1.65 D	3.03 D	2.15 D	0.375 U	0.584 J,D
Pesticides (mg/kg)															
4,4'-DDD	0.0033	13	**0.00774** D	0.00281 U	0.00271 U	0.0026 U	0.00266 U	**0.00559** D	0.00272 U	0.00184 U	**0.0526** D	**0.0166** D	**0.00834** D	0.00273 U	0.0028 U
4,4'-DDE	0.0033	8.9	**0.00389** D	0.00281 U	0.00271 U	0.0026 U	0.00266 U	**0.0111** D	0.00272 U	**0.0298** D	**0.0239** D	**0.0283** D	**0.0178** D	0.00273 U	0.0028 U
4,4'-DDT	0.0033	7.9	**0.00572** D	0.00281 U	0.00271 U	0.0026 U	0.00266 U	**0.069** D	0.00272 U	**0.0378** D	**0.0174** D	**0.113** D	**0.0573** D	0.00273 U	**0.00429** D
Chlordane, total	0.094	4.2	0.0216 D	0.0112 U	0.0137 D	0.0158 D	0.0107 U	0.0388 D	0.0109 U	0.0121 D	0.0624 D	0.0873 D	0.0854 D	0.0109 U	0.0112 U
Dieldrin	0.005	0.2	0.00267 U	0.00281 U	0.00271 U	0.0026 U	0.00266 U	0.00311 D	0.00272 U	0.00184 U	**0.0163** D	**0.0123** D	**0.0115** D	0.00273 U	0.0028 U
PCB (mg/kg)															
Total PCBs	0.1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals (mg/kg)															
Aluminum	~	~	2000	6290	5680	4930	11900	6430	16900	7760	8730	9290	8800	10300	9400
Antimony	~	~	0.238 U	0.747	0.241 U	0.842	0.835	1.18	1.44	5.17	0.739	0.755	0.25 U	0.243 U	0.737
Arsenic	13	16	1.67	5.22	3.1	3.49	3.25	7.52	5.91	4.69	4.39	5.67	6.6	0.375 U	11.4
Barium	350	400	52.9	142	89.6	84.8	188	**1860**	218	**390**	**577**	**546**	**497**	40.3	113
Cadmium	2.5	4.3	0.108 U	0.113 U	0.109 U	0.105 U	0.108 U	0.663	0.11 U	0.111 U	0.114 U	0.11 U	0.114 U	0.11 U	0.339 U
Calcium	~	~	3750	30500	36300	42900	29700	60100 E	3380	24000	28400	29300	38700	1570	15600
Chromium	30*	180*	4.07	11.5	16.3	14.5	25.5	20.1	29	17.1	18.3	18.5	17.7	11.8	24.8
Cobalt	~	~	2.19	7.52	4.9	4.22	13.8	4.69	17.3	5.87	7.14	7.91	6.48	5.8	8.94
Copper	50	270	8.69	44.2	49.4	24.7	38.2	29.3	**66.5**	44.8	43.3	**50.6**	39.1	14.6	**64.1**
Iron	~	~	4480	12300	11000	8840	23200 E	13800	27700 E	14800	15800	18900	15200	11000	17700
Lead	63	400	**92.9**	**195**	**102**	**118**	**114**	**414**	**208**	**414**	**320**	**302**	**517**	30	**106**
Magnesium	~	~	869	3480	3460	3100	5890	3520	6600	3390	4190	5390	5500	2840	4990
Manganese	1600	2000	104	210	190	188	178	280	260	241	239	256	248	85.5	269
Mercury	0.18		0.0356 U	0.0374 U	0.0361 U	0.0347 U	0.0355 U	0.0379 U	0.0363 U	0.0367 U	0.0375 U	0.0364 U	0.0376 U	0.0364 U	0.134
Nickel	30	310	4.52	15	15.4	10.5	21.9	13.9	29	15.6	17.4	17	17.1	13.3	23.6
Potassium	~	~	359	1260	1570	1200	7070	1370	7580	1230	1580	2820	1760	736	2300
Selenium	3.9	180	0.54 U	2.09	1.2	0.526 U	2.14	1.94	2.68	0.796	1.02	0.943	1	1.23	2.27
Sodium	~	~	53.7	156	156	144	249	325	161	155	222	219	348	103	335
Vanadium	~	~	8.53	14.9	17.1	13.1	36.3	24.8	47.7	22.3	23.6	26.5	25.9	13.6	31
Zinc	109	10000	**124**	**278**	98.7	**129**	**179**	**771**	**332**	**289**	**341**	**418**	**389**	60.2	**119**

Notes:

1. Grab soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use and Restricted-Residential Soil Cleanup Objectives (SCO).
2. Only detected compounds are shown.
3. Concentrations exceeding NYSDEC Part 375 Unrestricted Use SCO are bolded and highlighted.
4. Concentrations exceeding NYSDEC Part 375 Restricted Use Restricted-Residential SCO are bolded and in red.
5. Results with reporting limits above the comparison criteria are italicized.
6. VOC = Volatile Organic Compounds
7. SVOC = Semivolatile Organic Compounds
8. PCB = Polychlorinated biphenyls
9. mg/kg = milligrams per kilogram
10. ND = Not detected
11. ~ = This indicates that no regulatory limit has been established for this analyte.

Qualifiers:

D = Result is from an analysis that required a dilution
J = Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated
U = Analyte not detected at or above the level indicated
E = Result is estimated and cannot be accurately reported due to levels encountered or interferences
B = Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants. Data users should consider anything <10x the blank value as artifact.

Table 2
VOC, SVOC, Pesticides, PCB and Metals Detected in Groundwater
1901 Madison Ave - Remedial Action Work Plan
New York, New York
Langan Project No. 170242101

Location SampleID Lab Sample ID Sampling Date	NYSDEC TOGS 1.1.1 AWQS and Guidance Values (GA)	TMW-2 TMW-2_20130506 13E0213-08 5/6/2013		TB01 TB01-20130506 13E0213-09 5/6/2013		TMW-4 TMW4_20130509 13E0443-01 5/9/2013	
VOC (µg/l)							
Methylene chloride	5	3.7	J,B	2.9	J,B	2.5	U
SVOC (µg/l)							
2-Methylnaphthalene	~	0.54	J	NT		0.0469	U
Anthracene	50	1.23		NT		0.0184	U
Benzo(a)anthracene	0.002	**1.73**		NT		*0.0119*	U
Benzo(a)pyrene	0.002	**1.55**		NT		**0.227**	
Benzo(b)fluoranthene	0.002	**0.64**		NT		**0.216**	
Benzo(k)fluoranthene	0.002	**1.55**		NT		**0.119**	
Bis(2-ethylhexyl)phthalate	5	0.72	J	NT		0.509	U
Chrysene	0.002	**2.03**		NT		*0.0125*	U
Fluoranthene	50	3.29		NT		0.227	
Fluorene	50	0.71		NT		0.0114	U
Naphthalene	10	3	J	NT		0.00843	U
Phenanthrene	50	4.19		NT		0.119	
Pyrene	50	4.36		NT		0.141	
Pesticides (µg/l)							
Pesticides	~	ND		NT		ND	
PCB (µg/l)							
Total PCB	~	ND		NT		ND	
Dissolved Metals (µg/l)							
Barium	1000	133		NT		384	
Calcium	~	182000		NT		291000	
Copper	200	5		NT		5	
Iron	300	20		NT		42	
Magnesium	35000	14700		NT		7360	
Manganese	300	6		NT		16	
Potassium	~	7780		NT		13800	
Selenium	10	**13**		NT		7	U
Sodium	20000	**27900**		NT		11600	
Zinc	~	170		NT		2	U
Metals (µg/l)							
Aluminum	~	362		NT		2690	
Barium	1000	137		NT		796	
Calcium	~	181000		NT		219000	
Copper	200	9		NT		50	
Iron	300	**353**		NT		**2670**	
Lead	25	10		NT		**396**	
Magnesium	35000	15100		NT		5850	
Manganese	300	10		NT		235	
Nickel	100	1	J	NT		9	
Potassium	~	7830		NT		12900	
Selenium	10	**12**		NT		7	U
Sodium	20000	**27900**		NT		9640	
Zinc	~	189		NT		257	

Notes:

1. Groundwater samples analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and guidance values for drinking water (Class GA) .

2. Only detected compounds are shown.
3. NYSDEC TOGS exceedances are bolded and highlighted.
4. VOC = Volatile Organic Compounds
5. SVOC = Semivolatile Organic Compounds
6. PCB = Polychlorinated biphenyls
7. ND = Not detected
8. NT = This indicates the analyte was not a target for this sample.
9. ~ = Criteria not available
10. µg/l = micrograms per liter

Qualifiers:

J = Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

B = Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants. Data users should consider anything <10x the blank value as artifact.

Table 3
VOC Detected in Soil Vapor Samples
1901 Madison Ave - Remedial Action Work Plan
New York, New York
Langan Project No. 170242101

Location ID Sample ID Laboratory ID Sampling Date	NYSDOH AGV	SV1 SV1_20130507 13E0310-03 5/7/2013		SV2 SV2_20130507 13E0310-04 5/7/2013		SV3 SV3_20130507 13E0310-05 5/7/2013		SV4 SV4_20130507 13E0310-06 5/7/2013		SV5 SV5_20130507 13E0310-07 5/7/2013		Duplicate Dup02 13E0310-08 5/7/2013		SV6 SV6_20130508 13E0402-01 5/8/2013	
Volatile Organic Compounds (VOC) (µg/m³)															
1,2,4-Trimethylbenzene	-	65	D	35	D	150	D	41	D	39	D	22	D	10	D
1,2-Dichloroethane	-	1	U	0.75	U	3.8	D	0.94	U	1.2	D	0.83	U	7.8	U
1,2-Dichlorotetrafluoroethane	-	1.7	U	1.3	U	1.5	U	1.6	U	5.7	D	1.4	U	13	U
1,3,5-Trimethylbenzene	-	31	D	10	D	110	D	12	D	12	D	6.2	D	9.4	U
2-Butanone	-	16	D	7.3	D	51	D	26	D	91	D	4.7	D	9.1	D
2-Hexanone	-	3.4	D	5.5	D	0.86	U	0.95	U	64	D	4.1	D	7.9	U
4-Methyl-2-pentanone	-	1	U	0.76	U	0.86	U	0.95	U	17	D	0.84	U	7.9	U
Acetone	-	180	D,B	120	D,B	530	D,B	290	D,B	870	D	98	D,B	220	D,B
Benzene	-	4.6	D	11	D	620	D	0.74	U	24	D	10	D	6.1	U
Bromodichloromethane	-	1.5	U	1.1	U	1.3	U	1.4	U	8	D	1.3	U	12	U
Carbon disulfide	-	12	D	16	D	140	D	150	D	0.78	U	22	D	6	D
Carbon tetrachloride	-	0.78	U	1.2	D	0.66	U	0.73	U	0.94	D	0.9	D	6	U
Chlorobenzene	-	1.1	U	0.85	U	65	D	1.1	U	1.1	D	0.94	U	8.8	U
Chloroethane	-	0.65	U	0.49	U	0.55	U	0.61	U	2.1	D	0.54	U	5.1	U
Chloroform	-	1.2	U	2.3	D	4.2	D	1.1	U	200	D	3.6	D	9.4	U
Chloromethane	-	0.51	U	0.38	U	0.43	U	0.48	U	5.6	D	0.42	U	4	U
Cyclohexane	-	2.3	D	7	D	110	D	15	D	4	D	5.9	D	15	D
Dichlorodifluoromethane	-	4.1	D	2.8	D	2.8	D	4.3	D	3.7	D	2.2	D	9.5	U
Ethyl Benzene	-	15	D	17	D	180	D	18	D	25	D	11	D	8.3	U
Isopropanol	-	0.61	U	0.45	U	4	D	0.57	U	0.61	U	0.5	U	31	D
Methylene chloride	60	3.4	D	2.5	D	5.9	D	2.3	D	0.86	U	2.1	D	8.7	D
n-Heptane		15	D	32	D	250	D	53	D	20	D	27	D	10	D
n-Hexane	-	15	D	27	D	580	D	130	D	22	D	19	D	6.8	U
o-Xylene	-	26	D	27	D	210	D	30	D	36	D	17	D	9.2	D
p- & m- Xylenes	-	64	D	76	D	530	D	81	D	96	D	48	D	25	D
p-Ethyltoluene	-	62	D	27	D	360	D	33	D	33	D	16	D	47	U
Styrene	-	1	U	0.79	U	0.89	U	0.99	U	17	D	0.87	U	8.2	U
Tetrachloroethylene	100	19	D	8.6	D	1.4	U	28	D	4.1	D	13	D	13	U
Toluene	-	31	D	79	D	0.79	U	50	D	86	D	65	D	15	D
Trichloroethylene	5	0.66	U	0.99	D	0.56	U	2.6	D	1.5	D	0.88	D	5.2	U
Trichlorofluoromethane (Freon 11)	-	10	D	9.2	D	2.6	D	9.4	D	1.5	D	11	D	11	U

Notes:
1. Sample results were compared to the New York State Department of Health (NYSDOH) Air Guideline Values (AGV).
2. Only detected compounds are shown.
3. Reported concentrations did not exceed NYSDOH AGV.
4. µg/m3 = micrograms per cubic meter.
5. - = this indicates that no regulatory limit has been established for this analyte

Qualifiers:
D = Result is from an analysis that required a dilution
U = Analyte not detected at or above the level indicated
B = Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants. Data users should consider anything <10x the blank value as artifact.

Table 4. Site-Specific Soil Cleanup Standards
Remedial Action Work Plan
1901 Madison Avenue New York, New York
Langan Project No. 170242101

Contaminant of Concern	**Track 4 Site-Specific SCO**
Total SVOC (mg/kg)	150
Barium	600
Lead	600
VOCs	Part 375 Restricted Residential SCOs
Pesticides	
PCB	
Metals (excluding lead and barium)	

APPENDIX 1
CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and Maple Court Housing Development Fund Corporation (Maple Court HDFC) 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, Maple Court HDFC 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, Dr. Daniel Walsh, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

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

manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

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. Langan will inspect the repositories, on behalf of the Maple Court HDFCto ensure that they are fully populated with project information. The repository for this project is:

125th Street Library

224 East 125th Street New York, New York

(212) 534-5050

Hours of Operation: 11:00am to 6:00pm Monday and Wednesday

12:00pm to 7:00pm Tuesday and Thursday

10:00am to 5:00pm Friday and Saturday

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.

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 Maple Court HDFC, reviewed and approved by OER prior to distribution and mailed by Maple Court HDFC. 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.

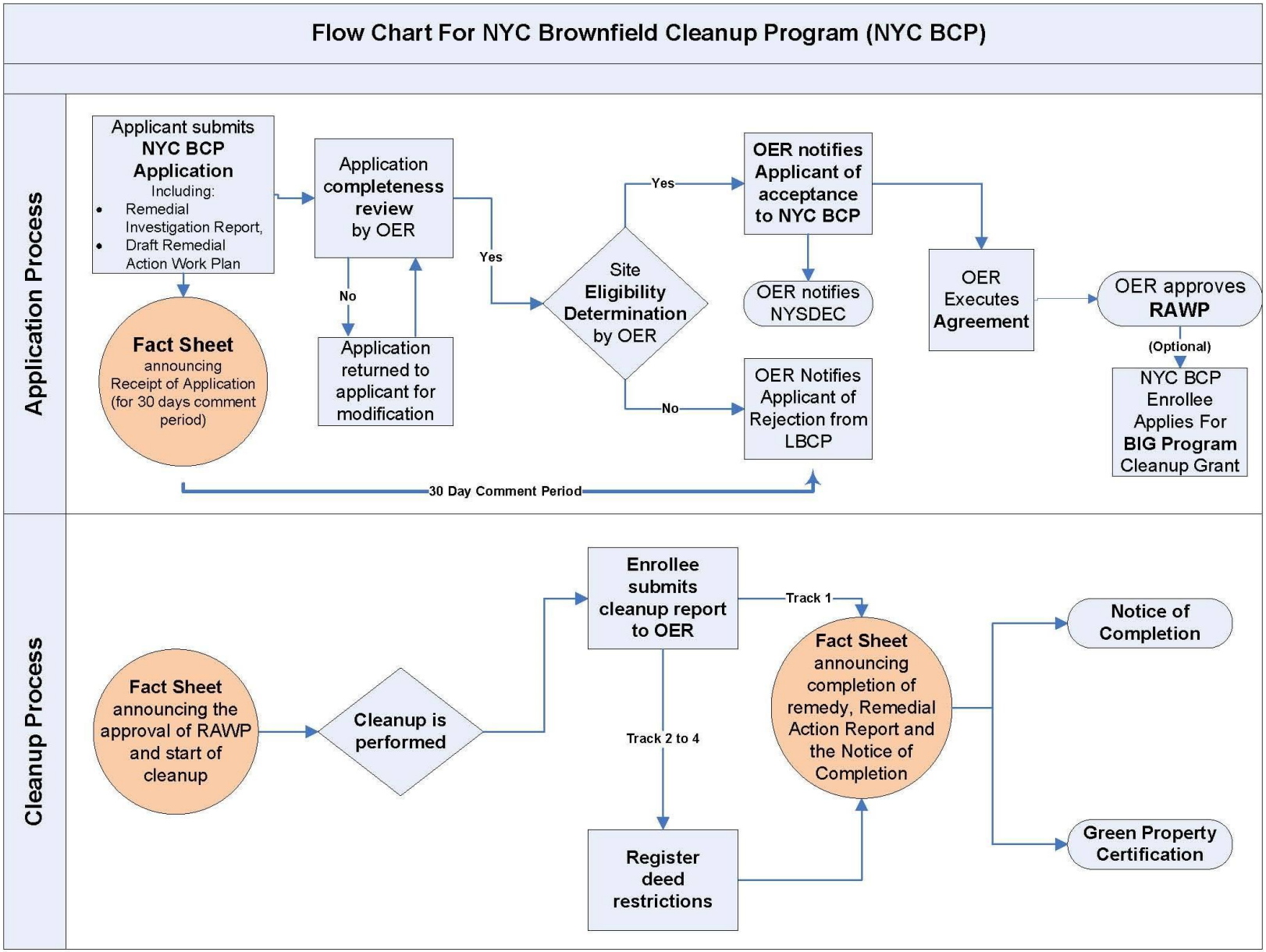
- **Public Notice announcing the approval of the RAWP and the start of remediation**

  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.

Flow Chart For NYC Brownfield Cleanup Program (NYC BCP)



APPENDIX 2
SUSTAINABILITY STATEMENT

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

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

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

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

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

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

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

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

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

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

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

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

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

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

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

Paperless Volunteer Cleanup Program. Love Funding is participating in OER's Paperless Volunteer 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. Love Funding is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

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

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

SOIL AND MATERIALS MANAGEMENT PLAN

for

1901 MADISON AVENUE
NEW YORK, NEW YORK

Prepared For:

Love Funding
1250 Connecticut Avenue, NW
Washington, D.C. 20036

Prepared By:

Langan Engineering, Environmental, Surveying
And Landscape Architecture, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001
NJ Certificate of Authorization No: 24GA27996400

Joel Landes, PE
Professional Engineer License No. 076348

October 16, 2013
170242101

LANGAN

TABLE OF CONTENTS

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 Remedial Action Report (RAR). Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Satisfaction.

1.2 STOCKPILE METHODS

Stockpiling might occur on Site. 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. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be kept covered at all times withappropriately anchored double layers of 8-mil minimum sheeting plastic, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant 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

1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

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

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

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

1.5 OFF-SITE MATERIALS TRANSPORT

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

Outbound truck transport routes are discussed in Section 5.8 of the RAWP. 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 Applicant to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Applicant. 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 RAR 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-Sitewill be stored, transported, and disposed of in compliance with applicable laws and regulations.

1.7 MATERIALS REUSE ON-SITE

Soil or fill excavated during the remedy shall not be reused on-Site. 'Reuse on-Site' means material that is excavated during the remedy, does not leave the property, and is relocated within the same property. 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 RAR; 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.

1.9 IMPORT OF BACKFILL AND SOIL COVER FROM OFF-SITE SOURCES

This section presents the requirements for imported fill materials to be used on Site. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site.

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.

General backfill is not anticipated, the following potential sources may be used pending attainment cover soil quality objectives for approximately 650 cubic yards of clean soil cover to be imported. Imported cover soil will achieve the lesser of Track 2 Restricted Residential Soil Cleanup Objectives and the Groundwater Protection Standards established in 6NYCRR Part 365-6.8:

- 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;
- The source facility should issue a letter on company letterhead stating that the material is segregated, has been properly maintained, and not comingled with other materials.

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.

The following sampling should be completed for imported fill:

- A composite sample will be taken at a minimum frequency of one sample for every 250 cubic yards of material and analyzed for NYS DEC Part 375-listed semi-volatile organic compounds (SVOCs), metals, PCBs, pesticides, and herbicides; and
- A grab sample will be taken at a minimum frequency of one sample for every 250 cubic yards of material and analyzed for NYS DEC Part 375-listed volatile organic compounds (VOCs).

As soil cover is the only material to be imported, recycled concrete aggregate (RCA) will not be used as imported fill.

Upon receipt of the segregated stockpile analytical results collected at the source, a Clean Soil Sampling Report will be submitted to OER for review/approval prior to importing. The report will include the following:

1) Summary of number of samples collected and analyzed, tabulated data and comparison to Restricted Residential Use SCOs;
2) Analytical data sheets and chain of custody documentation; and

Once it is determined that the fill material meets cover soil chemical requirements (the lower of Restricted Residential SCOs and Groundwater Protection Standards) and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site. The material will be placed and compacted as necessary.

1.10 FLUIDS MANAGEMENT

It is unlikely that dewatering activities will be required on this Site. 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 NYS DEC Part 375-listed metals, VOCs, SVOCs, 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, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry periods.

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.

HEALTH AND SAFETY PLAN
1901 Madison Avenue
New York, New York

Prepared For:

Love Funding (Enrollee Representative)
1250 Connecticut Avenue
Washington, D.C. 20036

Prepared By:

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
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New York, New York 10001

Joel B. Landes, P.E.
Vice President

July 2013

LANGAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

SECTION 1 HEALTH AND SAFETY PLAN (HASP) SUMMARY

Emergency Contacts

Emergency contacts are listed on Table 1.

Emergency Procedures

Emergency procedures are described in Section 6.

Site Specific Hazards and Training

Site Specific Hazards are described in Section 2.

The Field Safety Officer (FSO) will be responsible for providing site-specific training to all personnel that work at the site. This training will cover the following topics:

- Names of personnel responsible for site safety and health.
- Hazards potentially present at the site.
- Proper use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Acute effects of compounds at the site.
- Decontamination procedures.

Personnel will be required to sign and date the Site-Specific Training Form provided in Attachment B prior to working on-site.

General Health and Safety Requirements

Personnel will be required to sign and date the Health and Safety Plan and Work Plan Acceptance Form provided in Attachment B prior to working on-site.

Personnel Protective Equipment

Level D protection will be worn for initial entry on-site and for all activities except as noted in Section 3. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses or goggles must be worn when splash hazard is present
- Hard hat

Modified Level D protection may be required under conditions where potential contact of the skin or clothes with significant contamination occurs. Modified Level D

is the same as Level D but includes Tyvek coveralls and disposable polyethylene overboots.

Level C protection, unless otherwise specified in Section 3, will consist of Level D equipment and the following additional equipment:

- Full-face or half-mask air-purifying respirator (APR)
- Combination dust/organic vapor cartridges
- Tyvek coveralls if particulate hazard present
- PE-Coated Tyvek coverall if liquid contamination present
- PVC or nitrile inner and nitrile outer gloves
- 5-minute escape SCBA

Level B protection, unless otherwise specified in Section 3, will consist of Level D equipment and the following additional equipment:

- Hard hat
- Positive Pressure SCBA or positive pressure air line and respirator with escape SCBA
- PE-Coated Tyvek coverall
- Nitrile outer and PVC or nitrile inner gloves
- Nitrile boot covers

Air Monitoring

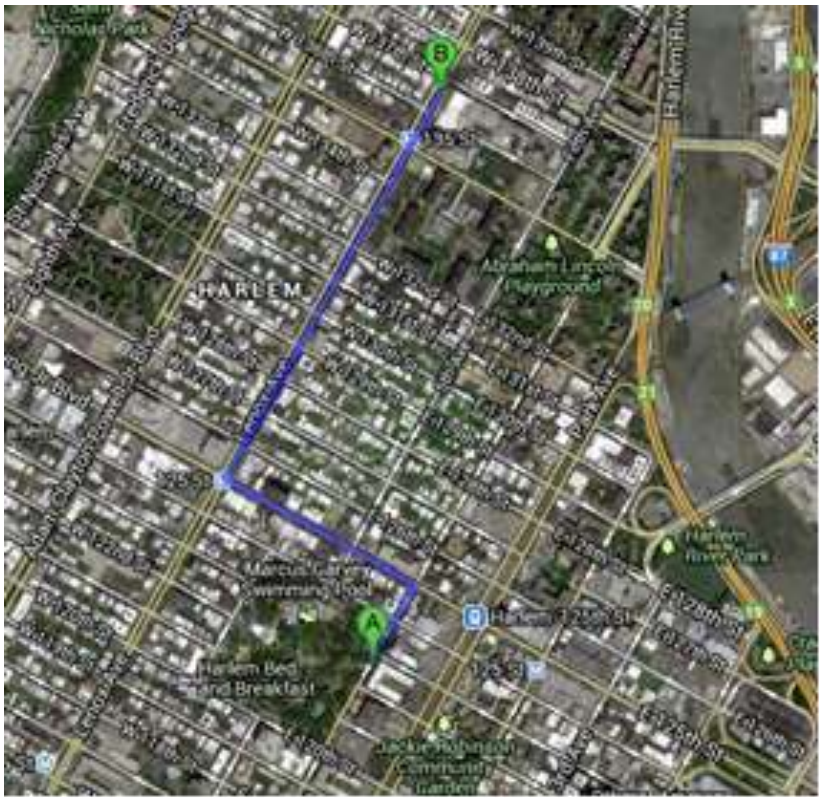
A summary of the action levels and restrictions is presented on Table 2.

FIGURE 1 - HOSPITAL ROUTE PLAN
(The Harlem Hospital Center in New York, NY)

Site Location: **1901 Madison Avenue, New York, NY**

Hospital Location: **506 Lenox Ave, New York, NY**

Information Line (212)-939-1000



Route to Hospital

From 1901 Madison Avenue, New York, NY to The Harlem Hospital Center, located at 506 Lenox Ave, New York, NY.

1: Head northeast on Madison Ave toward E 123rd St (go 0.1 miles)

2: Take left onto E 125th St/Dr Martin Luther King Jr. Blvd (go 0.3 miles)

3: Turn right onto Lenox Ave (go 0.6 miles)

4: Harlem Hospital Center will be on the right.

Total Est. Time: 3 minutes **Total Est. Distance:** 1.0 miles

TABLE 1 - EMERGENCY CONTACTS

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations, contact should first be made with the Field Team Leader (or designee) and the Site Safety Officer, who will notify emergency personnel who will then contact the appropriate response teams. This emergency contacts list must be in an easily accessible location at the site.

Emergency Contacts	**Phone Number**
Fire Department:	911
Police:	911
New York City-Long Island One Call Center: (3 day notice required for utility mark-outs)	(800) 272-4480
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
Medical Emergency	
Ambulance Service:	911
Hospital Name:	The Harlem Hospital Center
Hospital Telephone Number:	(212)-939-1000
Hospital Address:	506 Lenox Ave New York, NY 10037
Route to Hospital:	See Page 3 and 4
Travel Time From Site:	3 minutes

Langan Contacts		
Vice President:	Joel Landes, P.E.	(212) 479-5404
Program Manager:	Jennifer Armstrong	(917) 613-7234
Health & Safety Officer:	Tony Moffa (cell)	(215) 756-2523
Field Safety Officer	J. Patrick Diggins	(603) 494-7090
Field Team Leader	J. Patrick Diggins	(603) 494-7090
Quality Assurance Officer	Stuart Knoop, P.G.	(917) 941-2831

TABLE 2 -
SUMMARY OF ACTION LEVELS AND RESTRICTIONS

Conditions for Level D:

All areas

- PID readings < 25 ppm
- No visible fugitive dust emissions from site activities

Conditions for Level C:

All areas

- Where PID readings > 25 ppm (sustained for 15 minutes in the breathing zone) to 200 ppm and/or
- Any visible fugitive dust emissions from site activities that disturb contaminated soil.

Conditions for Level B (or retreat):

All areas

- Where PID readings > 500 ppm
- Visible fugitive dust emissions from site activities cloud the surrounding air.

SECTION 2 INTRODUCTION

2.1 PURPOSE AND POLICY

The purpose of this site-specific Health and Safety Plan (HASP) is to establish personnel protection standards and mandatory safety practices and procedures for potential encounters with non-hazardous soil or groundwater during construction at the Site. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted during pile installation.

The provisions of the plan are the minimum for all on-site personnel. Contractor and subcontractors are required to prepare and adhere to their own HASP that conforms to this plan at a minimum. All Langan personnel who engage in project activities must be familiar with this plan, comply with its requirements, and sign the Plan Acceptance Form (Attachment B), page number B-5, prior to working on the site. The Plan Acceptance Form must be submitted to the Langan Health and Safety Officer (HSO). In addition to this plan, all work shall be performed in accordance with all applicable federal, state and local regulations.

2.2 SITE DESCRIPTION

The Site is located at 1901 Madison Avenue in the Harlem neighborhood of Manhattan, New York, and is identified as Block 1748 and Lot 1 on the New York City Tax Map. The Site is 80,000 square feet and is bounded by East 123rd Street to the north, Madison Avenue to the west, Park Avenue to the east, and East 122nd Street to the north. The Site is improved with a U-shaped, six-story residential apartment building with a basement level (Maple Court Housing), which occupies the western portion of the Site. An asphalt-paved parking lot is located on the eastern portion of the Site, a landscaped area adjoins the Madison Avenue entrance, and a grass-covered and concrete-paved courtyard occupies the central portion of the Site.

The Site is not currently being considered for redevelopment. However, the property is undergoing refinancing through the United States Department of Housing and Urban Development (HUD), which requires that an environmental regulatory agency issue a release of environmental liability to the owner.

2.3 SCOPE OF WORK

The remediation will consist of the removal, and off Site transport, of up to 650 cubic yards of soil from courtyard areas without impermeable cover, installation of a TenCate Mirafi® impenetrable geotextile liner, and importation of up to 650 cubic yards of fill meeting 6NYCRR

Part 375 Restricted Residential Soil Cleanup Objective (SCOs) in the courtyard areas. Dewatering is not anticipated.

2.4 LANGAN PROJECT TEAM ORGANIZATION

Table 2.1 describes the responsibilities of Langan personnel associated with this project. The names of principal personnel associated with this project are:

Vice President:	Joel Landes, P.E.	(917) 940-3015
Program Manager/Project Manager:	Jennifer Armstrong	(917) 613-7234
Health & Safety Officer:	Tony Moffa (cell)	(215) 756-2523
Field Safety Officer	J. Patrick Diggins	(603) 494-7090
Field Team Leader	J. Patrick Diggins	(603) 494-7090
Quality Assurance Officer	Stuart Knoop, P.G.	(917) 941-2831

All Langan personnel have been appropriately trained in first aid and hazardous waste safety procedures, including the operating and fitting of personal protective equipment, and are experienced with the field operations planned for this site.

TABLE 2.1
ON-SITE PERSONNEL AND RESPONSIBILITIES

PROJECT MANAGER - Assumes total control over site activities. Reports to upper-level management. Has authority to direct response operations.

Responsibilities:

- Prepares and organizes the background review of the situation, the Work Plan, the Site Health and Safety Plan, and the field team.
- Obtains permission for site access and coordinates activities with appropriate officials.
- Ensures that the Work Plan is executed and on schedule.
- Briefs the field team on their specific assignments.
- Coordinates with the site Health and Safety Officer (HSO) to ensure that health and safety requirements are met.
- Prepares the final report and support files on the response activities.
- Serves as the liaison with public officials.

FIELD SAFETY OFFICER (FSO) - Advises the HSO and Project Manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety.

Responsibilities:

- Ensures that all necessary Health and Safety Equipment is available on-site. Ensures that all equipment is functional.
- Periodically inspects protective clothing and equipment.
- Ensures that protective clothing and equipment are properly stored and maintained.
- Controls entry and exit at the Access Control Points.
- Coordinates health and safety program activities with the Project HSO.
- Confirms each team member's suitability for work based on a physician's recommendation.
- Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue.
- Implements the Site Health and Safety Plan.

TABLE 2.1 - CONTINUED
ON-SITE PERSONNEL AND RESPONSIBILITIES

Field Safety Officer Responsibilities (continued)

- Conducts periodic inspections to determine if the Site Health and Safety Plan is being followed.
- Enforces the "buddy" system.
- Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
- Notifies, when necessary, local public emergency officials.
- Coordinates emergency medical care.
- Sets up decontamination lines and the decontamination solutions appropriate for the type of chemical contamination on the site.
- Controls the decontamination of all equipment, personnel, and samples from the contaminated areas.
- Assures proper disposal of contaminated clothing and materials.
- Ensures that all required equipment is available.
- Advises medical personnel of potential exposures and consequences.
- Notifies emergency response personnel by telephone or radio in the event of an emergency.

FIELD TEAM LEADER - Advises the Project Manager on all aspects of health and safety on site. Stops work if any operation threatens worker or public health or safety. Is directly responsible for the field team and the safety of site operations.

Responsibilities:

- Manages field operations.
- Executes the Work Plan and schedule.
- Enforces safety procedures.
- Coordinates with the Site Safety Officer in determining protection level.
- Enforces site control.
- Documents field activities and sample collection.
- Serves as a liaison with public officials.

TABLE 2.1 - CONTINUED
ON-SITE PERSONNEL AND RESPONSIBILITIES

WORK TEAM – Operators, laborers, samplers. The work party must consist of at least two people.

Responsibilities:

- Safely completes the on-site tasks required to fulfill the Work Plan.
- Complies with Site Safety Plan.
- Notifies Site Safety Officer or supervisor of suspected unsafe condition.

SECTION 3 RISK ANALYSIS

3.1 CHEMICAL HAZARDS

The primary potential chemical hazard is exposure to soil impacted with metals and semi-volatile organic compounds (SVOC). Other compounds that may be encountered are site equipment fuels (gasoline, diesel, etc.) that contain volatile components. Relevant properties of these compounds are outlined in Table 2.2. Dust, odors and organic vapors will be monitored in accordance with the Community Air Monitoring Plan described in Section 4.4.

In addition to the compounds detected onsite, some solvents used in decontamination of equipment are potentially hazardous to human health if they are not used properly. Material Safety Data Sheets for substances that will be used on site are included in Attachment C.

3.2 RADIATION HAZARDS

No radiation hazards are known or expected at the site.

3.3 BIOLOGICAL HAZARDS

3.3.1 Animals

During site operations, animals such as dogs, pigeons, sea gulls, mice, and rats may be encountered. Workers will use discretion and avoid all contact with animals. Bites and scratches from dogs can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis; crytococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

TABLE 2.2
RELEVANT PROPERTIES OF VOLATILES (PETROLEUM [GASOLINE, DIESEL, ETC.]), METALS AND SEMIVOLATILES KNOWN OR SUSPECTED AT THE SITE

Compound (Synonym)	OSHA PEL[1] (ppm)	IDLH (ppm)	LEL (%)	Odor Threshold[2] (ppm)	Odor Character	Vapor Pressure (mm Hg)	Physical State	Detectable w/ 10.6 eV lamp PID (I.P. eV)
Benzene	1	500	1.2	NA	NA	75	Combustible	Yes
Ethylbenzene	100	800	0.8	NA	NA	7	Combustible	Yes
Toluene	200	500	1.1	NA	Sweet	21	Combustible	Yes
Xylene	100	900	0.9	NA	Aromatic	7	Combustible Solid	Yes
PAHs	0.2	80	Varies	Varies	Varies	Very Low	Combustible Solid	No
Barium	0.5	50	NA	NA	NA	Low	Noncombustible Solid	NA
Cadmium	0.005	9	NA	NA	NA	0 (approx)	Noncombustible Solid	NA
Copper	1	100	NA	NA	NA	0 (approx)	Noncombustible	NA
Lead (Pb)	0.05	100	NA	NA	NA	0 (approx)	Noncombustible Solid	NA
Zinc	5	50	NA	NA	NA	0 (approx)	Combustible	Yes
Selenium	0.2	100	NA	NA	NA	0 (approx)	Noncombustible Solid	NA
Sodium	2	250	NA	NA	NA	0 (approx)	Noncombustible Solid	NA
Vanadium	0.5	70	NA	NA	NA	0 (approx)	Noncombustible Solid	NA
Zinc (Zn)	5	50	NA	NA	NA	0 (approx)	Combustible Solid[5]	NA
Acetone	1,000	20,000	2.5	Varies	Nail polish remover	182	Colorless Liquid	Yes
Bis(2-ethylhexyl)phthalate	5	5,000	.4	Varies	NA	0 (approx)	Colorless Liquid	No
4,4'-DDD	7.81	500	0.008	Varies	NA	0 (approx)	Combustible Solid	NA
4,4'-DDE	374	500	0.005	Varies	NA	0 (approx)	Combustible Solid	NA
4,4'-DDT	4.77	500	0.007	Varies	NA	0 (approx)	Combustible Solid	NA

(1) 29 CFR 1910, June 30, 1993 (8-hour Time weighted average unless otherwise specified.)
(2) ACGIH 1989 Highest reported value of acceptable odor threshold range.
[IDLH] Immediately dangerous to life or health
[CA] Suspect carcinogen - Minimize all possible exposures

3.3.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, and spiders, may be present at this site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis. Personnel that have been bitten or stung by an insect at the Site should notify the HSO or FSO of such immediately. The following is a list of preventive measures:

- Wear proper protective clothing (work boots, socks and light colored pants).
- Field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on Site.

The HSO or FSO will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the Site.

3.4 PHYSICAL HAZARDS

3.4.1 Explosion

No explosion hazards are expected for the scope of work at this site.

3.4.2 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72°F or above. Table 2.3 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Refer to the Table 2.4 below to assist in assessing when the risk for heat related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be performed by the Field Safety Officer, who shall be able to recognize symptoms related to heat stress.

TABLE 2.3
SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATED WORKERS[a]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (ta adj) by using this equation: ta adj $^{\circ}$F = ta $^{\circ}$F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

Table 2.4 - HEAT INDEX

ENVIRONMENTAL TEMPERATURE (Fahrenheit)

RELATIVE HUMIDITY	70	75	80	85	90	95	100	105	110	115	120
	APPARENT TEMPERATURE*										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	**130**
30%	67	73	78	84	90	96	104	113	123	**135**	**148**
40%	68	74	79	86	93	101	110	123	**137**	**151**	
50%	69	75	81	88	96	107	120	**135**	**150**		
60%	70	76	82	90	100	114	**132**	**149**			
70%	70	77	85	93	106	124	**144**				
80%	71	78	86	97	113	**136**					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:
1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

Note: Exposure to full sunshine can increase Heat Index values by up to 15 degrees F.

Apparent Temperature	Heat Stress Risk with Physical Activity and/or Prolonged Exposure
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heatstroke Highly Likely

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Prickly Heat** (Heat rash)
  - Painful, itchy red rash. Occurs during sweating, on skin covered by clothing.
- **Heat Cramps**
  - Painful spasm of arm, leg or abdominal muscles, during or after work.
- **Heat Exhaustion**
  - Headache, nausea, dizziness. Cool, clammy, moist skin. Heavy sweating. Weak, fast pulse. Shallow respiration, normal temperature.
- **Heat Fatigue**
  - Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control.
- **Heat Syncope** (Heat Collapse)
  - Fainting while standing in a hot environment.
- **Heat Stroke**
  - Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. **This is a life threatening condition.**

Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
  - If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
  - If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
    - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6°F.
    - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
    - Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, id., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
    - Maintain water temperature 50° to 60°F (10° to 16.6°C).
    - Provide small disposal cups that hold about four ounces (0.1 liter).
    - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.

- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat related illness.

3.4.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally called frostbite.

Hypothermia - Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

Frostbite - Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

Prevention of Cold-Related Illness - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors:
- Assure the availability of enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Assure the availability of warm drinks.
- Start (oral) temperature recording at the job site:
  - At the FSO or Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
  - At a worker's request.
  - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation).

- As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92^{O}F) cannot return to work for 48 hours.

3.4.4 Noise

Work activities during the proposed demolition and remediation activities may be conducted at locations with high noise levels from the operation of equipment. Hearing protection will be used as necessary.

3.4.5 Hand and Power Tools

In order to complete the various tasks for the project, personnel will utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for all portable tools.

3.4.6 Slips, Trips and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, pits, facility equipment, and soil piles contribute to tripping hazards and fall hazards. To the extent possible, all hazards should be identified and marked on the Site, with hazards communicated to all workers in the area.

3.4.7 Utilities (Electrocution and Fire Hazards)

The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. All excavation work will be preceded by review of available utility drawings and by notification of the subsurface work to the N.Y. One Call Center. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

3.5 TASK HAZARD ANALYSIS

3.5.1 Soil Excavation and Soil Sampling

Excavation and soil sampling activities are inherently dangerous. Special attention should be given to establishing the location of any underground utilities prior to excavating.

Chemical exposure may occur as these activities progress across the site, where workers may be exposed to contaminants in the excavated soils, encountered groundwater, or products used on-site including gasoline, diesel, and motor oil. Also,

sampling of both in-situ and stockpiled soils presents similar potential exposure hazard. Activities will be conducted initially in Level D but may be upgraded to Modified Level D. Although not anticipated, there will be a Level C and B contingency should pockets of contaminants be brought to the surface and breathing zone air becomes contaminated.

If evidence of historic or unknown contamination is encountered during remediation activities or other contaminated materials, such as oily materials, high PID readings, etc., the FSO will make a determination of the appropriate level of personnel protection.

SECTION 4 PERSONNEL PROTECTION AND MONITORING

4.1 OSHA TRAINING

All on-site personnel who will be actively involved in excavation activities involving potentially hazardous waste must have completed hazardous waste operations-related training, as required by OSHA Regulations 29 CFR 1910.120. Working involved in non-hazardous materials will not be required to have the 40-hour hazwoper training. All site workers will be required to have OSHA 10-hour Construction Health and Safety certifications. Personnel who completed the 40-hour training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Documentation of OSHA training for project personnel must be provided to Langan prior to starting work.

4.2 SITE-SPECIFIC TRAINING

The Site Safety Officer will be responsible for developing a site-specific occupational hazard training program and providing training to all personnel that are to work at the site. This training will be conducted prior to starting fieldwork and will consist of the following topics:

- Names of personnel responsible for site safety and health.
- Hazards potentially present at the site.
- Proper use of personal protective equipment.
- Requirements of this HASP.
- Work practices by which the employee can minimize risk from hazards. This may include a specific review of heavy equipment safety, safety during inclement weather, changes in common escape rendezvous point, site security measures, or other site-specific issues that need to be addressed before work begins.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds present at the site.
- Decontamination procedures.

Upon completion of site-specific training, workers will sign the Site-Specific-Training Form provided in Attachment B. A copy of the completed Site-Specific Training Form will be included in the project files for future reference.

4.3 ODOR, VAPOR AND DUST MONITORING AND RESPONSE

4.3.1 Work Zone Area Monitoring

The contractor is responsible for completing their own health and safety plan. General contractor and sub-contractor site worker monitoring will be the responsibility of the respective contractor.

VOC

Continuous monitoring for VOCs will be conducted during all ground intrusive activities (i.e., excavation). The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total organic vapor levels at the perimeter of the hot zone persist at levels in excess of 5 ppm above 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 outside the hot zone is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the hot zone, activities will be shutdown.

Dust

Particulate or dust will be monitored continuously with real-time field instrumentation during earthwork operations. NYSDEC issued a 1989 memorandum on controlling fugitive dust emissions during "ground intrusive activities" (e.g. excavation, drilling). The National Ambient Air Quality Standard for Respirable Particulates, which are defined as particles 10 ug (PM10) in diameter or less, is 150 ug/m3. Based on this standard, dust exposure from excavation activities should not exceed 150 ug/m3 above background and monitoring should be within the work area if exceedances of this standard are anticipated.

The NYSDEC defines fugitive dust as particulate matter that is not from a specific source and could include discrete particles, droplets, and solids over a wide range of sizes. Most continuous dust monitors are designed to provide maximum response to PM10 particulate, since these particles are considered respirable.

Based on the air monitoring results, dust suppression may need to be implemented. This could include the following:

- Appling water to the excavation surface
- Wetting equipment
- Spraying work area
- Utilizing alternate work methods
- Implementing site speed restrictions

Background dust monitoring shall be performed prior to the start of the workday. Sampling shall be performed outside of the work zone for a minimum of fifteen minutes. Sampling shall be performed continuously within the work zone. Monitoring results shall be kept in a logbook and used to initiate additional dust control measures as necessary.

4.4 COMMUNITY AIR MONITORING PLAN (CAMP)

This CAMP was developed in accordance with the NYSDOH Generic Community Air Monitoring Plan.

VOC Monitoring, response Levels, and Actions

VOCs must be monitored at the downwind perimeter of the active work zone on a continuous basis during earthwork activities until the ground is completely capped with clean soil or impervious barrier. Upwind concentrations should 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 the known VOC contaminants on the Site. This equipment should be calibrated daily and should be capable of calculating 15-minute running averages. All 15-minute readings will be recorded and be available for State personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded. The measured 15-minute averages will be compared to the levels below:

1. If the ambient air concentration of total VOCs at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15 minute average, work activities must be halted until the levels readily decreases below 5 ppm (per instantaneous readings).
2. If the total VOCs at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work must be halted. The source of vapors must be identified and corrective actions must be taken to abate the emissions. Work activities can only resume

provided that the concentration is less than 5 ppm over a 15 minute average period.

3. If the total VOC level is above 25 ppm at the perimeter of the work area, all activities must be shut down and work methods and controls will be re-evaluated.

Particulate Monitoring, Response Levels, and Actions

Dust or particulate concentrations should be monitored continuously at the upwind and downwind perimeters at the site perimeter and active work zones. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities. All readings will be recorded and be available for state personnel review. Corrective action is determined by the following levels:

1. If the downwind PM-10 at a site perimeter location is 100 micrograms per cubic meter (µg/m3) greater than background for the 15 minute period of if airborne dust is observed at the site perimeter from excavation activity, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that the downwind PM-10 particulate level does not exceed 150 µg/m3 above the upwind level and provided that no visible dust is migrating from the excavation work area.

2. If, after implementing dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m3 above the upwind level, work must be stopped and re-evaluation of work activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m3 of the upwind level and in preventing visible dust migration.

4.4.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the hot zone, work activities will be halted or odor controls will be employed, and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume, provided:

- The organic vapor level outside the hot zone is below 1 ppm over background, and

- More frequent intervals of monitoring, as directed by the Site Health and Safety Officer, are conducted.

If the organic vapor level is greater than 5 ppm above background at the perimeter of the hot zone, work activities must be shut down or odor controls must be employed. When work shut-down occurs, downwind air monitoring as directed by the Site Health and Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

4.4.2 Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or odor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the hot zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented.

- Sustained organic vapor levels approaching 5 ppm above background for a period of more than 30 minutes, or
- Organic vapor levels greater than 5 ppm above background for any time period.

4.4.3 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. The local police authorities will immediately be contacted by the Site Health and Safety Officer and advised of the situation;
2. Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer; and

All Emergency contacts will go into effect as appropriate.

4.5 SUMMARY OF ACTION LEVELS AND RESTRICTIONS

A PID such as the RaeSystems MiniRae 2000, equipped with a 10.6 eV lamp shall be used to screen for total VOCs. All readings pertain to sustained readings for 15 minutes in the worker breathing zone. The following conditions shall apply to each level of protection.

Conditions for Level D:

All areas where PID readings < 25 ppm

Conditions for Level C:

All areas where PID readings > 25 ppm (sustained for 15 minutes in the breathing zone) to 200 ppm

Conditions for Level B (or retreat):

All areas where PID readings > 500 ppm

4.5.1 Level D and Modified Level D

Level D protection will be worn for initial entry on-site and initially for all activities. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses (goggles must be worn when splash hazard is present)
- Nitrile gloves must be worn during all activities requiring contact with saturated soils.
- Hard hat (must be worn during all site activities)

Modified Level D is the same as Level D but includes Tyvek coveralls and disposable polyethylene overboots to contact with the skin or clothes if significant contamination is present in subsurface materials.

4.5.2 Level C

The level of personal protection will be upgraded to Level C if the concentration of volatile organic compounds which can be detected with a photoionization detector (PID) in the breathing zone equals or exceeds the specified action limits and the contaminants of concern have characteristic warning properties appropriate for air purifying respirators (e.g. taste, odor). Level C protection will consist of the following equipment:

- Full-face or half-mask air-purifying respirator (APR) or powered air purifier (PAPR), depending on presence and abundance of airborne toxic constituents of concern
- Combination HEPA filter/organic vapor cartridges
- Tyvek coveralls must be worn if particulate hazard present
- PE-coated Tyvek coveralls if liquid contamination present
- Steel-toe safety boots
- Nitrile outer gloves must be worn during all activities requiring contact with saturated soil.
- Hard hat (must be worn during all site activities)

Cartridges will be disposed at the end of each day's use.

4.5.3 Level B (Retreat)

If the concentration of volatile organics which can be detected with a PID equals or exceeds the specified action levels, all field personnel associated with the project will immediately retreat to a location up-wind of the source of contamination. At this point the Site Safety Officer must consult with the Langan HSO to discuss appropriate actions.

4.5.4 OSHA Requirements for Personal Protective Equipment

All personal protective equipment used during the course of this field investigation must meet the following OSHA standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133 29 CFR 1926.102	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134 29 CFR 1926.103	ANSI Z88.1-1980
Head	29 CFR 1910.135 29 CFR 1926.100	ANSI Z89.1-1969
Foot	29 CFR 1910.136 29 CFR 1926.96	ANSI Z41.1-1967

ANSI = American National Standards Institute

Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.1025; 29 CFR 1910.134).

Based on performance criteria of air purifying respirators, they cannot be worn under the following conditions:

- Oxygen deficiency;
- Immediately Dangerous to Life or Health (IDLH) concentrations;
- High relative humidity; and
- If contaminant levels exceed designated use concentrations.

SECTION 5 WORK ZONES AND DECONTAMINATION

5.1 SITE WORK ZONES

To reduce the spread of hazardous materials by workers from potentially contaminated areas to the clean areas, work zones will be delineated at the site. The flow of personnel between the zones should be controlled. The establishment of the work zones will help ensure that personnel are properly protected against the hazards present where they are working, and ensure that work activities and contamination are confined to the appropriate areas. The work zones described below may be modified in the field depending on field conditions.

5.1.1 Hot Zone

Hot zones will be established within the delineated hazardous lead area in the western portion of the site. Unprotected onlookers should not be located within the hazardous area during intrusive activities. All personnel within the hot zone must don the appropriate levels of personal protection as set forth by the FSO. It is not anticipated that Level C or higher will be required for this site.

All personnel within the hot zone will be required to use the specified level of protection. No food, drink, or smoking will be allowed in the hot or warm zones.

5.1.2 Warm Zone

Should PID action levels be exceeded or obvious indications of contamination (by sight or odor) be encountered, a warm zone will be established and utilized during the field activities. This zone will be established between the hot zone and the cold zone (discussed below), and will include the personnel and equipment necessary for decontamination of equipment and personnel exiting the hot zone. Personnel and equipment in the hot zone must pass through this zone before entering the cold zone. This zone should always be located upwind of the hot zone.

5.1.3 Cold Zone

The cold zone will include the remaining areas of the job site. Break areas and support facilities (include equipment storage and maintenance areas) will be located in this zone. No equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone (if necessitated). Eating, smoking, and drinking will be allowed only in this area.

5.2 DECONTAMINATION

Any water used in decontamination procedures will be placed in containers, temporarily stored on-site, and properly characterized and disposed.

5.2.1 Decontamination of Personnel

Decontamination of personnel will be necessary if Level C or Level B protection is used, which is not anticipated based on previous investigation work completed at the site. Decontamination will not be necessary if only Level D protection is used. However, disposable gloves used during sampling activities should be removed and bagged; personnel should be encouraged to remove clothing and shower as soon as is practicable at the end of the day. All clothing should be machine-washed. All personnel will wash hands and face prior to eating and before and after using the restroom.

5.2.2 Decontamination of Field Equipment

Decontamination of field equipment will be necessary for all equipment in contact with contaminated materials (if encountered). Decontamination activities shall be performed in a designated area lined with polyethylene sheeting designed to collect the decontamination rinse liquid. Equipment to be decontaminated includes, but is not limited to, excavators, sampling and pumping equipment.

5.3 REMEDIAL ACTIVITY-DERIVED WASTE

All PPE related remedial activity-derived waste materials (PPE, decontamination waste) will be placed in labeled containers and appropriately disposed. If encountered, soil from previously unknown hot spot will be kept moist, properly characterized and disposed off-site. Stockpiling of contaminated materials will only occur temporarily and if adequate space exists.

SECTION 6 ACCIDENT PREVENTION AND CONTINGENCY PLAN

6.1 ACCIDENT PREVENTION

6.1.1 Site-Specific Training

All field personnel will receive health and safety training prior to the initiation of any site activities. The site-specific training form provided in Attachment B must be signed, dated, and returned to the Langan Field Safety Officer. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, a regular meeting should be held. Discussion should include:

- Tasks to be performed;
- Time constraints (e.g., rest breaks, cartridge changes);
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals; and
- Emergency procedures.

6.1.2 Vehicles and Heavy Equipment

Working with large motor vehicles and heavy equipment could be a major hazard at this site. Injuries can result from equipment hitting or running over personnel, impacts from flying objects, or overturning of vehicles. Vehicle and heavy equipment design and operation will be in accordance with 29 CFR, Subpart O, 1926.600 through 1926.602. In particular, the following precautions will be utilized to help prevent injuries/accidents.

- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked at the beginning of each shift.
- Large construction motor vehicles will not be backed up unless:
    - The vehicle has a reverse signal alarm audible above the surrounding noise level; or
    - The vehicle is backed up only when an observer signals that it is safe to do so.

- Heavy equipment or motor vehicle cable will be kept free of all nonessential items, and all loose items will be secured.
- Large construction motor vehicles and heavy equipment will be provided with necessary safety equipment (such as seat belts, roll-over protection, emergency shut-off in case of roll-over, backup warning lights and audible alarms).
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment or vehicles.

6.2 SPILL CONTROL PLAN

All personnel must take every precaution to minimize the potential for spills during site operations. Any spill shall be reported immediately to the FSO. Spill control apparatus (sorbent materials) will be located on-site. All materials used for the clean up of spills will be containerized and labeled separately from other wastes.

6.3 CONTINGENCY PLAN

6.3.1 Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site.
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General emergency procedures, and specific procedures for personal injury, chemical exposure and radiation exposure, are described below.

6.3.2 Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.

- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- All chemical exposure incidents must be reported in writing to the Langan Health and Safety Officer. The Field Safety Officer or Field Team Leader is responsible for completing the accident report.

6.3.3 Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- Another team member (buddy) should signal the Field Team Leader that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.
- The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- For less severe cases, the individual can be taken to the site dispensary.
- The Field Team Leader or Field Safety Officer is responsible for making certain that an Accident Report Form is completed. This form is to be submitted to the Langan Health and Safety Officer. Follow-up action should be taken to correct the situation that caused the accident.
- Any incident (near miss, property damage, first aid, medical treatment, etc.) must be reported.

A first-aid kit and blood-born pathogens kit will be kept on-site during the field activities.

6.3.4 Evacuation Procedures

- The Field Team Leader will initiate evacuation procedures by signaling to leave the site.
- All personnel in the work area should evacuate the area and meet in the common designated area.

- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts or missing persons determined immediately.
- The Field Team Leader will then give further instruction.

6.3.5 Procedures Implemented in the Event of a Major Fire, Explosion, or Emergency

- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire;
- Keep the area surrounding the problem source clear after the incident occurs;
- Complete accident report for and distribute to appropriate personnel.

ATTACHMENT A
Air Monitoring Equipment Calibration and Maintenance

All monitoring instruments must be calibrated and maintained periodically. Calibration and on-site maintenance records will be kept in the field log book. The operator must understand the limitations and possible sources of errors for each instrument. It is important that the operator checks that the instrument responds properly to the substances it was designed to monitor. Portable air quality monitoring equipment that measures total ionizables present such as the RaeSystems MiniRae 2000 (or equivalent) photoionization detector (PID) must be calibrated at least once each day. Combustible gas/oxygen meters (explosimeter) such as the MSA Model 360 monitor must be calibrated at least once a week. The specific instructions for calibration and maintenance provided for each instrument should be followed.

ATTACHMENT B
Forms for Health and Safety Related Activity

Note: The OSHA Job Safety and Health Protection Poster must be posted prominently during field activities. The following page is an example of the poster to be used in the field. The actual poster must be an 11 inch by 17 inch size version of this page. The OSHA 300 Log of injuries and illnesses is maintained in the home office of each Langan employee.

You Have a Right to a Safe and Healthful Workplace.

IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

The Occupational Safety and Health Act of 1970 (OSH Act), P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at **www.osha.gov**. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA

www.osha.gov

U.S. Department of Labor • Occupational Safety and Health Administration • OSHA 3165

Langan **ACCIDENT REPORT FORM**

Project Name:_____

Injured or Ill Employee

1. Name _____ Social Security #_____
   (First) (Middle) (Last)
2. Home Address _____
   (No. and Street) (City or Town) (State and Zip)
3. Age _____ 4. Sex: Male ( ) Female ( )
5. Occupation _____
   (Specific job title, not the specific activity employee was performing at time of injury)
6. Department _____
   (Enter name of department in which injured person is employed, even though they
   may have been temporarily working in another department at the time of injury)

Employer

7. Name _____
8. Mailing Address _____
   (No. and Street) (City or Town) (State and Zip)
9. Location (if different from mailing address):_____
   _____

The Accident or Exposure to Occupational Illness

10. Place of accident or exposure _____
    (No. and Street) (City or Town) (State and Zip)
11. Was place of accident or exposure on employer's premises? _____(Yes/No)
12. What was the employee doing when injured?_____
    _____
    (Be specific - was employee using tools or equipment or handling material?)
    _____
13. How did the accident occur? _____
    (Describe fully the events that resulted in the injury or
    _____
    occupational illness. Tell what happened and how. Name objects and substances involved.
    _____
    Give details on all factors that led to accident. Use separate sheet if needed)
14. Time of accident: _____

15. Date of injury or initial diagnosis of occupational illness _____

16. WITNESS TO ACCIDENT

(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)
(Name)	(Affiliation)	(Phone No.)

Occupational Injury or Occupational Illness

17. Describe the injury or illness in detail; indicate part of body affected.

18. Name the object or substance that directly injured the employee. (For example, object that struck employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.)

19. Did the accident result in employee fatality? _____ (Yes or No)
20. Number of lost workdays ____/restricted workdays _____ resulting from injury or illness?

Other

21. Did you see a physician for treatment? _____ (Yes or No) _____ (Date)
22. Name and address of physician _____

(No. and Street) (City or Town) (State and Zip)

23. If hospitalized, name and address of hospital _____

(No. and Street) (City or Town) (State and Zip)

Date of report _____ Prepared by _____

Official position _____

Project Health and Safety Plan and Work plan Acceptance Form

(For Langan employees only)

I have read and agree to abide by the contents of the Work Plan and Health and Safety Plan for the following project:

1901 Madison Avenue (New York, NY) (Project Title)

170242101 (Project Number)

Furthermore, I have read and am familiar with the work plan or proposal that describes the field work to be conducted and the procedures to be utilized in the conduct of this work.

Name (print)	Signature	Date

Place in project Health and Safety File as soon as possible

Site-Specific Health and Safety Training

(For all Langan and subcontract employees on site)

I hereby confirm that site-specific health and safety training has been conducted by the site health and safety officer that included:

- Names of personnel responsible for site safety and health
- Safety, health, and other hazards at the site
- Proper use of personal protective equipment
- Work practices by which the employee can minimize risk from hazards
- Safe use of engineering controls and equipment on the site
- Acute effects of compounds at the site
- Decontamination procedures

For the following project:

_____ _____

(Project Title) (Project Number)

Name (print)	Signature	Date

Place in project Health and Safety File as soon as possible

ATTACHMENT C
Material Safety Data Sheets

- Barium
- Copper
- Lead
- Zinc
- PAHs
- BTEX
- Zinc
- Motor Oil
- Diesel Fuel
- Isobutylene Gas in Air 100ppm
- Unleaded Gasoline

E I DU PONT DE NEMOURS & CO INC -- ZINC METAL -- 9650-00N056501

========== Product Identification ==========

Product ID:ZINC METAL
MSDS Date:12/31/1985
FSC:9650
NIIN:00N056501
MSDS Number: BWGBT
=== Responsible Party ===
Company Name:E I DU PONT DE NEMOURS & CO INC
Address:1007 MARKET ST
City:WILMINGTON
State:DE
ZIP:19898
Country:US
Info Phone Num:800-962-9919
Emergency Phone Num:800-424-9300 (CHEMTREC)
CAGE:B0589
=== Contractor Identification ===
Company Name:E I DU PONT DE NEMOURS & CO
Address:RAKETSTRAAT, 100, RUE DE LA FUSEE
City:BRUSSEL
Country:BE
Phone:32-(0)15-401.505
CAGE:B0589
Company Name:E.I. DUPONT DE NEMOURS & CO
Address:1007 MARKET STREET
Box:City:WILMINGTON
State:DE
ZIP:19898
Country:US
Phone:800-441-7515;800-441-9442
CAGE:18873

========== Composition/Information on Ingredients ==========

Ingred Name:ZINC (SARA III)
CAS:7440-66-6
RTECS #:ZG8600000
OSHA PEL:10 MG/M3
ACGIH TLV:10 MG/M3
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

========== Hazards Identification ==========

LD50 LC50 Mixture:LD50 (MICE)=15 MG/KG (INTERPERITONEAL)
Routes of Entry: Inhalation:NO Skin:NO Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:TOXIC IF INGESTED.
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:INGEST: CALL MD IMMEDIATELY . INHAL: REMOVE TO FRESH AIR.
SUPPORT BREATHING (GIVE OXYGEN/ARTIFICIAL RESPIRATION) . EYES:

IMMEDIATELY FLUSH W/POTABLE WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD . SKIN: FLUSHW/COPIOUS AMOUNTS OF WATER. CALL MD .

========== Fire Fighting Measures ==========

Extinguishing Media:DRY CHEMICAL.
Fire Fighting Procedures:USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT . NO SPECIAL PROCEDURES.
Unusual Fire/Explosion Hazard:EXPLOSIVE IF HIGH LEVELS OF DUST EXPOSED TO FIRE.

========== Accidental Release Measures ==========

Spill Release Procedures:NO SPECIAL PROCEDURES.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:NO SPECIAL PROCEDURES.
Other Precautions:NONE SPECIFIED BY MANUFACTURER.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NONE. USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN .
Ventilation:LOCAL EXHAUST.
Protective Gloves:IMPERVIOUS GLOVES .
Eye Protection:ANSI APPROVED SAFETY GLASSES .
Other Protective Equipment:NONE SPECIFIED BY MANUFACTURER.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:1665F,907C
Melt/Freeze Pt:M.P/F.P Text:788F,420C
Vapor Pres:1 @ 487C
Spec Gravity:7.13
Evaporation Rate & Reference:0
Solubility in Water:INSOLUBLE
Appearance and Odor:BLUISH-WHITE METAL.
Percent Volatiles by Volume:0

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
NONE.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:NONE.

========== Disposal Considerations ==========

Waste Disposal Methods:SEPARATE FROM ACIDIC SOLUTIONS. DISPOSE OF BY MEANS AS TO COMPLY WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS OR CONTACT AN APPROVED AND LICENSED DISPOSAL AGENCY.

Disclaimer (provided with this information by the compiling agencies):
This information is formulated for use by elements of the Department

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MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

NFPA 704 (Section 16)

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

1. CHEMICAL PRODUCT and COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800)424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732)750-6000
MSDS (Environment, Health, Safety) Internet Website www.hess.com

SYNONYMS: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS *

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Gasoline (86290-81-5)	100
Benzene (71-43-2)	0.1 - 4.9 (0.1 - 1.3 reformulated gasoline)
n-Butane (106-97-8)	< 10
Ethyl Alcohol (Ethanol) (64-17-5)	0 - 10
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Tertiary-amyl methyl ether (TAME) (994-05-8)	0 to 17.2
Toluene (108-88-3)	1 - 25
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 - 15

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol or MTBE and/or TAME).

Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

3. HAZARDS IDENTIFICATION

EYES
Moderate irritant. Contact with liquid or vapor may cause irritation.

SKIN
Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with systemic toxicity. See also Section 11 - Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

FLASH POINT:	-45 ^{o}F (-43^{o}C)
AUTOIGNITION TEMPERATURE:	highly variable; > 530 ^{o}F (>280 ^{o}C)
OSHA/NFPA FLAMMABILITY CLASS:	1A (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.4%
UPPER EXPLOSIVE LIMIT (%):	7.6%

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

During certain times of the year and/or in certain geographical locations, gasoline may contain MTBE and/or TAME. Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration - refer to NFPA 11 “Low Expansion Foam - 1994 Edition.”

FIRE FIGHTING INSTRUCTIONS
Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

******USE ONLY AS A MOTOR FUEL******
******DO NOT SIPHON BY MOUTH******

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

Component (CAS No.)	Source	TWA (ppm)	STEL (ppm)	Exposure Limits Note
Gasoline (86290-81-5)	ACGIH	300	500	A3
Benzene (71-43-2)	OSHA	1	5	Carcinogen
	ACGIH	0.5	2.5	A1, skin
	USCG	1	5	
n-Butane (106-97-8)	ACGIH	1000	--	Aliphatic Hydrocarbon Gases Alkane (C1-C4)
Ethyl Alcohol (ethanol) (64-17-5)	OSHA	1000	--	
	ACGIH	1000	--	A4
Ethyl benzene (100-41-4)	OSHA	100	--	
	ACGIH	100	125	A3
n-Hexane (110-54-3)	OSHA	500	--	
	ACGIH	50	--	Skin
Methyl-tertiary butyl ether [MTBE] (1634-04-4)	ACGIH	50		A3
Tertiary-amyl methyl ether [TAME] (994-05-8)				None established
Toluene (108-88-3)	OSHA	200		Ceiling: 300 ppm; Peak: 500 ppm (10 min.)
	ACGIH	20	--	A4
1,2,4- Trimethylbenzene (95-63-6)	ACGIH	25	--	
Xylene, mixed isomers (1330-20-7)	OSHA	100	--	
	ACGIH	100	150	A4

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as that made of of E.I. DuPont Tychem ®, products or equivalent is recommended based on degree of exposure.

Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE

A translucent, straw-colored or light yellow liquid

ODOR
A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

ODOR THRESHOLD

	Odor Detection	Odor Recognition
Non-oxygenated gasoline:	0.5 - 0.6 ppm	0.8 - 1.1 ppm
Gasoline with 15% MTBE:	0.2 - 0.3 ppm	0.4 - 0.7 ppm
Gasoline with 15% TAME:	0.1 ppm	0.2 ppm

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	85 to 437 ^{o}F (39 to 200 ^{o}C)
VAPOR PRESSURE:	6.4 - 15 RVP @ 100 ^{o}F (38 ^{o}C) (275-475 mm Hg @ 68 ^{o}F (20 ^{o}C)
VAPOR DENSITY (air = 1):	AP 3 to 4
SPECIFIC GRAVITY (H_2O = 1):	0.70 – 0.78
EVAPORATION RATE:	10-11 (n-butyl acetate = 1)
PERCENT VOLATILES:	100 %
SOLUBILITY (H_2O):	Non-oxygenated gasoline - negligible (< 0.1% @ 77 ^{o}F). Gasoline with 15% MTBE - slight (0.1 - 3% @ 77 ^{o}F); ethanol is readily soluble in water

10. STABILITY and REACTIVITY)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS
Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY
Acute Dermal LD50 (rabbits): > 5 ml/kg
Acute Oral LD50 (rat): 18.75 ml/kg
Primary dermal irritation (rabbits): slightly irritating
Draize eye irritation (rabbits): non-irritating
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenicity: OSHA: NO IARC: YES - 2B NTP: NO ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME:	Gasoline
DOT HAZARD CLASS and PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 1203
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

PLACARD:

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION WT. PERCENT
Benzene (71-43-2)	0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)
Ethyl benzene (100-41-4)	< 3

n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Toluene (108-88-3)	1 to 15
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 to 15

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION - Parts per million (ppm) by weight
Polycyclic aromatic compounds (PACs)	17
Benzo (g,h,i) perylene (191-24-2)	2.55
Lead (7439-92-1)	0.079

CALIFORNIA PROPOSITION 65 LIST OF CHEMICALS

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

INGREDIENT NAME (CAS NUMBER)	Date Listed
Benzene	2/27/1987
Ethyl benzene	6/11/2004
Toluene	1/1/1991

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
HMIS® HAZARD RATING	HEALTH:	1 *	Slight
	FIRE:	3	Serious
	PHYSICAL:	0	Minimal
			* CHRONIC

SUPERSEDES MSDS DATED: 07/01/06

ABBREVIATIONS:

AP = Approximately	< = Less than	> = Greater than
N/A = Not Applicable	N/D = Not Determined	ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
AIHA	American Industrial Hygiene Association	DOT	U.S. Department of Transportation [General Info: (800)467-4922]
ANSI	American National Standards Institute (212)642-4900	EPA	U.S. Environmental Protection Agency
API	American Petroleum Institute (202)682-8000	HMIS	Hazardous Materials Information System

IARC	International Agency For Research On Cancer	REL	Recommended Exposure Limit (NIOSH)
MSHA	Mine Safety and Health Administration	SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
NFPA	National Fire Protection Association (617)770-3000	SCBA	Self-Contained Breathing Apparatus
NIOSH	National Institute of Occupational Safety and Health	SPCC	Spill Prevention, Control, and Countermeasures
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)	STEL	Short-Term Exposure Limit (generally 15 minutes)
NTP	National Toxicology Program	TLV	Threshold Limit Value (ACGIH)
OPA	Oil Pollution Act of 1990	TSCA	Toxic Substances Control Act
OSHA	U.S. Occupational Safety & Health Administration	TWA	Time Weighted Average (8 hr.)
PEL	Permissible Exposure Limit (OSHA)	WEEL	Workplace Environmental Exposure Level (AIHA)
RCRA	Resource Conservation and Recovery Act	WHMIS	Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Material Safety Data Sheet
PAH Contaminated Soil

ACC# 17974

Section 1 - Chemical Product and Company Identification

MSDS Name: PAH Contaminated Soil
Catalog Numbers: SRS103100
Synonyms: API separator sludge
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
Not available	Soil	78-99	unlisted
120-12-7	Anthracene	0-2	204-371-1
129-00-0	Pyrene	0-2	204-927-3
132-64-9	Dibenzofuran	0-2	205-071-3
205-99-2	Benzo(b)fluoranthene	0-2	205-911-9
206-44-0	Fluoranthene	0-2	205-912-4
208-96-8	Acenaphthylene	0-2	205-917-1
218-01-9	1,2-benzphenanthrene	0-2	205-923-4
50-32-8	Benzo(a)pyrene	0-2	200-028-5
56-55-3	1,2-Benzanthracene	0-2	200-280-6
83-32-9	Acenaphthene	0-2	201-469-6
85-01-8	Phenanthrene	0-2	201-581-5
86-73-7	Fluorene	0-2	201-695-5
87-86-5	Pentachlorophenol	0-2	201-778-6
91-20-3	Naphthalene	0-2	202-049-5
91-57-6	2-methylnaphthalene	0-2	202-078-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: not available solid.
Warning! May cause allergic skin reaction. Causes eye and skin irritation. May cause cancer based on animal studies.
Target Organs: Eyes, skin.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Naphthalene can cause cataracts, optical neuritis, and cornea injuries. Ingestion of large quantities may cause severe hemolytic anemia and
Inhalation: Causes respiratory tract irritation. May cause effects similar to those described for ingestion.
Chronic: May cause cancer according to animal studies. Prolonged exposure to respirable crystalline quartz may cause delayed lung injury/fibrosis (silicosis).

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
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.
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.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: Not published.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

Section 7 - Handling and Storage

Handling: Avoid generating dusty conditions. Use with adequate ventilation. Avoid contact with skin

and eyes. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Soil	none listed	none listed	none listed
Anthracene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Dibenzofuran	none listed	none listed	none listed
Benzo(b)fluoranthene	none listed	none listed	none listed
Fluoranthene	none listed	none listed	none listed
Acenaphthylene	none listed	none listed	none listed
1,2-benzphenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Benzo(a)pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
1,2-Benzanthracene	none listed	none listed	none listed
Acenaphthene	none listed	none listed	none listed
Phenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Fluorene	none listed	none listed	none listed
Pentachlorophenol	0.5 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.5 mg/m3 TWA 2.5 mg/m3 IDLH	0.5 mg/m3 TWA
Naphthalene	10 ppm TWA; 15 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	10 ppm TWA; 50 mg/m3 TWA 250 ppm IDLH	10 ppm TWA; 50 mg/m3 TWA

2-methylnaphthalene	0.5 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	none listed	none listed

OSHA Vacated PELs: Soil: No OSHA Vacated PELs are listed for this chemical. Anthracene: No OSHA Vacated PELs are listed for this chemical. Pyrene: No OSHA Vacated PELs are listed for this chemical. Dibenzofuran: No OSHA Vacated PELs are listed for this chemical. Benzo(b)fluoranthene: No OSHA Vacated PELs are listed for this chemical. Fluoranthene: No OSHA Vacated PELs are listed for this chemical. Acenaphthylene: No OSHA Vacated PELs are listed for this chemical. 1,2-benzphenanthrene: No OSHA Vacated PELs are listed for this chemical. Benzo(a)pyrene: No OSHA Vacated PELs are listed for this chemical. 1,2-Benzanthracene: No OSHA Vacated PELs are listed for this chemical. Acenaphthene: No OSHA Vacated PELs are listed for this chemical. Phenanthrene: No OSHA Vacated PELs are listed for this chemical. Fluorene: No OSHA Vacated PELs are listed for this chemical. Pentachlorophenol: 0.5 mg/m3 TWA Naphthalene: 10 ppm TWA; 50 mg/m3 TWA 2-methylnaphthalene: 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 gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: not available
Odor: none reported
pH: Not available.
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density: Not available.
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures.
Incompatibilities with Other Materials: None reported.
Hazardous Decomposition Products: No data available.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 120-12-7: CA9350000
CAS# 129-00-0: UR2450000; UR2450100
CAS# 132-64-9: HP4430000
CAS# 205-99-2: CU1400000
CAS# 206-44-0: LL4025000
CAS# 208-96-8: AB1254000; AB1254200
CAS# 218-01-9: GC0700000
CAS# 50-32-8: DJ3675000
CAS# 56-55-3: CV9275000
CAS# 83-32-9: AB1000000
CAS# 85-01-8: SF7175000
CAS# 86-73-7: LL5670000
CAS# 87-86-5: SM6300000; SM6314000; SM6321000
CAS# 91-20-3: QJ0525000
CAS# 91-57-6: QJ9635000
LD50/LC50:
CAS# 120-12-7:
Oral, mouse: LD50 = 4900 mg/kg;
.

CAS# 129-00-0:
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 170 mg/m3;
Inhalation, rat: LC50 = 170 mg/m3;
Oral, mouse: LD50 = 800 mg/kg;
Oral, rat: LD50 = 2700 mg/kg;
.

CAS# 132-64-9:
.

CAS# 205-99-2:
.

CAS# 206-44-0:
Oral, rat: LD50 = 2 gm/kg;
Skin, rabbit: LD50 = 3180 mg/kg;
.

CAS# 208-96-8:
Oral, mouse: LD50 = 1760 mg/kg;
.

CAS# 218-01-9:
.

CAS# 50-32-8:
.

CAS# 56-55-3:
.

CAS# 83-32-9:
.

CAS# 85-01-8:
Oral, mouse: LD50 = 700 mg/kg;
Oral, rat: LD50 = 1.8 gm/kg;
.

CAS# 86-73-7:
.

CAS# 87-86-5:
Draize test, rabbit, eye: 100 uL/24H Mild;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, rat: LC50 = 355 mg/m3;
Inhalation, rat: LC50 = 200 mg/m3;
Inhalation, rat: LC50 = 335 mg/m3;
Oral, mouse: LD50 = 36 mg/kg;
Oral, mouse: LD50 = 117 mg/kg;
Oral, mouse: LD50 = 30 mg/kg;
Oral, rabbit: LD50 = 200 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 50 mg/kg;
Skin, rat: LD50 = 96
CAS# 91-20-3:
Draize test, rabbit, eye: 100 mg Mild;
Inhalation, rat: LC50 = >340 mg/m3/1H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 490 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rat: LD50 = >2500 mg/kg;
.

CAS# 91-57-6:
Oral, rat: LD50 = 1630 mg/kg;
.

Carcinogenicity:
CAS# 120-12-7:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 129-00-0:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 132-64-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 205-99-2:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 206-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 208-96-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 218-01-9:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen

CAS# 56-55-3:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 83-32-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 85-01-8:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 86-73-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 87-86-5:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

CAS# 91-20-3:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/19/02
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 91-57-6: 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

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:
CAS# 206-44-0: waste number U120.
CAS# 218-01-9: waste number U050.
CAS# 50-32-8: waste number U022.
CAS# 56-55-3: waste number U018.
CAS# 91-20-3: waste

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

Soil is not listed on the TSCA inventory. It is for research and development use only.
CAS# 120-12-7 is listed on the TSCA inventory.
CAS# 129-00-0 is listed on the TSCA inventory.
CAS# 132-64-9 is listed on the TSCA inventory.
CAS# 205-99-2 is not listed on the TSCA inventory. It is for research and development use only.
CAS# 206-44-0 is listed on the TSCA inventory.
CAS# 208-96-8 is listed on the TSCA inventory.
CAS# 218-01-9 is listed on the TSCA inventory.
CAS# 50-32-8 is listed on the TSCA inventory.
CAS# 56-55-3 is listed on the TSCA inventory.
CAS# 83-32-9 is listed on the TSCA inventory.
CAS# 85-01-8 is listed on the TSCA inventory.
CAS# 86-73-7 is listed on the TSCA inventory.
CAS# 87-86-5 is listed on the TSCA inventory.
CAS# 91-20-3 is listed on the TSCA inventory.
CAS# 91-57-6 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 129-00-0: Effective 6/1/87, Sunset 6/1/97 CAS# 91-20-3: Effective 6/1/87, Sunset

6/1/97

Chemical Test Rules

CAS# 91-20-3: 40 CFR 799.5115

Section 12b

CAS# 91-20-3: Section 4, 0.1 % de minimus concentration

TSCA Significant New Use Rule

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

CERCLA Hazardous Substances and corresponding RQs

CAS# 120-12-7: 5000 lb final RQ; 2270 kg final RQ CAS# 129-00-0: 5000 lb final RQ; 2270 kg final RQ CAS# 132-64-9: 100 lb final RQ; 45.4 kg final RQ CAS# 205-99-2: 1 lb final RQ; 0.454 kg final RQ CAS# 206-44-0: 100 lb final RQ; 45.4 kg final RQ CAS# 208-96-8: 5000 lb final RQ; 2270 kg final RQ CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ CAS# 56-55-3: 10 lb final RQ; 4.54 kg final RQ CAS# 83-32-9: 100 lb final RQ; 45.4 kg final RQ CAS# 85-01-8: 5000 lb final RQ; 2270 kg final RQ CAS# 86-73-7: 5000 lb final RQ; 2270 kg final RQ CAS# 87-86-5: 10 lb final RQ; 4.54 kg final RQ CAS# 91-20-3: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 129-00-0: 1000 lb lower threshold TPQ; 10000 lb upper threshold T PQ

SARA Codes

CAS # 120-12-7: immediate.
CAS # 129-00-0: immediate, delayed.
CAS # 206-44-0: immediate.
CAS # 50-32-8: immediate, delayed.
CAS # 56-55-3: delayed.
CAS # 83-32-9: immediate.
CAS # 85-01-8: immediate.
CAS # 91-20-3: immediate, delayed, fire.
CAS # 91-57-6: immediate.

Section 313

This material contains Anthracene (CAS# 120-12-7, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Dibenzofuran (CAS# 132-64-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Benzo(b)fluoranthene (CAS# 205-99-2, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Fluoranthene (CAS# 206-44-0, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains 1,2-benzphenanthrene (CAS# 218-01-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Benzo(a)pyrene (CAS# 50-32-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains 1,2-Benzanthracene (CAS# 56-55-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Phenanthrene (CAS# 85-01-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Pentachlorophenol (CAS# 87-86-5, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Naphthalene (CAS# 91-20-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 132-64-9 is listed as a hazardous air pollutant (HAP).

CAS# 87-86-5 is listed as a hazardous air pollutant (HAP).
CAS# 91-20-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 87-86-5 is listed as a Hazardous Substance under the CWA. CAS# 91-20-3 is listed as a Hazardous Substance under the CWA. CAS# 120-12-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 129-00-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 205-99-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 208-96-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 56-55-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 86-73-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Priority Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

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

STATE

CAS# 120-12-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 129-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 132-64-9 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 205-99-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 206-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 208-96-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 56-55-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 83-32-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 85-01-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 86-73-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 87-86-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-20-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-57-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65
WARNING: This product contains Benzo(b)fluoranthene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-benzphenanthrene, a chemical known to the state of California to cause cancer. WARNING: This product contains Benzo(a)pyrene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-Benzanthracene, a chemical known to the state of California to cause cancer. WARNING: This product contains Pentachlorophenol, a chemical known to the state of California to cause cancer. WARNING: This product contains Naphthalene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 205-99-2: 0.096 æg/day NSRL (oral) CAS# 218-01-9: 0.35 æg/day NSRL (oral) CAS# 50-32-8: 0.06 æg/day NSRL CAS# 56-55-3: 0.033 æg/day NSRL (oral) CAS# 87-86-5: 40 æg/day NSRL CAS# 91-20-3: 5.8 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
Not available.
Risk Phrases:

Safety Phrases:

WGK (Water Danger/Protection)
CAS# 120-12-7: 2
CAS# 129-00-0: No information available.
CAS# 132-64-9: No information available.
CAS# 205-99-2: No information available.
CAS# 206-44-0: No information available.
CAS# 208-96-8: No information available.
CAS# 218-01-9: No information available.
CAS# 50-32-8: No information available.
CAS# 56-55-3: No information available.
CAS# 83-32-9: No information available.
CAS# 85-01-8: No information available.
CAS# 86-73-7: No information available.
CAS# 87-86-5: 3
CAS# 91-20-3: 2
CAS# 91-57-6: No information available.

Canada - DSL/NDSL
CAS# 120-12-7 is listed on Canada's DSL List.
CAS# 129-00-0 is listed on Canada's DSL List.
CAS# 132-64-9 is listed on Canada's DSL List.
CAS# 218-01-9 is listed on Canada's DSL List.
CAS# 50-32-8 is listed on Canada's DSL List.
CAS# 83-32-9 is listed on Canada's DSL List.
CAS# 85-01-8 is listed on Canada's DSL List.
CAS# 86-73-7 is listed on Canada's DSL List.
CAS# 87-86-5 is listed on Canada's DSL List.
CAS# 91-20-3 is listed on Canada's DSL List.
CAS# 91-57-6 is listed on Canada's DSL List.
CAS# 206-44-0 is listed on Canada's NDSL List.
CAS# 208-96-8 is listed on Canada's NDSL List.
CAS# 56-55-3 is listed on Canada's NDSL List.

Canada - WHMIS
This product has a WHMIS classification of D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 120-12-7 is listed on the Canadian Ingredient Disclosure List.
CAS# 129-00-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 205-99-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 206-44-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 208-96-8 is not listed on the Canadian Ingredient Disclosure List.
CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 56-55-3 is listed on the Canadian Ingredient Disclosure List.
CAS# 83-32-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 85-01-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 86-73-7 is not listed on the Canadian Ingredient Disclosure List.
CAS# 87-86-5 is not listed on the Canadian Ingredient Disclosure List.
CAS# 91-20-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #5 Date: 11/20/2008

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.

MATERIAL SAFETY DATA SHEET

QUAKER STATE® PEAK PERFORMANCE CONVENTIONAL MOTOR OIL - ALL GRADES

1. PRODUCT AND COMPANY IDENTIFICATION

MSDS Number: 14938
Version Date: 07/16/02

Product Name: QUAKER STATE® PEAK PERFORMANCE CONVENTIONAL MOTOR OIL - ALL GRADES
Product Use: Engine oil
Synonyms: 5W-30, 10W-30, 10W-40, 20W-50, 15W-40

Company Information
SOPUS Products
P.O. Box 4427
Houston, TX 77210-4427
USA

Phone Numbers
Medical Emergency: 1-800-546-6040
Transportation Emergency (USA): 1-800-424-9300
Transportation Emergency (International): 1-703-527-3887 (Call Collect)
MSDS Assistance: 1-800-546-6227
Fax On Demand: 1-800-546-6227
Technical Assistance: 1-800-458-4998
Customer Service: 1-800-468-8397
Fax Number: 713-217-3181
Internet Address: www.MSDS.PZLQS.com

2. COMPONENT INFORMATION

Component	CAS No.	Weight Percent Range	Hazardous in Blend
HYDROTREATED HEAVY PARAFFINIC PETROLEUM DISTILLATES	64742-54-7	< 70	No
SOLVENT-DEWAXED HEAVY PARAFFINIC DISTILLATE	64742-65-0	< 70	No
DETERGENT/DISPERSANT	MIXTURE	5 - 10	No
VISCOSITY MODIFIER	9003-29-6	< 10	No
POUR POINT DEPRESSANT	MIXTURE	< 2	No

Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Other: No information available

3. HAZARDS IDENTIFICATION

Emergency and Hazards Overview
CAUTION: Contains Petroleum Lubricant. Repeated skin contact can cause skin disorders.

ATTENTION: Used motor oil is a possible skin cancer hazard based on animal data. Repeated exposure to oil mist in excess of the OSHA limit (5mg/m3) can result in accumulation of oil droplets in pulmonary tissue.

NFPA Ratings: **Health** 1 **Flammability** 1 **Reactivity** 0

Primary Route of Exposure: **Skin** X **Inhalation** -- **Eye** X

Health Effect Information

Eye Contact: This product is practically non-irritating to the eyes upon direct contact. Based on testing of similar products and/or components.

Skin Contact: Avoid skin contact. This product is minimally irritating to the skin upon direct contact. Based on testing of similar products and/or components. Prolonged or repeated contact may result in contact dermatitis which is characterized by dryness, chapping, and reddening. Prolonged or repeated contact may result in oil acne which is characterized by blackheads with possible secondary infection. Avoid prolonged and repeated skin contact with used motor oils. See Section 11 - Toxicological Information.

Inhalation: This product has a low vapor pressure and is not expected to present an inhalation hazard at ambient conditions. Caution should be taken to prevent aerosolization or misting of this product. On rare occasions, prolonged and repeated exposure to oil mist poses a risk of pulmonary disease such as chronic lung inflammation. Signs of respiratory effects vary with concentration and length of exposure and include nasal discharge, sore throat, coughing, bronchitis, pulmonary edema and difficulty breathing. Shortness of breath and cough are the most common symptoms.

Ingestion: Do not ingest. This product is relatively non-toxic by ingestion. This product has laxative properties and may result in abdominal cramps and diarrhea. Exposure to a large single dose, or repeated smaller doses, may lead to lung aspiration, which can lead to lipid pneumonia or chronic lung inflammation. These are low-grade, chronic localized tissue reactions.

Medical Conditions Aggravated by Exposure: Drying and chapping may make the skin more susceptible to other irritants, sensitizers and disease.

Other: No information available

4. FIRST AID INFORMATION

Eye Contact: Immediately flush eyes with large amounts of water and continue flushing until irritation subsides. If material is hot, treat for thermal burns and seek immediate medical attention.

Skin Contact: No treatment is necessary under ordinary circumstances. Remove contaminated clothing. Wash contaminated area thoroughly with soap and water. If material is hot, submerge injured area in cold water. If victim is severely burned, remove to a hospital immediately.

Inhalation: This material has a low vapor pressure and is not expected to present an inhalation exposure at ambient conditions. If vapor or mist is generated when the material is heated, and the victim experiences signs of respiratory tract irritation, remove to fresh air.

Ingestion: No treatment is necessary under ordinary circumstances. Do not induce vomiting. If victim exhibits signs of lung aspiration such as coughing or choking, seek immediate medical assistance.

Notes to Physician: No information available

Other: No information available

5. FIRE AND EXPLOSION INFORMATION

Flammable Properties

Flash Point: 415 F, 212.8 C **Test Method:** ASTM 3278 - Closed Cup

Flammable Limits in Air

Upper Percent: No data available

Lower Percent: No data available

Autoignition Temperature: No data available **Test Method:** No information available

NFPA Classification: Class III-B combustible liquid

Extinguishing Media: Use dry chemical, foam, or carbon dioxide.

Fire Fighting Measures

Special Fire Fighting Procedures and Equipment: Water may be ineffective but can be used to cool containers exposed to heat or flame to prevent vapor pressure buildup and possible container rupture. Caution should be exercised when using water or foam as frothing may occur, especially if sprayed into containers of hot, burning liquid.

Unusual Fire and Explosion Conditions: Dense smoke may be generated while burning. Carbon monoxide, carbon dioxide, and other oxides may be generated as products of combustion.

Hazardous Combustion By-Products: None

Other: No information available

6. ACCIDENTAL RELEASE MEASURES

Personnel Safeguards: Consult Health Effect Information in Section 3, Personal Protection Information in Section 8, Fire and Explosion Information in Section 5, and Stability and Reactivity Information in Section 10.

Regulatory Notifications: Notify appropriate authorities of spill.

Containment and Clean up: Contain spill immediately. Do not allow spill to enter sewers or watercourses. Absorb with appropriate inert material such as sand, clay, etc. Large spills may be picked up using vacuum pumps, shovels, buckets, or other means and placed in drums or other suitable containers.

Other: No information available

7. HANDLING AND STORAGE INFORMATION

Handling: Fire extinguishers should be kept readily available. See NFPA 30 and OSHA 1910.106--Flammable and Combustible Liquids.

Storage: Do not transfer to unmarked containers. Store in closed containers away from heat, sparks, open flame, or oxidizing materials.

Empty Container Warnings

Drums: Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed.

Plastic: Empty container may retain product residues.

Other: No information available

8. EXPOSURE CONTROLS / PERSONAL PROTECTION INFORMATION

Exposure Limits and Guidelines

This product does not contain any components with OSHA or ACGIH exposure limits.

Personal Protective Equipment

Eye/Face Protection: Eye protection is not required under conditions of normal use. If material is handled such that it could be splashed into eyes, wear plastic face shield or splash-proof safety goggles.

Skin Protection: No skin protection is required for single, short duration exposures. For prolonged or repeated exposures, use impervious clothing (boots, gloves, aprons, etc.) over parts of the body subject to exposure. If handling hot material, use insulated protective clothing (boots, gloves, aprons, etc.). Launder soiled clothes. Properly dispose of contaminated leather articles including shoes, which cannot be decontaminated.

Respiratory Protection: Respiratory protection is not required under conditions of normal use. If vapor or mist is generated when the material is heated or handled, use an organic vapor respirator with a dust and mist filter. All respirators must be NIOSH certified. Do not use compressed oxygen in hydrocarbon atmospheres.

Personal Hygiene: Consumption of food and beverage should be avoided in work areas where hydrocarbons are present. Always wash hands and face with soap and water before eating, drinking, or smoking.

Engineering Controls / Work Practices

Ventilation: If vapor or mist is generated when the material is heated or handled, adequate ventilation in accordance with good engineering practice must be provided to maintain concentrations below the specified exposure or flammable limits.

Other: The OSHA permissible exposure limit (PEL) and ACGIH threshold limit value (TLV) for oil mist is 5 mg/m3. The ACGIH short-term exposure limit (STEL) for oil mist is 10 mg/m3.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Amber to dark amber	
Odor: Hydrocarbon - mild	**Vapor Pressure:** No data available
Physical state: Liquid	**Vapor Density (air=1):** No data available
pH: No data available	**Percent Volatile by Volume:** No data available
Boiling Point: No data available	**Volatile Organic Content:** No data available
Melting Point: No data available	**Molecular Weight:** No data available
Specific Gravity: 0.88 - 0.9 @ 16 C / 60 F	**Average Carbon Number:** No data available
Pour Point: -15 F, -26.1 C	**Viscosity @ 100 F:** No data available
	Viscosity @ 40 C: No data available
Solubility in Water: Negligible in water	
Octanol / Water Coefficient: Log K_{ow} = No data available	

10. STABILITY AND REACTIVITY INFORMATION

Chemical Stability: Stable

Conditions to Avoid: High heat and open flames.

Incompatible Materials to Avoid: May react with strong oxidizing agents.

Other: No information available

11. TOXICOLOGICAL INFORMATION

Primary Eye Irritation: No information available

Primary Skin Irritation: No information available

Acute Dermal Toxicity: No information available

Subacute Dermal Toxicity: No information available

Dermal Sensitization: No information available

Inhalation Toxicity: No information available

Inhalation Sensitization: No information available

Oral Toxicity: No information available

Mutagenicity: No information available

Carcinogenicity: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate data to evaluate the carcinogenicity to experimental animals of this class of product. IARC has concluded there is sufficient evidence that used gasoline-engine motor oils produce skin tumors in experimental animals. Also, IARC has determined this class of products belongs to Group 3-"not classifiable as to its carcinogenicity to humans".

Reproductive and Developmental Toxicity: No information available

Teratogenicity: No information available

Immunotoxicity: No information available

Neurotoxicity: No information available

Other: No information available

12. ECOLOGICAL INFORMATION

Aquatic Toxicity: No information available

Terrestrial Toxicity: No information available

Chemical Fate and Transport: No information available

Other: No information available

13. DISPOSAL INFORMATION

Regulatory Information: All disposals must comply with federal, state, and local regulations. The material, if spilled or discarded, may be a regulated waste. Refer to state and local regulations. Caution! If regulated solvents are used to clean up spilled material, the resulting waste mixture may be regulated. Department of Transportation (DOT) regulations may apply for transporting this material when spilled.

Waste Disposal Methods: Waste material may be landfilled or incinerated at an approved facility. Materials should be recycled if possible.

Other: No information available

14. TRANSPORTATION INFORMATION

U.S. Department of Transportation (DOT)
Highway / Rail (Bulk): Not Regulated
Highway / Rail (Non-Bulk): Not Regulated

For US shipments, US DOT law requires the shipper to determine the proper shipping description of the material that is being shipped. The shipping information and description contained in this section may not be suitable for all shipments of this material, but may help the shipper determine the proper shipping description for a particular shipment.

International Information

Vessel:	**IMDG Regulated:**	**--**	**IMDG Not Regulated:**	**X**
Air:	**ICAO Regulated:**	**--**	**ICAO Not Regulated:**	**X**

Other: No information available

15. Regulatory Information

Regulatory Lists Searched: The components listed in Section 2 of this MSDS were compared to substances that appear on the following regulatory lists. Each list is numerically identified. See Regulatory Search Results below.

Health & Safety: 10 - IARC carcinogen, 11 - NTP carcinogen, 12 - OSHA carcinogen, 15 - ACGIH TLV, 16 - OSHA PEL, 17 - NIOSH exposure limit, 20 - US DOT Appendix A, Hazardous substances, 22 - FDA 21 CFR Total food additives, 23 - NFPA 49 or 325

Environmental: 30 - CAA 1990 Hazardous air pollutants, 31 - CAA Ozone depletors, 33 - CAA HON rule, 34 - CAA Toxic substance for accidental release prevention, 35 - CAA Volatile organic compounds (VOC's) in SOCMI, 41 - CERCLA / SARA Section 302 extremely hazardous substances, 42 - CERCLA / SARA Section 313 emissions reporting, 43 - CWA Hazardous substances, 44 - CWA Priority pollutants, 45 - CWA Toxic pollutants, 46 - EPA Proposed test rule for hazardous air pollutants, 47 - RCRA Basis for listing - Appendix VII, 48 - RCRA waste, 49 - SDWA - (S)MCLs

International: 50 - Canada - WHMIS Classification of substance, 54 - Mexico - Drinking water - ecological criteria, 55 - Mexico - Wastewater discharges, 56 - US -TSCA Section (12)(b) - export notification

State Lists: 60 - CA - Proposition 65, 61 - FL - Substances, 62 - MI - Critical materials, 63 - MA - RTK, 64 - MA - Extraordinarily hazardous substances, 65 - MN - Hazardous substances, 66 - PA - RTK, 67 - NJ - RTK, 68 - NJ - Environmental hazardous substances, 69 - NJ - Special hazardous substances

Inventories: 80 - Canada - Domestic substances , 81 - European - EINECS, 82 - Japan - ENCS, 83 - Korea - Existing and evaluated chemical substances, 84 - US - TSCA , 85 - China Inventory

Regulatory Search Results:
HYDROTREATED HEAVY PARAFFINIC PETROLEUM DISTILLATES: 80, 81, 83, 84, 85
SOLVENT-DEWAXED HEAVY PARAFFINIC DISTILLATE: 80, 81, 83, 84, 85
VISCOSITY MODIFIER: 35, 80, 83, 84, 85

U.S. TSCA Inventory: All components of this material are on the US TSCA Inventory.

SARA Section 313: This product is not known to contain any SARA, Title III, Section 313 Reportable Chemicals at or greater than 1.0% (0.1% for carcinogens).

IARC: No information available

SARA 311 / 312 Categories
Acute: -- **Chronic:** -- **Fire:** -- **Pressure:** -- **Reactive:** --
Not Regulated: X

Canadian WHMIS Classification
Not a controlled substance under WHMIS

European Union Classification
Hazard Symbols:
No classification recommended
Risk Phrases:
No classification recommended
Safety Phrases:
No classification recommended

Other: No information available

16. OTHER INFORMATION

Health and Environmental Label Language

WARNING: Continuous contact with used gasoline engine oils has caused skin cancer in animal tests.
ATTENTION: Prolonged or repeated skin contact may cause oil acne or dermatitis. Repeated exposure to oil mist in excess of the OSHA limit (5mg/m3 can result in accumulation of oil droplets in pulmonary tissue.

Precautionary Measures: Avoid prolonged or repeated contact with eyes, skin and clothing. Avoid generation and inhalation of oil mists.

First Aid: Skin Contact: Wash skin with soap and water. Launder soiled clothes and discard oil-soaked shoes. If irritation persists seek medical attention. Eye Contact: Flush with water. If irritation persists seek medical attention. Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. If discomfort persists seek medical assistance.

Instructions in Case of Fire or Spill: In case of fire, use water fog, foam, dry chemical or carbon dioxide. Water spray may be ineffective, but can be used to cool containers. Do not use a direct stream of water. Material will float and can be reignited on surface of water.

Spill or Leak: Dike and contain spill. Do not use water; soak up with absorbent material such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

Contains: highly refined petroleum distillate, mixture; zinc compounds, mixture; polymer additives, mixture.

KEEP OUT OF REACH OF CHILDREN. (If intended for retail also)

MSDS Revisions
Previous Version Date: 06/01/01

Previous Version Information
Revised Section 1 - Product Name

Other

No information available

Prepared By:

SOPUS Products
P.O. Box 4427
Houston, TX 77210-4453 USA

Disclaimer of Warranty: The information contained herein is based upon data and information available to us, and reflects our best professional judgment. This product may be formulated in part with components purchased from other companies. In many instances, especially when proprietary or trade secret materials are used, SOPUS Products must rely upon the hazard evaluation of such components submitted by that product's manufacturer or importer. No warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of such data or information, the results to be obtained from the use thereof, or that any such use do not infringe any patent. Since the information contained herein may be applied under conditions of use beyond our control and with which we may be unfamiliar, we do not assume responsibility for the results of such application. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular use.

Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Section 1 - Product and Company Identification
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Product Identification: PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD
Date of MSDS: 12/09/1985 **Technical Review Date:** 10/26/1988
FSC: 5910 **NIIN: LIIN:** 00F007527
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: WESCO ELECTRICAL CO
Post Office Box: N/K
Manufacturer's Address1: 201 MUNSON ST
Manufacturer's Address2: GREENVILLE, MA 01301-9605
Manufacturer's Country: NK
General Information Telephone: (413) 774-4358
Emergency Telephone: (413) 774-4358
Emergency Telephone: (413) 774-4358
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 12673
Special Project Code: N

Preparer Information

Preparer's Name: WESCO ELECTRICAL
Preparer's Address1: 201 MUNSON ST
Preparer's Address2: GREENVILLE, MA 01301
Preparer's CAGE: 12673
Assigned Individual: N

Contractor Information

Contractor's Name: WESCO ELECTRICAL
Contractor's Address1: 201 MUNSON ST
Contractor's Address2: GREENVILLE, MA 01301
Contractor's Telephone: (413) 774-4358
Contractor's CAGE: 12673

Section 2 - Compositon/Information on Ingredients
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Ingredient Name: LEAD (SARA III)
Ingredient CAS Number: 7439-92-1 **Ingredient CAS Code:** M
RTECS Number: OF7525000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 99.9%
% Enviromental Weight:

Other REC Limits: N/K
OSHA PEL: 0.05 MG/M3;1910.1025 **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.15 MG/M3;DUST 9192 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Health Hazards Acute & Chronic: IRRITATING TO THE RESPIRATORY SYSTEM, SKIN, & EYES, WEAKNESS, VOMITING, LOSS OF APPETITE,UNCOORDINATION, CONVULSIONS, STUPOR, COMA.

Signs & Symptoms of Overexposure:
IF LEFT UNTREATED: WEAKNESS, INSOMINIA, HYERTENSION, IRRITATION TO SKIN & EYE, ANEMIA, METALIC TASTE, CONSTIPATION, HEADACHE, MUSCLE & JOINT PAIN, NEUROMUSCULAR DYSFUNCTION, PARALYSIS, ENCEPHALOPATHY. LEAD & ITS INORGANIC COMPOUNDS ARE NEUROTOXINS WHICH MAY PRODUCE PERIPHERAL NEUOPATHY.

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

First Aid:
EYES: FLUSH WITH COPIOUS QUANTITIES OF WATER. GET MEDICAL ATTENTION. SKIN: WASH THOROUGHLY WITH SOAP & WATER. INHALATION: REMOVE FROM EXPOSURE. GET MEDICAL ATTENTION. INGESTION: GET MEDICAL ATTENTION.

Section 5 - Fire Fighting Measures
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Fire Fighting Procedures:
WEAR SELF-CONTAINED BREATHING APPARATUS (SCBA) AND FULL PROTECTIVE CLOTHING.
Unusual Fire or Explosion Hazard:
MOLTEN METALS PRODUCE FUME, VAPOR & DUST THAT MAY BE TOXIC & RESPIRATORY IRRITANTS.
Extinguishing Media:
DRY CHEMICAL, CO2. DON'T USE WATER ON FIRES WHERE MOLTEN METAL IS PRESENT.
Flash Point: Flash Point Text: N/R

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/R
Upper Limit(s): N/R

Section 6 - Accidental Release Measures
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Spill Release Procedures:
DUST MATERIAL SHOULD BE VACUUMED, OR WET SWEPT WHERE VACUUMING ISN'T FEASIBLE. PARTICULATE MATTER SHOULD BE STORED IN DRY CONTAINERS FOR LATER DISPOSAL. DON'T USE COMPRESSED AIR OR DRY SWEEPING AS A M EANS OF CLEANING.

Section 7 - Handling and Storage
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Repiratory Protection:
N/K
Ventilation:
PROVIDE LOCAL EXHAUST VENTILATION TO KEEP **Protective Gloves:**
SHOULD BE WORN
Eye Protection: FACE SHIELD, GOGGLES
Other Protective Equipment: COVERALLS, FULL BODY CLOTHING. HAT, SAFETY BOOTS, & SHOES SHOULD BE PROTECTED FROM CONTAMINATION WITH THIS PRODUCT.
Work Hygenic Practices: ALWAYS EXERCISE NORMAL, GOOD PERSONAL HYGIENE PRIOR TO SMOKING OR EATING.
Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 3164F
Melting/Freezing Point: Melting/Freezing Text: 621F
Decomposition Point: Decomposition Text: N/R
Vapor Pressure: N/R **Vapor Density:** N/R
Percent Volatile Organic Content:
Specific Gravity: 11.3
Volatile Organic Content Pounds per Gallon:
pH: N/R
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/R
Solubility in Water: NEGLIGIBLE
Appearance and Odor: SILVER-GRAY METAL, TARNISHES; NO APPARENT ODOR.
Percent Volatiles by Volume: N/R
Corrosion Rate: N/R

Section 10 - Stability & Reactivity Data
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Stability Indicator: YES
Materials to Avoid:
CAN REACT VIGOROUSLY WITH STRONG OXIDIZING AGENTS & THIS PRODUCT MAY LIBERATE HYDROGEN GAS.
Stability Condition to Avoid:
N/R
Hazardous Decomposition Products:
HIGH TEMPERATURESS MAY PRODUCE HEAVY METAL FUME, VAPOR & DUST.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/R

Section 11 - Toxicological Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Toxicological Information:
N/P

Section 12 - Ecological Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Ecological Information:
N/P

Section 13 - Disposal Considerations
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Waste Disposal Methods:
DISPOSE OF TOXIC SUBSTANCES & HAZARDOUS WASTES IN ACCORDANCE WITH LOCAL, STATE & FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Transport Information:
N/P

Section 15 - Regulatory Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD

Other Information:
N/P

HAZCOM Label Information

Product Identification: PURE LEAD PIG LEAD, PURE LEAD BLOCK LEAD
CAGE: 12673
Assigned Individual: N
Company Name: WESCO ELECTRICAL
Company PO Box:
Company Street Address1: 201 MUNSON ST
Company Street Address2: GREENVILLE, MA 01301 NK
Health Emergency Telephone: (413) 774-4358
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

8/8/2002 8:01:05 AM

GASCO

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR

MSDS NO: 248 **Version:3** **Date: August, 2010**

1. Chemical Product and Company Identification

Gasco Affiliates, LLC
320 Scarlett Blvd.
Oldsmar, FL 34677

TELEPHONE NUMBER: (800) 910-0051 **24-HOUR EMERGENCY NUMBER: 1-800-424-9300**
FAX NUMBER: (866) 755-8920
E-MAIL: info@gascogas.com

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR
CHEMICAL NAME: Isobutylene in air
COMMON NAMES/ SYNONYMS: None
TDG (Canada) CLASSIFICATION: 2.2
WHIMIS CLASSIFICATION: A

2. COMPOSITION/ INFORMATION ON INGREDIENTS

INGREDIENT	%VOLUME	PEL-OSHA	TLV-ACGIH	LD_{50} or LC_{50} Route/Species
Isobutylene FORMULA: C_4H_8	0.0001-0.9	N/A	N/A	N/A
Air FORMULA: Mixture	99.0 to 99.9999	N/A	N/A	N/A

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Release of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene may cause drowsiness and other central nervous system effects in high concentrations; however, due to the low concentration of this gas mixture, this is unlikely to occur.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization	Reproductive Hazard	Mutagen
Yes	No	No	No	No

Carcinogenicity: --NTP: No IARC: No OSHA: No

EYE EFFECTS:
N/A.

SKIN EFFECTS:
N/A.

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR

INGESTION EFFECTS:
Ingestion unlikely. Gas at room temperature.

INHALATION EFFECTS:
Due to the small size of this cylinder, no unusual health effects from over-exposure are anticipated under normal routine use.

NFPA HAZARD CODES		HMIS HAZARD CODES		RATING SYSTEM
Health:	1	Health:	1	0= No Hazard
Flammability:	0	Flammability:	0	1= Slight Hazard
Reactivity:	0	Reactivity:	0	2= Moderate Hazard
				3= Serious Hazard
				4= Severe Hazard

4. FIRST AID MEASURES

EYES:
N/A

SKIN:
N/A

INGESTION:
Not required

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASED OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED THE SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

5. FIRE-FIGHTING MEASURES

These containers hold gas under pressure, with no liquid phase. If involved in a major fire, they should be sprayed with water to avoid pressure increases, otherwise pressures will rise and ultimately they may distort or burst to release the contents. The gases will not add significantly to the fire, but containers or fragments may be projected considerable distances - thereby hampering fire fighting efforts.

6. ACCIDENTAL RELEASE MEASURES

In terms of weight, these containers hold very little contents, such that any accidental release by puncturing etc. will be of no practical concern.

7. HANDLING AND STORAGE

Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Use only in well-ventilated areas. Do not heat cylinder by any means to increase rate of product from the cylinder. Do not allow the temperature where cylinders are stored to exceed 130^{o}F (54^{o}C).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Use adequate ventilation for extended use of gas.

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR

9. PHYSICAL AND CHEMICAL PROPERTIES

PARAMETER:	VALUE:
Physical state	: Gas
Evaporation point	: N/A
pH	: N/A
Odor and appearance	: Colorless, odorless gas

10. STABILITY AND REACTIVITY

Stable under normal conditions. Expected shelf life 48 months.

11. TOXICOLOGICAL INFORMATION

No toxicological damage caused by this product.

12. ECOLOGICAL INFORMATION

No ecological damage caused by this product.

13. DISPOSAL INFORMATION

Do not discharge into any place where its accumulation could be dangerous. Used containers are acceptable for disposal in the normal waste stream as long as the cylinder is empty and valve removed or cylinder wall is punctured; but GASCO encourages the consumer to return cylinders.

14. TRANSPORT INFORMATION

	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Compressed Gas N.O.S. (Isobutylene in Air)	Compressed Gas N.O.S. (Isobutylene in Air)
HAZARD CLASS:	2.2	2.2
IDENTIFICATION NUMBER:	UN1956	UN1956
SHIPPING LABEL:	NONFLAMMABLE GAS	NONFLAMMABLE GAS

15. REGULATORY INFORMATION

Isobutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

16. OTHER INFORMATION

This MSDS has been prepared in accordance with the Chemicals (Hazard Information and Packaging for Supply (Amendment) Regulation 1996. The information is based on the best knowledge of GASCO, and its advisors and is given in good faith, but we cannot guarantee its accuracy, reliability or completeness and therefore disclaim any liability for loss or damage arising out of use of this data. Since conditions of use are outside the control of the Company and its advisors we disclaim any liability for loss or damage when the product is used for other purposes than it is intended.

MSDS/S010/248/ August, 2010

Safety Data Sheet

Material Name: Diesel Fuel, All Types

SDS No. 9909
US GHS

Synonyms: Ultra Low Sulfur Diesel; Low Sulfur Diesel; No. 2 Diesel; Motor Vehicle Diesel Fuel; Non-Road Diesel Fuel; Locomotive/Marine Diesel Fuel

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquids - Category 3
Skin Corrosion/Irritation – Category 2
Germ Cell Mutagenicity – Category 2
Carcinogenicity - Category 2
Specific Target Organ Toxicity (Single Exposure) - Category 3 (respiratory irritation, narcosis)
Aspiration Hazard – Category 1
Hazardous to the Aquatic Environment, Acute Hazard – Category 3

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

DANGER

Hazard Statements

Flammable liquid and vapor.
Causes skin irritation.
Suspected of causing genetic defects.
Suspected of causing cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.

Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Wash hands and forearms thoroughly after handling.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing fume/mist/vapours/spray.

Response
In case of fire: Use water spray, fog or foam to extinguish.
IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell.
If swallowed: Immediately call a poison center or doctor. Do NOT induce vomiting.
IF exposed or concerned: Get medical advice/attention.

Storage
Store in a well-ventilated place. Keep cool.
Keep container tightly closed.
Store locked up.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
68476-34-6	Fuels, diesel, no. 2	100
91-20-3	Naphthalene	<0.1

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

First Aid: Skin
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and the area of the body burned.

First Aid: Ingestion
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, and other gaseous agents.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a combustible liquid. Keep away from heat, sparks, excessive temperatures and open flame! No smoking or open flame in storage, use or handling areas. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks."

Incompatibilities

Keep away from strong oxidizers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: 100 mg/m3 TWA (inhalable fraction and vapor, as total hydrocarbons, listed under Diesel fuel)
Skin - potential significant contribution to overall exposure by the cutaneous route (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH: 10 ppm TWA
15 ppm STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 10 ppm TWA; 50 mg/m3 TWA
NIOSH: 10 ppm TWA; 50 mg/m3 TWA
15 ppm STEL; 75 mg/m3 STEL

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Clear, straw-yellow.	**Odor:**	Mild, petroleum distillate odor
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	0.009 psia @ 70 °F (21 °C)	**Vapor Density:**	>1.0
Boiling Point:	320 to 690 °F (160 to 366 °C)	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	0.83-0.876 @ 60°F (16°C)
Evaporation Rate:	Slow; varies with conditions	**VOC:**	ND
Percent Volatile:	100%	**Octanol/H2O Coeff.:**	ND
Flash Point:	>125 °F (>52 °C) minimum	**Flash Point Method:**	PMCC
Upper Flammability Limit (UFL):	7.5	**Lower Flammability Limit (LFL):**	0.6
Burning Rate:	ND	**Auto Ignition:**	494°F (257°C)

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Naphthalene (91-20-3)

Inhalation LC50 Rat >340 mg/m3 1 h; Oral LD50 Rat 490 mg/kg; Dermal LD50 Rat >2500 mg/kg; Dermal LD50 Rabbit >20 g/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Contact with eyes may cause mild irritation.

Potential Health Effects: Ingestion

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This material has been positive in a mutagenicity study.

Carcinogenicity

A: General Product Information

Suspected of causing cancer.

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

B: Component Carcinogenicity

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity repeat exposure effects.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Fuels, diesel, no. 2 (68476-34-6)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	35 mg/L [flow-through]	

Naphthalene (91-20-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	5.74-6.44 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	1.6 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	0.91-2.82 mg/L [static]	
96 Hr LC50 Pimephales promelas	1.99 mg/L [static]	

96 Hr LC50 Lepomis macrochirus	31.0265 mg/L [static]
72 Hr EC50 Skeletonema costatum	0.4 mg/L
48 Hr LC50 Daphnia magna	2.16 mg/L
48 Hr EC50 Daphnia magna	1.96 mg/L [Flow through]
48 Hr EC50 Daphnia magna	1.09 - 3.4 mg/L [Static]

Persistence/Degradability
No information available.

Bioaccumulation
No information available.

Mobility in Soil
No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions
See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging
Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT Information
Shipping Name: Diesel Fuel
NA #: 1993 **Hazard Class:** 3 **Packing Group:** III
Placard:

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Naphthalene (91-20-3)

CERCLA: 100 lb final RQ; 45.4 kg final RQ

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product may contain listed chemicals below the de minimis levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right- To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Fuels, diesel, no. 2	68476-34-6	No	No	No	Yes	No	No
Naphthalene	91-20-3	Yes	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

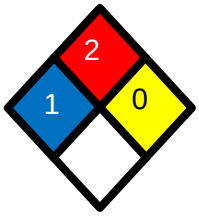
Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Fuels, diesel, no. 2	68476-34-6	Yes	DSL	EINECS
Naphthalene	91-20-3	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	1
Fire	2
Reactivity	0



HMIS® Hazard Rating

Health	1*	Slight
Fire	2	Moderate
Physical	0	Minimal
		*Chronic

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

Literature References

None

Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

101/102/110 COPPER/COPPER ALLOYS

Section 1 - Product and Company Identification
101/102/110 COPPER/COPPER ALLOYS

Product Identification: 101/102/110 COPPER/COPPER ALLOYS
Date of MSDS: 09/01/1989 **Technical Review Date:** 08/18/1993
FSC: 3439 **NIIN:** **LIIN:** 00F029170
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ANSONIA COPPER & BRASS INC
Post Office Box: 109
Manufacturer's Address1: 75 LIBERTY ST
Manufacturer's Address2: ANSONIA, CT 06401
Manufacturer's Country: US
General Information Telephone: 203-732-6600/800-521-17038
Emergency Telephone: 203-732-6600/800-521-1703
Emergency Telephone: 203-732-6600/800-521-1703
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 40518
Special Project Code: N

Preparer Information

Preparer's Name: ANSONIA COPPER & BRASS INC
Preparer's Address1: 75 LIBERTY ST
Preparer's Address2: ANSONIA, CT 06401
Preparer's CAGE: 40518
Assigned Individual: N

Contractor Information

Contractor's Name: ANSONIA COPPER & BRASS INC
Contractor's Address1: 75 LIBERTY ST
Contractor's Address2: ANSONIA, CT 06401
Contractor's Telephone: 203-732-6600/800-521-17038
Contractor's CAGE: 40518

Section 2 - Compositon/Information on Ingredients
101/102/110 COPPER/COPPER ALLOYS

Ingredient Name: COPPER (DUST & MIST), BRONZE POWDER
Ingredient CAS Number: 7440-50-8 **Ingredient CAS Code:** M
RTECS Number: GL5325000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Enviromental Weight:

Other REC Limits: 1 MG(CU)/M3 (DUST)
OSHA PEL: 0.1 MG(CU)/M3 (FUME) **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.2 MG/M3 (FUME) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
101/102/110 COPPER/COPPER ALLOYS

Health Hazards Acute & Chronic: RESPIRATORY TRACT IRRITATION, METAL FUME FEVER, EYE IRRITATION. LEAD INTOXICATION INCLUDING KIDNEY DISEASE, ANEMIA, NERVOUS DISORDERS, REPRODUCTIVE EFFECTS, BIRTH DEFECTS & KIDNEY CANCER. COPPER FUMES CAUSES METAL FUME FEVER, SKIN/HAIR DISCOLORATION, KERATINIZATION OF HANDS/FEET SOLES, & RESPIRATORY TRACT IRRITATION.

Signs & Symptoms of Overexposure:
METAL FUME FEVER SYMPTOMS INCLUDE: SWEET OR METALLIC TASTE IN MOUTH, DRYNESS & IRRITATION OF THROAT, COUGH, SHORTNESS OF BREATH, CHEST PAIN, NAUSEA, VOMITING, WEAKNESS, FATIGUE, MUSCLE & JOINT PAIN, C HILLS, SWEATING & FEVER. COPPER: METALLIC TASTE IN MOUTH & NAUSEA. SEE SUPP.

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures
101/102/110 COPPER/COPPER ALLOYS

First Aid:
EYES: FLUSH W/WATER. SKIN: VACUUM OFF EXCESS DUST. WASH W/SOAP & WATER. INHALATION: REMOVE TO FRESH AIR. METAL FUME FEVER MAY BE TREATED SYMPTOMATICALLY. INGESTION: OBTAIN MEDICAL ATTENTION IF LARGE Q UANTITIES HAVE BEEN INGESTED. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
101/102/110 COPPER/COPPER ALLOYS

Fire Fighting Procedures:
SOLID MASSIVE FORM ISN'T COMBUSTIBLE. WEAR SELF-CONTAINED BREATHING APPARATUS & PROTECTIVE CLOTHING. WHEN IN DUST FORM USE DRY CHEMICAL/SAND.
Unusual Fire or Explosion Hazard:
FIRE & EXPLOSION HAZARDS ARE MODERATE WHEN MATERIAL IS IN THE FORM OF DUST & EXPOSED TO HEAT, FLAMES, CHEMICAL REACTION OR IN CONTACT W/POWDERFUL OXIDIZERS.
Extinguishing Media:
N/K
Flash Point: Flash Point Text: N/R

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/R
Upper Limit(s): N/R

Section 6 - Accidental Release Measures
101/102/110 COPPER/COPPER ALLOYS

Spill Release Procedures:
LARGE QUANTITIES OF DUST: VACUUM/WET SWEEP. LIQUIDS W/SOLID METAL: EVACUATE AREA. ABSORB W/VERMICULATE/DRY SAND/SIMILAR MATERIAL.

Section 7 - Handling and Storage
101/102/110 COPPER/COPPER ALLOYS

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
101/102/110 COPPER/COPPER ALLOYS

Repiratory Protection:
USE NIOSH/OSHA APPROVED RESPIRATORY PROTECTION IF EXPOSURE EXCEEDS THE PEL/TLV LIMITS.
Ventilation:
LOCAL EXHAUST/MECHANICAL (GENERAL): REQUIRED IF DUST/FUME CREATED IN HANDLING OR WORKING ON THIS MATERIAL
Protective Gloves:
REQUIRED FOR MELT/GRIND/CUT/WELD JOBS
Eye Protection: SAFETY GLASSES W/SIDE SHIELDS
Other Protective Equipment: GRINDING OPERATIONS MAY REQUIRED FACE SHIELDS. MELTING/WELDING REQUIRE FACE SHIELDS W/SPECIALTY TINTED GLASS.
Work Hygenic Practices: USE GOOD PERSONAL HYGIENE. WASH HANDS BEFORE

EATING/DRINKING/SMOKING/LEAVING WORK AFTER CONTACT W/METAL DUST OR FUME.
Supplemental Health & Safety Information: UNDER NORMAL CONDITIONS THE SOLID ALLOY PRESENTS NO SIGNIFICANT HEALTH HAZARDS. PROCESSSING OF THE ALLOY BY DUST/FUME PRODUCING OPERATION (GRINDING/BUFFING/HEATING/WELDING) MAY RESULT IN POTENTIAL FOR EXPOSURE TO AIRBORNE METAL PARTICULATES/FUME.

Section 9 - Physical & Chemical Properties
101/102/110 COPPER/COPPER ALLOYS

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/R
Melting/Freezing Point: Melting/Freezing Text: 1500-2260F
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/R **Vapor Density:** N/R
Percent Volatile Organic Content:
Specific Gravity: 7.4-9
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/R
Solubility in Water: INSOLUBLE
Appearance and Odor: SILVER OR YELLOW TO RED SOLID
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
101/102/110 COPPER/COPPER ALLOYS

Stability Indicator: YES
Materials to Avoid:
STRONG ACIDS, BASES & OXIDERS. MAY REACT VIOLENTLY W/WATER. MERCURY, AMMONIA & ACETYLENE.
Stability Condition to Avoid:
HEAT, FLAMES
Hazardous Decomposition Products:
METAL FUME
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/K

Section 11 - Toxicological Information
101/102/110 COPPER/COPPER ALLOYS

Toxicological Information:
N/P

Section 12 - Ecological Information
101/102/110 COPPER/COPPER ALLOYS

Ecological Information:
N/P

Section 13 - Disposal Considerations
101/102/110 COPPER/COPPER ALLOYS

Waste Disposal Methods:
MAXIMIZE PRODUCT RECOVERY FOR REUSE OR RECYCLING. CONDITIONS MAY CAUSE THIS MATERIAL TO BECOME A SOLID HAZARDOUS WASTE. SOLID WASTE LEACHATE TESTING MAY INDICATE THE NEED FOR PROPERLY PERMITTED DISPOS AL IN ACCORDANCE W/FEDERAL, STATE, & LOCAL LAWS.

Section 14 - MSDS Transport Information
101/102/110 COPPER/COPPER ALLOYS

Transport Information:
N/P

Section 15 - Regulatory Information
101/102/110 COPPER/COPPER ALLOYS

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
101/102/110 COPPER/COPPER ALLOYS

Other Information:
N/P

HAZCOM Label Information

Product Identification: 101/102/110 COPPER/COPPER ALLOYS
CAGE: 40518
Assigned Individual: N
Company Name: ANSONIA COPPER & BRASS INC
Company PO Box:
Company Street Address1: 75 LIBERTY ST
Company Street Address2: ANSONIA, CT 06401 US
Health Emergency Telephone: 203-732-6600/800-521-1703
Label Required Indicator: N
Date Label Reviewed: 08/18/1993
Status Code: C
Manufacturer's Label Number: N/R
Date of Label: 08/18/1993
Year Procured: N/K
Organization Code: N
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P

Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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MATHESON TRI•GAS
ask. . .The Gas Professionals™

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: BTEX MIXTURE

CHEMICAL FAMILY: Nitrogen/Organic Hydrocarbon Mixture
PRODUCT USE: BTEX Calibration Gas

MANUFACTURER

MATHESON TRI-GAS, INC.

959 ROUTE 46 EAST
PARSIPPANY, NJ 07054-0624
USA

Phone: 973/257-1100

EMERGENCY PHONE:

CHEMTREC (U.S. DOMESTIC):	**1-800-424-9300**
CHEMTREC INTERNATIONAL:	**1-703-527-3887**
CANUTEC (CANADA):	**1-613-996-6666**

2. COMPOSITION and INFORMATION ON INGREDIENTS

(10,000 ppm = 1%)

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-STEL		NIOSH	OTHER
			TWA ppm	STEL ppm	TWA ppm	STEL ppm	IDLH ppm	ppm
Benzene	71-43-2	≤ 100 ppm	0.5 (skin)	2.5 (skin)	1	5	50	NIOSH REL: TWA = 0.1 STEL = 1 DFG MAK: Skin DFG MAK Germ Cell Mutagen Category: 3 Carcinogen: EPA-A, IARC-1, MAK-1, NIOSH-Ca, NTP-K, OSHA-Ca, TLV-A1
Ethyl Benzene	100-41-4	≤ 100 ppm	100	NE	100	125 (Vacated 1989 PEL)	800 (based on 10% of LEL)	NIOSH REL TWA = 100 STEL = 125 DFG MAKs: TWA = 100 (skin) PEAK = 2•MAK 5 min., momentary value DFG MAK Pregnancy Risk Classification: D Carcinogen: EPA-D, NIC-TLV-A3

NE = Not Established

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.
See Section 16 for Definitions of Terms Used.
(Table Continued on Following Page)

2. COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

(10,000 ppm = 1%)

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-STEL		NIOSH	OTHER
			TWA ppm	STEL ppm	TWA ppm	STEL ppm	IDLH ppm	ppm
Toluene	108-88-3	≤ 100 ppm	50 (skin)	NE	200 100 (Vacated 1989 PEL)	300 (ceiling) 150 (Vacated 1989 PEL)	500	NIOSH RELs TWA = 100 STEL = 150 DFG MAKs: TWA = 50 (skin) PEAK = 4•MAK 15 min., average value, 1-hr interval DFG MAK Pregnancy Risk Classification: C Carcinogen: EPA-D, IARC-3, TLV-A4
m-Xylene	108-38-3	≤ 100 ppm	100	150	100	150 (vacated 1989 PEL)	900	NIOSH RELs TWA = 100 STEL = 150 DFG MAKs: TWA = 100 (skin) PEAK = 2•MAK 15 min., average value, 1-hr interval DFG MAK Pregnancy Risk Classification: D Carcinogen: EPA-D, EPA-I, IARC-3, TLV-A4
o-Xylene	95-47-6	≤ 100 ppm	100	150	100	150 (vacated 1989 PEL)	900	NIOSH RELs TWA = 100 STEL = 150 DFG MAKs: TWA = 100 (skin) PEAK = 2•MAK 15 min., average value, 1-hr interval DFG MAK Pregnancy Risk Classification: D Carcinogen: EPA-D, EPA-I, IARC-3, TLV-A4
p-Xylene	106-42-3	≤ 100 ppm	100	150	100	150 (vacated 1989 PEL)	900	NIOSH RELs TWA = 100 STEL = 150 DFG MAKs: TWA = 100 (skin) PEAK = 2•MAK 15 min., average value, 1-hr interval DFG MAK Pregnancy Risk Classification: D Carcinogen: EPA-D, EPA-I, IARC-3, TLV-A4
Nitrogen (VOC-free)	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.
See Section 16 for Definitions of Terms Used.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This is a colorless, non-flammable gas mixture with a sweet, solvent odor. Inhalation of high concentration of this gas mixture may cause significant, adverse health effects at, due to the large number of hydrocarbon components. Overexposure to high concentrations of this mixture may cause nausea, dizziness, headaches, and collapse, and may be slightly irritating to the mucous membranes. Additionally, releases of this gas mixture may produce oxygen-deficient atmospheres. Individuals in such atmospheres may be asphyxiated. This gas mixture does not present a fire hazard if released. Flame or high temperature impinging on a localized area of the cylinder may cause cylinder to rupture violently or explosively.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this product is by inhalation.

INHALATION: Due to the presence of the solvents in this gas mixture, inhalation of high concentrations may result in central nervous system effects, such as dizziness, headaches, incoordination, and drowsiness. In addition, high concentrations of this gas mixture can cause an oxygen-deficient environment, especially if released in a poorly-ventilated area (e.g., an enclosed or confined space). Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of overexposure, death may occur. The effects associated with various levels of oxygen are as follows:

OXYGEN CONCENTRATION	**OBSERVED EFFECT**
12-16% Oxygen:	Breathing and pulse rate increase, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea, vomiting, collapse, or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

It should be noted that before adverse health effects or suffocation could occur, the lower flammability limits of the components of this gas mixture in air may be exceeded, possibly causing an explosive atmosphere as well as an oxygen-deficient environment.

CONTACT WITH SKIN or EYES: Prolonged exposure to this gas mixture may result in irritation of the eyes and skin. In addition, contact with rapidly expanding gases (which are released under high pressure) may cause frostbite.

SKIN ABSORPTION: The Benzene component has been shown to cause significant toxicity by skin absorption. Although the level of these components is low in this gas mixture, skin absorption should be considered to be a possible route of exposure for these components. The m-Xylene, o-Xylene, p-Xylene, Ethyl Benzene, and Toluene components of this gas mixture can also be absorbed via intact skin; however, this route of exposure is not considered significant for these compounds.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: Over-exposure to this gas mixture may cause the following health effects:

ACUTE: This gas mixture may produce adverse health effects such as central nervous system effects, and overexposure or oxygen deficiency. Severe inhalation overexposures can be fatal. This gas mixture may be irritating to the eyes.

CHRONIC: Components of this gas mixture are known or suspect human carcinogens and suspect carcinogens, based on animal tests. Some components of this product are suspect reproductive toxins. Some components of this gas mixture can cause adverse symptoms or damage to the cardiac system, blood system, peripheral, optic and cranial nerves, liver, kidneys, and spleen. Refer to Section 11 (Toxicological Information) of this MSDS for further information. Prolonged exposure to this gas mixture may cause irritation to the eyes and skin.

TARGET ORGANS: ACUTE: Respiratory system, central nervous system. CHRONIC: Reproductive system, skin, eyes.

HMIS RATING: HEALTH HAZARD = 1 FLAMMABILITY HAZARD = 0 PHYSICAL HAZARD = 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * Chronic hazards.

4. FIRST-AID MEASURES

GENERAL INFORMATION: RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant clothing must be worn. Adequate fire protection must be provided during rescue situations. Remove to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. **Seek medical attention immediately**.

SKIN EXPOSURE: Rinse exposed skin for 15 minutes if any irritation adverse effects occur. If release of this gas mixture has resulted in frostbite, warm affected area slowly. Seek immediate medical attention.

EYE EXPOSURE: If release of this gas mixture has affected the eyes, seek immediate medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing acute or chronic respiratory conditions may be aggravated by overexposure to this gas mixture.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %): Not applicable.
Lower (LEL): Not applicable. Upper (UEL): Not applicable.

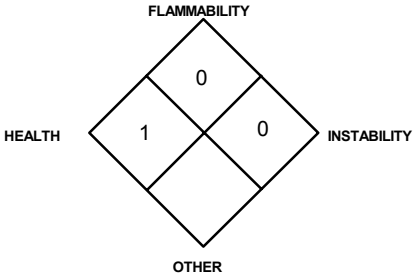
FIRE EXTINGUISHING MATERIALS: Use fire extinguishing material appropriate for surrounding materials that are involved in fire. Use water spray to cool fire-exposed cylinders.

UNUSUAL FIRE AND EXPLOSION HAZARD: DANGER! Fire-exposed cylinders may rupture explosively.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: Not sensitive.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE: Not sensitive.

NFPA RATING



See Section 16 for Definition of Ratings

SPECIAL FIRE-FIGHTING PROCEDURES: Evacuate all personnel from danger area. Immediately cool cylinders with water spray from maximum distance. Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. When cool, move cylinders from fire area if this can be done without risk to firefighters. Other information for pre-planning can be found in the American Petroleum Institute Publications 2510 and 1510A, and the North American Emergency Response Guidebook (Guide Number 126).

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment, including fire protection non-sparking tools.

Call CHEMTREC (1-800-424-9300) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666). Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there. Protect personnel attempting to shut-off with water spray. Monitor the surrounding area for the level of Oxygen. The atmosphere must have at least 19.5 percent Oxygen before non-emergency personnel can be allowed in the area without Self-Contained Breathing Apparatus.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES

Do not eat or drink while handling chemicals.

Be aware of all potential exposure symptoms; exposures to a fatal oxygen-deficient atmosphere could occur without any significant warning symptoms.

All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release.

Workers who handle this gas mixture should wear protective clothing, as listed in Section 8 (Exposure Controls and Personal Protection).

If ventilation controls are not adequate to keep exposure limits of components below levels below those listed in Section 2, Composition and Information on Ingredients and provide sufficient oxygen content, proper respiratory protection equipment should be provided and workers using such equipment should be carefully trained in its operation and limitations.

Precautions must always be taken to prevent suck-back of foreign materials into the cylinder by using a check-valve, or vacuum break, since suck-back may cause dangerous pressure changes within the cylinder.

Due to the presence of Benzene, requirements of 29 CFR 1910.1028 (The OSHA *Occupational Exposure Standard to Benzene*) and also due to the presence of Vinyl Chloride, requirements of 29 CFR 1910.1017 (The OSHA *Occupational Exposure Standard to Vinyl Chloride*), which includes requirements for employee monitoring, regulated areas, engineering controls and work practices) should be consulted when handling this gas mixture.

STORAGE AND HANDLING PRACTICES:

Cylinders should be stored upright and be firmly secured to prevent falling or being knocked-over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat or ignition. Do not allow the area where cylinders are stored to exceed 52°C (125°F).

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Compressed gases can present significant safety hazards. The following rules are applicable to work situations in which cylinders are being used.

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not use oils or grease on gas-handling fittings or equipment. Immediately contact the supplier if there are any difficulties associated with operating the cylinder valve. Never insert an object (e.g wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage the valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc, on a compressed gas cylinder or make a cylinder part of and electric circuit.

After Use: Close main cylinder valve. Replace valve protection cap. Close valve after each use and when empty. Mark empty cylinders “EMPTY”.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Refer to current CGA Guidelines for information on protective practices during maintenance of contaminated equipment.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure compliance with exposure limits described in Section 2 (Composition and Information on Ingredients). Local exhaust ventilation is preferred, because it prevents dispersion of this gas mixture into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of Oxygen.

RESPIRATORY PROTECTION: Maintain the Oxygen level above 19.5% in the workplace. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent U.S. State standards and Canadian CSA Standard Z94.4-93. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA’s Respiratory Protection Standard (1910.134-1998).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

RESPIRATORY PROTECTION (continued): The following are NIOSH Respiratory Guidelines for components of this gas mixture and are being provided for additional information on respiratory protection.

BENZENE

CONCENTRATION	RESPIRATORY PROTECTION
At Concentrations Above the NIOSH REL, or Where There is no REL, at Any Detectable Concentration:	Any Self-Contained Breathing Apparatus (SCBA) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any Supplied-Air Respirator (SAR) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode.
Escape:	Any Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister, or any appropriate escape-type, SCBA.

EYE PROTECTION: Splash goggles or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or appropriate Canadian Standards.

HAND PROTECTION: Wear mechanically-resistant gloves when handling cylinders containing this gas mixture. If necessary, refer to U.S. OSHA 29 CFR 1910.138, or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to the task.

9. PHYSICAL and CHEMICAL PROPERTIES

The physical and chemical properties of this gas mixture have not been determined. The following information is for the main component of this gas mixture, **Nitrogen**, which will define the most significant physical and chemical properties of the mixture.

The following information is for **Nitrogen**, the main component of this gas mixture:

GAS DENSITY @ 0°C (32°F) and 1 atm: 0.072 lbs/cu ft (1.153 kg/m^3)

FREEZING/MELTING POINT (@ 10 psig) -210°C (-345.8°F)

BOILING POINT: -195.8°C (-320.4°F)

SPECIFIC GRAVITY (air = 1) @ 21.1°C (70°F): 0.906

pH: Not applicable.

VAPOR PRESSURE @ 21.1°C (70°F) psig: Not applicable.

MOLECULAR WEIGHT: 28.01

EVAPORATION RATE (nBuAc = 1): Not applicable.

EXPANSION RATIO: Not applicable.

ODOR THRESHOLD: Not applicable.

SPECIFIC VOLUME (ft^3/lb): 13.8

SOLUBILITY IN WATER vol/vol at °0 C (32°F) and 1 atm: 0.023

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

The following information is pertinent to this product:

APPEARANCE, ODOR and COLOR: This gas mixture is colorless and has chloroform-like odor due to the presence of volatile organic components in this product.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinct warning properties of this gas mixture. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Stable at standard temperatures and pressures.

DECOMPOSITION PRODUCTS: If involved in a fire, the components of this gas mixture will generate carbon monoxide, carbon dioxide, water, oxides of nitrogen.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This gas mixture is incompatible with strong oxidizers (i.e., chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride), strong acids, alkali metals, reactive metals, and strong reducing materials. Due to the very small concentration levels of components other than nitrogen, the incompatibilities of individual components is not expected to be significant. Nitrogen is incompatible with lithium, magnesium neodymium, ozone and titanium.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials, heat, spark or flame. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The main component, Nitrogen is a simple asphyxiant (SA), which acts to displace oxygen in the environment. No toxicity data are applicable. Due to the very small percentage of all other components of this gas mixture (0.00001% [1 ppm]), no toxicity data for those components is given. Most of the components of this gas mixture have produced central nervous system effects in humans or animals at levels higher than are present in this gas mixture. The Toluene, m-Xylene, o-Xylene and p-Xylene components has been found to produce some level of liver, kidney and/or spleen toxicity in animal tests on upon chronic, long term human exposure. Chronic exposure to the Benzene, component has caused adverse blood effects in either animals or humans.

SUSPECTED CANCER AGENT: The components of this gas mixture are listed by agencies tracking carcinogenic potential as follows:

Benzene: EPA-A (Human Carcinogen), IARC-1 (Carcinogenic to Humans), MAK-1 (Substances the Cause Cancer in Man and Which Can Be Assumed to Make a Significant Contribution to Cancer Risk), NIOSH-Ca (Potential Occupational Carcinogen with No Further Categorization), NTP-K (Known to Be a Human Carcinogen), OSHA-Ca (Carcinogen Defined with no Further Categorization), TLV-A1 (Confirmed Human Carcinogen)

Ethyl Benzene: EPA-D (Not Classifiable as to Human Carcinogenicity); IARC-2B (Possibly Carcinogenic to Humans); MAK-3A (Substances for Which the Criteria for Classification in Category 4 or 5 are Fulfilled, but for Which the Database is Insufficient for the Establishment of a MAK Value); NIOSH-Ca (Potential Occupational Carcinogen with No Further Categorization); TLV-A3 (Confirmed Animal Carcinogen)

Toluene: EPA-D (Not Classifiable as to Human Carcinogenicity), IARC-3 (Unclassifiable as to Carcinogenicity in Humans), TLV-A4 (Not Classifiable as a Human Carcinogen- agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of lack of data)

m-Xylene, o-Xylene, p-Xylene: EPA-D (Not Classifiable as to Human Carcinogenicity), IARC-3 (Unclassifiable as to Carcinogenicity in Humans), TLV-A4 (Not Classifiable as a Human Carcinogen- agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of lack of data)

The remaining components are not found on the following lists: FEDERAL OSHA Z LIST, IARC, NTP, CAL/OSHA, and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Prolonged exposure to this gas mixture may be irritating to the skin and eyes.

SENSITIZATION TO THE PRODUCT: The components of this product are not known to be human skin or respiratory sensitizers.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of the components of this gas mixture on the human reproductive system.

Mutagenicity: This gas mixture is not expected to cause mutagenic effects in humans. Animal mutagenic data are available for the Ethyl Benzene component of this gas mixture; these data were obtained during clinical studies on specific animal tissues exposed to relatively high doses of these compounds.

Embryotoxicity: This gas mixture is not expected to cause embryotoxic effects in humans. Clinical studies involving test animals exposed to high concentrations of the Ethyl Benzene, m-Xylene, o-Xylene, p-Xylene indicate embryotoxic effects (e.g., skeletal malformations, stillbirths). These data were obtained during clinical studies on specific animal tissues exposed to relatively high doses of this gas.

Teratogenicity: This gas mixture is not expected to cause teratogenic effects in humans. Clinical studies involving test animals exposed to high concentrations of the Ethyl Benzene, m-Xylene, o-Xylene, p-Xylene indicate teratogenic effects (e.g., skeletal malformations, stillbirths). These data were obtained during clinical studies on specific animal tissues exposed to relatively high doses of these compounds.

Reproductive Toxicity: Studies involving test animals exposed to high concentrations of Ethyl Benzene, m-Xylene, o-Xylene, p-Xylene, show effects (e.g. changes in testes, spermatogenesis, maternal effects).

11. TOXICOLOGICAL INFORMATION (Continued)

BIOLOGICAL EXPOSURE INDICES (BEIs): There are Biological Exposure Indices (BEIs) determined for components of this gas mixture, as follows.

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
BENZENE • S-Phenylmercapturic Acid in Urine • t,t-Muconic Acid in Urine	 • End of shift • End of shift	 • 25 μg/g creatinine • 500 μg/g creatinine
ETHYL BENZENE • Mandelic Acid in Urine • Ethyl Benzene in End-Exhaled Air	• End of shift at end of Workweek	• 1.5 g/g creatinine
TOLUENE • o-Creosol in Urine • Hippuric Acid in Urine • Toluene in Blood	 • End of Shift • End of Shift • Prior to Last Shift of Workweek	 • 0.5 mg/L • 1.6 g/g creatinine • 0.05 mg/L
XYLENES (m-, o-, p-) • Methylhippuric Acids in Urine	• End of Shift	• 1.5 g/g creatinine

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas mixture will be dissipated rapidly in well-ventilated areas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen deficient environments.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No an adverse effect from this gas mixture on aquatic life is expected.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations and regulations of Canada and its provinces. Return cylinders with any residual product to Matheson Tri-Gas. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS GAS MIXTURE IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Compressed gases, n.o.s.
(Nitrogen, mixture of volatile organics)

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not applicable.

D.O.T HAZARD LABEL: Non-Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): 126

MARINE POLLUTANT: The Carbon Tetrachloride, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Hexachlorobutadiene, Styrene, 1,1,2,2-Tetrachloroethane, Tetrachloroethylene, Tetrachloroethane, Trichlorobenzenes, 1,2,4-Trimethylbenzene, and 1,3,5-Trimethylbenzene components of this gas mixture are classified by the DOT as a Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles present serious safety hazards and should be discouraged.

NOTE: Shipment of compressed gas cylinders which have not been filled with the owner's consent is a violation of Federal law (49 CFR, Part 173.301 (b).

14. TRANSPORTATION INFORMATION (Continued)

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas mixture is considered as dangerous goods, per regulations of Transport Canada.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (Nitrogen, mixture of volatile organics)
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1956
PACKING GROUP: Not Applicable
HAZARD LABEL: Class 2.2 (Non-Flammable Gas)
SPECIAL PROVISIONS: None
EXPLOSIVE LIMIT AND LIMITED QUANTITY INDEX: 0.12
ERAP INDEX: 3000
PASSENGER CARRYING SHIP INDEX: Forbidden
PASSENGER CARRYING ROAD VEHICLE OR PASSENGER CARRYING RAILWAY VEHICLE INDEX: Forbidden
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): 126

NOTE: Shipment of compressed gas cylinders via Public Passenger Road Vehicle is a violation of Canadian law (Transport Canada Transportation of Dangerous Goods Act, 1992).

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Benzene	No	No	Yes
Ethylbenzene	No	No	Yes
Toluene	No	No	Yes
m-Xylene	No	No	Yes
o-Xylene	No	No	Yes
p-Xylene	No	No	Yes

U.S. SARA THRESHOLD PLANNING QUANTITY per 40 CFR 370.20: There are no specific Threshold Planning Quantities for the components of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. SARA HAZARD CATEGORIES (SECTION 311/312, 40 CFR 370-21): ACUTE: Yes; CHRONIC: Yes; FIRE: No; REACTIVE: No; SUDDEN RELEASE: Yes

U.S. TSCA INVENTORY STATUS: Components of this product are listed on the TSCA Inventory.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Benzene = 10 lb (0.454 kg), Ethylbenzene = 1000 lb (454 kg), Toluene = 1000 lb (454 kg), m-Xylene, o-Xylene = 1000 lb (454 kg), p-Xylene 100 lb (45.4 kg).

OTHER U.S. FEDERAL REGULATIONS: Due to the presence of Benzene, requirements of 29 CFR 1910.1028 and 29 CFR 1910.19(1) should be consulted when handling this gas mixture. In addition, due to the presence of Vinyl Chloride, the requirements of 29 CFR 1910.1017 should be consulted when handling this gas mixture.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL U.S. REGULATIONS (continued):

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The Benzene and Toluene components of this gas mixture are on the California Proposition Lists as compounds that cause reproductive toxicity and cancer. WARNING! This product contains compound known to the State of California to cause cancer or reproductive harm.

LABELING: Cylinders of this gas mixture should be labeled for precautionary information per the guidelines of the CGA. Refer to the CGA for further information.

ADDITIONAL CANADIAN REGULATIONS:

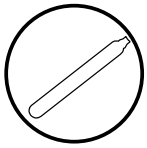
CANADIAN DSL/NDSL INVENTORY STATUS: The components of this product are listed on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this product are not on the CEPA Priorities Substances Lists.

ADDITIONAL CANADIAN. REGULATIONS:

CANADIAN CLASSICIATION and WHMIS SYMBOLS: This gas mixture would be categorized as a Controlled Product, Hazard Class: **A** (Compressed Gas), and **D2B** (Materials Causing Other Toxic Effects - Chronic Toxic Effects). The following symbol is required for WHMIS compliance for this gas mixture.



16. OTHER INFORMATION

CREATION DATE: March 14 **REVISION DATE:** New

REVISION HISTORY: Up-date of manufacturer address and phone.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you use the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

"Safe Handling of Compressed Gases in Containers" (P-1, 1999)

"Safe Handling and Storage of Compressed Gases" (AV-1, 1999)

"Handbook of Compressed Gases" (1992)

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
800/441-3365

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

DFG MAK Pregnancy Risk Group Classification: Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. **Group B:** Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed.

EXPOSURE LIMITS IN AIR (continued):

DFG MAK Pregnancy Risk Group Classification (continued): Group C: There is no reason to fear a risk of damage to the developing embryo or fetus when MAK and BAT values are observed. **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, they are not sufficient for final evaluation.

LOQ: Limit of Quantitation.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

EXPOSURE LIMITS IN AIR (continued):

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH's Recommended Exposure Limits.

PEL-Permissible Exposure Limit: OSHA's Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL that was vacated by Court Order.

SKIN: Used when a there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

IDLH-Immediately Dangerous to Life and Health: This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:

0 (Minimal Hazard: No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation*: Essentially non-irritating. PII or Draize = "0". *Eye Irritation*: Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = "0". *Oral Toxicity LD_{50} Rat*: < 5000 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC_{50} Rat*: < 20 mg/L.); **1** (Slight Hazard: Minor reversible Injury may occur; slightly or mildly irritating. *Skin Irritation*: Slightly or mildly irritating. *Eye Irritation*: Slightly or mildly irritating. *Oral Toxicity LD_{50} Rat*: > 500-5000 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 1000-2000 mg/kg. *Inhalation Toxicity LC_{50}* 4-hrs *Rat*: > 2-20 mg/L); **2** (Moderate Hazard: Temporary or transitory injury may occur. *Skin Irritation*: Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation*: Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD_{50} Rat*: > 50-500 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 200-1000 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.5-2 mg/L.); **2** (Moderate Hazard: Temporary or transitory injury may occur. *Skin Irritation*: Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation*: Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD_{50} Rat*: > 50-500 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 200-1000 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.5-2 mg/L.); **3** (Serious Hazard: Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation*: Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation*: Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD_{50} Rat*: > 1-50 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 20-200 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.05-0.5 mg/L.);

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

HEALTH HAZARD (continued):

4 (Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation*: Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation*: Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD_{50} Rat*: ≤ 1 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: ≤ 20 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: ≤ 0.05 mg/L).

FLAMMABILITY HAZARD:

0 (Minimal Hazard-Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.); **1** (Slight Hazard-Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, Including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class IIIB, or; Most ordinary combustible materials [e.g. wood, paper, etc.]; **2** (Moderate Hazard-Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air, Including: Liquids having a flash-point at or above 37.8°C [100°F]. Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors.); **3** (Serious Hazard- Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]); **4** (Severe Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric]).

PHYSICAL HAZARD:

0 (*Water Reactivity*: Materials that do not react with water. *Organic Peroxides*: Materials that are normally stable, even under fire conditions and will not react with water. *Explosives*: Substances that are Non-Explosive. Unstable *Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No "0" rating allowed. *Unstable Reactives*: Substances that will not polymerize, decompose, condense or self-react.); **1** (*Water Reactivity*: Materials that change or decompose upon exposure to moisture. *Organic Peroxides*: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives*: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases*: Pressure below OSHA definition. *Pyrophorics*: No Rating.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

1 (continued): *Oxidizers*: Packaging Group III; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives*: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.); **2** (*Water Reactivity*: Materials that may react violently with water. *Organic Peroxides*: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives*: Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases*: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group II Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Unstable Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3** (*Water Reactivity*: Materials that may form explosive reactions with water. *Organic Peroxides*: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives*: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases*: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group I Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3.:2 potassium bromate/cellulose mixture. Liquids: Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.); **4** (*Water Reactivity*: Materials that react explosively with water without requiring heat or confinement. *Organic Peroxides*: Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. *Explosives*: Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. *Compressed Gases*: No Rating. *Pyrophorics*: Add to the definition of Flammability "4".

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury);

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

HEALTH HAZARD (continued): **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury).

FLAMMABILITY HAZARD: **0** Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air. **3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions. **4** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily.

INSTABILITY HAZARD: **0** Materials that in themselves are normally stable, even under fire conditions. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures. **3** Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures.

FLAMMABILITY LIMITS IN AIR: Much of the information related to fire and explosion is derived from the **N**ational **F**ire **P**rotection **A**ssociation (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information: BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

DEFINITIONS OF TERMS (Continued)

ECOLOGICAL INFORMATION:

BCF = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter; **EC** is the Effect Concentration in water; **EC_{50}** is the Effect Concentration for 50% of the organisms exposed; **NOEC** is the No Observed Effect Concentration; MATC is the Maximum Acceptable Toxicant Concentration; **NOLC** is the No Observed Lethal Concentration; **TL_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

ACGIH: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act **(SARA)**; the Canadian Domestic/Non-Domestic Substances List **(DSL/NDSL)**; the U.S. Toxic Substance Control Act **(TSCA)**; Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act **(CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration.

Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

1000 PPM BARIUM

Section 1 - Product and Company Identification
1000 PPM BARIUM

Product Identification: 1000 PPM BARIUM
Date of MSDS: 03/05/1992 **Technical Review Date:** 11/22/1994
FSC: 6550 **NIIN: LIIN:** 00F037416
Submitter: F BT
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Post Office Box: N/K
Manufacturer's Address1: 5540 MARSHALL ST
Manufacturer's Address2: ARVADA, CO 80002-3108
Manufacturer's Country: US
General Information Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
MSDS Preparer's Name: DANIEL A GOLDSTEIN
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 1R664
Special Project Code: N

Preparer Information

Preparer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Preparer's Address1: 5540 MARSHALL STREET
Preparer's Address2: ARVADA, CO 80002
Preparer's CAGE: 1R664
Assigned Individual: N

Contractor Information

Contractor's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Contractor's Address1: 5540 MARSHALL STREET
Contractor's Address2: ARVADA, CO 80002
Contractor's Telephone: 303-431-8454
Contractor's CAGE: 1R664

Section 2 - Compositon/Information on Ingredients
1000 PPM BARIUM

Ingredient Name: BARIUM NITRATE
Ingredient CAS Number: 10022-31-8 **Ingredient CAS Code:** M
RTECS Number: CQ9625000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <1
% Enviromental Weight:

Other REC Limits: N/K
OSHA PEL: 0.5 MG/CUM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.5 MG/CUM **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: NITRIC ACID, HYDROGEN NITRATE
Ingredient CAS Number: 7697-37-2 **Ingredient CAS Code:** M
RTECS Number: QU5775000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <5
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 2 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5.2 MG/CUM **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
1000 PPM BARIUM

Health Hazards Acute & Chronic: POISON & CORROSIVE TO SKIN, EYES, MUCUS MEMBRANES/LUNGS. MAY BURN ANY TISSUE & CAUSE BLINDNESS. MAY CAUSE GI TRACT PERFORATION, PULMONARY EDEMA, DEATH. BARIUM NITRATE MAY CAUSE CARDIOVASCULAR COLLAPSE & DEATH.

Signs & Symptoms of Overexposure:
IRRITATION, BURNING, REDNESS, COUGH, SHORTNESS OF BREATH, PAIN, VOMITING, DIARRHEA, SALIVATION, DILATED PUPILS, IRREGULAR HEARTBEAT, METHEMOGLOBINEMIA. BARIUM NITRATE: SEVERE VOMITING/DIARRHEA & ELECT ROLYTE DISTURBANCES.

Medical Conditions Aggravated by Exposure:
ASTHMA.

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures
1000 PPM BARIUM

First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: GIVE MOIST OXYGEN. INGESTION: GIVE WATER/MILK. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures
1000 PPM BARIUM

Fire Fighting Procedures:
NONE
Unusual Fire or Explosion Hazard:
NONE
Extinguishing Media:
NONE
Flash Point: Flash Point Text: N/K

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/K
Upper Limit(s): N/K

Section 6 - Accidental Release Measures
1000 PPM BARIUM

Spill Release Procedures:
NEUTRALIZE & FLUSH W/WATER/NETURALIZE & ABSORB. VENTILATE AREA.

Section 7 - Handling and Storage
1000 PPM BARIUM

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
1000 PPM BARIUM

Repiratory Protection:
WEAR ACID GAS TYPE DUST/MIST RESPIRATOR IF MIST PRODUCTION OCCURS.
Ventilation:
MECHANICAL/LOCAL EXHAUST: USE IN HOOD.
Protective Gloves:
ACID PROOF
Eye Protection: SPLASH GOGGLES
Other Protective Equipment: ACID PROOF APRON W/SLEEVES, LAB COAT, CLOSED SHOES, SAFETY SHOWER, EYE WASH.
Work Hygenic Practices: N/K
Supplemental Health & Safety Information: BOILING POINT (0-5% ACID): 212-212.72F.

Section 9 - Physical & Chemical Properties
1000 PPM BARIUM

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: (SEE SUPP)
Melting/Freezing Point: Melting/Freezing Text: N/K
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: 28 **Vapor Density:** >1
Percent Volatile Organic Content:
Specific Gravity: 1
Volatile Organic Content Pounds per Gallon:
pH: <1
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: (WATER =1): 1
Solubility in Water: COMPLETE
Appearance and Odor: CLEAR LIQUID W/NO ODOR
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
1000 PPM BARIUM

Stability Indicator: YES
Materials to Avoid:
METALS
Stability Condition to Avoid:
FREEZING
Hazardous Decomposition Products:
HYDROGEN
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NONE

Section 11 - Toxicological Information
1000 PPM BARIUM

Toxicological Information:
N/P

Section 12 - Ecological Information
1000 PPM BARIUM

Ecological Information:
N/P

Section 13 - Disposal Considerations
1000 PPM BARIUM

Waste Disposal Methods:
DISPOSE OF AS NON-HAZARDOUS WASTE IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
1000 PPM BARIUM

Transport Information:
N/P

Section 15 - Regulatory Information
1000 PPM BARIUM

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
1000 PPM BARIUM

Other Information:
N/P

HAZCOM Label Information

Product Identification: 1000 PPM BARIUM
CAGE: 1R664
Assigned Individual: N
Company Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Company PO Box:
Company Street Address1: 5540 MARSHALL STREET
Company Street Address2: ARVADA, CO 80002 US
Health Emergency Telephone: 303-431-8454
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C

Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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ATTACHMENT D
Standard Safe Work Practices

1) Eating, drinking, chewing tobacco, smoking and carrying matches or lighters is prohibited in a contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.

2) Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., ground, etc.).

3) All field crew members should make use of their senses to alert them to potentially dangerous situations in which they should not become involved; i.e., presence of strong and irritating or nauseating odors.

4) Prevent, to the extent possible, spills. In the event that a spillage occurs, contain liquid if possible.

5) Field crew members shall be familiar with the physical characteristics of investigations, including:

- Communication
- Hot zone (areas of known or suspected contamination)
- Site access
- Nearest water sources

6) All wastes generated during activities on-site should be disposed of as directed by the project manager or his on-site representative.

7) Employees shall follow procedures to avoid at-risk behaviors that could result in an incident.