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HAZARDOUS MATERIALS HEALTH AND SAFETY PLAN
for the
EXCAVATION OF SOIL AND HAZARDOUS MATERIALS
SEPARATION OF COMBINED SEWER OVERFLOW
W.R.GRACE & CO. - CONN
62 WHITTEMORE AVENUE
CAMBRIDGE, MASSACHUSETTS

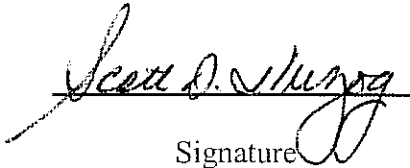
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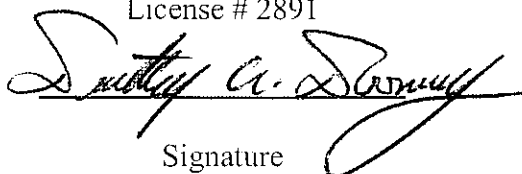
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Signature

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Covino Project Number 10.01508

March 7, 2011

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SECTION 1 - INTRODUCTION

1.1 Introduction

The purpose of this site-specific Hazardous Materials Health and Safety Plan (HMH&SP) is to establish in detail the procedures and protocols necessary for protecting site workers, on-site personnel, visitors and the general public from hazards associated with site activities during the excavation of soils and hazardous materials and site preparation for separation of an existing combined storm water/sanitary sewer manhole. The project is being performed as a part of CAM 400 Sewer Separation/Alewife Floatables Control Project, a larger upgrade of the entire sewer system that serves the Alewife area, to reduce the potential for sewer backup during periods of heavy rain, and discharge of combined sewer overflows (CSO) to the Alewife Brook. The site of this phase of the project is behind Building 23 of W.R. Grace & Co - Conn, located at 62 Whittemore Avenue, Cambridge, Massachusetts. The project lines for the overall CAM 400 project are bounded by Whittemore Avenue to the south, to the west and north by Alewife Parkway (MA Route 3A) and to the east by Magoun Street. The excavation portion of the project will be performed behind Building 23. The project lines for the excavation are bounded by W.R. Grace & Co. - Conn buildings on the north, east and south sides and a paved roadway and parking for Alewife Center on the west side. The location of Building 23 is shown on the MassGIS Color Orthophotomap in the appendices.

The General Contractor for the project is P. Gioioso & Sons. Environmental Management Professionals is the construction manager for the project. The Licensed Site Professional (LSP) for the Contractor is Tim Toomey of Subsurface Remediation Technologies, Rowley, MA. The LSP for the City of Cambridge is Richard K. Quateman of Kleinfelder ▪ S E A, Cambridge, MA. The LSPs will be responsible for protecting public health, safety and the environment by ensuring that the Contractor's work complies with the requirements of the Site Response Action Outcome (RAO) and Activity and Use Limitation. The LSPs will also be required to report releases of oil or hazardous materials (OHM), or other unanticipated conditions encountered during the work. The LSPs will also assist in managing surplus materials that require off-site transport and disposal.

The project entails excavation to install one drain manhole, replace an existing combined sewer manhole, and install approximately 40' of new sewer and drain line segments. The process also includes the installation of a CIPP sewer invert liner for a section of the line going out to the manhole. The excavation portion of this project is located within an existing 15-foot wide easement that is owned by the City of Cambridge on W.R. Grace & Co. - Conn property. The soil intrusive work will take place within the boundaries of the easement, although staging, storage and site access will require that activities be performed –outside of the easement. The existing site is a partially paved portion of the property directly behind Building 23. Emergency access to the site will be through the roadway behind Building 23.

The site activities covered under this HMM&SP include site mobilization/demobilization, excavation of asphalt, excavation of soil, digging one sewer manhole, replacing a second sewer manhole, installation of a sewer invert, on-site stockpiling, and soil testing and disposal.

The work is performed in accordance with the requirements of the Activity and Use Limitation (AUL), the requirements of the Massachusetts Contingency Plan (MCP) and the City of Cambridge Asbestos Ordinance. The plan will be submitted for review under the W.R. Grace & Co. - Conn Public Involvement Plan (PIP). The work is performed under Massachusetts DEP Release Tracking Numbers 3-0000277, 3-0017014 and 3-26100. The project is located at 62 Whittemore Avenue, Cambridge, Massachusetts. See Figure 1.

The designated areas of the project have been identified as W.R. Grace & Co. - Conn Sites #1 and #2 as shown on Figures 2 and 3. At W.R. Grace & Co. - Conn Site # 1, the work includes the CIPP (invert) lining of the existing 18 inch x 26 inch drain pipe for a distance of approximately 150 linear feet. The CIPP work does not require any excavation; however, there is also a common manhole removal, which includes excavation to install a new drain manhole and 40 linear feet of 24-inch PVC drain pipe and a 12-inch drain connection to existing Grace lines. At W.R. Grace & Co. - Conn Site # 2, there is an existing combined sewer/drain vault and sewer/drain separation will be performed by making modifications inside the existing vault. As part of this task the

concrete bottom of the vault will be saw-cut to create a 2.5' long by 2' wide trench. This will be hand excavated to approximately 20-inches deep to allow for installation of a short section of new piping. The trench will be filled with concrete after pipe installation. Access to the vault will be through the existing top slab and following the flow modifications, a new cast-in-place wall and top slab with new manhole covers will be constructed.

All work on Site 1 and the trench excavation within the vault in Site 2 will be completed as a Release Abatement Measure (RAM) in accordance with the Massachusetts Contingency Plan (MCP) and must also meet the requirements of the City of Cambridge Asbestos Protection Ordinance and the Activity and Use Limitations (AUL) which have been recorded on the property (RTN 3-0277). All soil excavation activities, including placement of stone and pipe, will therefore be performed within a tented, vented enclosure maintained under a pressure differential. The dimensions of the enclosure for Site 1 are approximately 40 feet wide by 20 feet high by 50 feet in length. The Contractor anticipates that no more than 10 to 12 linear feet of the excavation will be open at any one time. The excavation will be covered as the work progresses through the length of the enclosure. For Site 2, a tented, vented enclosure maintained under a pressure differential will be installed within or over the vault (the dimensions of which are 15.5' x 7') for the period the trench is being dug and until it is filled with concrete. Site activities for other portions of the project do not involve soil excavation and are not subject to City of Cambridge Asbestos Protection Ordinance or the AUL for the property.

The site activities covered under this HMM&SP include site mobilization/demobilization, excavation of asphalt, excavation of soil, digging one sewer manhole, replacing a second sewer manhole, installation of new sewer and drain lines, installation of the 2.5' pipe section within an existing sewer/drain vault, on-site stockpiling, soil testing, and disposal of soil.

There has been extensive site history and site characterization data on the W.R. Grace & Co. - Conn site as well as adjacent sites presented and used in the preparation of this HMM&SP. A review of environmental issues associates with the CAM 400 site was prepared by SEA

Consultants, dated October 20, 2009 on behalf of the City of Cambridge. Under RTN 3-0277, a Class A-3 Response Action Outcome (RAO) was filed by W.R. Grace on March 13, 2006 to address a release of VOC's and oil and asbestos fibers in soil. Since VOC, oil, and asbestos fibers in soil may be encountered during the work the following requirements govern the work being performed:

Cambridge Asbestos Protection Ordinance requires dust mitigation measures, an asbestos soil management plan and a contingency plan based on dust and asbestos air sampling measurements. The plan is made available for public review and comment for 20 days.

Activity and Use Limitation requires:

- 1) Soil Management Plan prepared by a LSP to cover excavation, handling, storage, transport, disposal, engineering controls and air monitoring for asbestos fibers in soil and VOCs, for work activities that are likely to disturb the soil below the Protective Cover.
- 2) Health & Safety Plan prepared by LSP and a Certified Industrial Hygienist (CIH) for activities that are likely to remove or disturb the Protective Cover and/or disturb the soil below the Protective Cover, and to control future exposures to groundwater as applicable.
- 3) Airborne Asbestos Dust and Odor Management plan prepared by CIH and LSP and includes:
 - a. methods to prevent liberation of asbestos fibers and dust and to prevent any potential odors from creating a nuisance condition;
 - b. utilize wetting and handling techniques to minimize dust generation;
 - c. use excavation techniques and odor suppressants to mitigate odors; and
 - d. monitoring for dust, asbestos fibers, and odors in the air with provisions to stop work if levels exceed applicable standards/limits.
- 4) The above mentioned plans are to be submitted for public review in accordance with the W.R. Grace & Co. - Conn Public Involvement Plan (PIP) which has a public review period of 30 days.

This Site-Specific Hazardous Materials Health and Safety Plan has been prepared in accordance with the OSHA Hazardous Waste and Emergency Response (HAZWOPER) rule as well as City of Cambridge Project Specifications Section 02082 and City of Cambridge Asbestos Protection Ordinance Chapter 8.61, the AUL recorded for the property, and state and federal regulations on handling of oils and hazardous materials. This version of the HMH&SP is submitted for review as a public comment review draft as required by AUL following the Public Involvement Plan (PIP) for the W.R. Grace site. This HMH&SP addresses all required air monitoring for intrusive activities required by the AUL and CAO. The Soil Management Plan required by the AUL and CAO is also being provided for public comment under separate cover.

Site characterization has been performed on W.R. Grace & Co.- Conn property. Based on the overall property assessment which is summarized in the appendices to the AUL, it is anticipated that the potential exists to encounter asbestos fibers as well as oils and hazardous materials (OHM) typical of developed industrial sites. Previously, a test boring program had been performed under the direction of SEA on rights-of-way of public roadways that were in proximity to the W.R. Grace & Co. - Conn site. Eight borings were advanced. Although the data was not from the W.R. Grace & Co - Conn site, Covino reviewed the results to obtain general background information as a part of the development of this HMH&SP, as the data could be predictive of conditions on the W.R. Grace & Co.- Conn site and is used for reference purposes only. The advancement of the borings was used to determine the extent of fill and the presence of potentially contaminated soils in the work area. SEA reported the presence of metals, semi-volatile organic compounds and petroleum hydrocarbons, but only SVOC's were present at concentrations above RCS-1 limits.

P. Gioioso & Sons is the General Contractor for the project and will hire all of the contractors and subcontractors directly for performance of the work. Each subcontractor and their employees involved with soil intrusive activities is responsible for complying with OSHA regulations and shall provide their own HMH&SP consistent with the plan. It does not address issues associated with general construction safety except to the extent that site workers may be exposed to soil and

groundwater in the course of their work. The scope is limited to the potential for exposure to asbestos fibers as well as oils and hazardous materials as specified in 29 CFR 1910.120 and 29 CFR 1926.65 (Hazardous Waste Operations and Emergency Response). The HMH&SP shall be implemented during all site activities.

1.2 Statement of Safety and Health Policy

This HMH&SP is intended to provide site-specific procedures to address known hazardous conditions and potentially hazardous conditions that may be encountered at the site. Site activities in conjunction with this project may pose unique safety, chemical, and/or physical hazards that require specialized expertise to address. The Emergency Response section of the HMH&SP addresses hazards that have not been identified or anticipated.

This HMH&SP addresses topics required by OSHA 29 CFR 1910.120(b)(4) and 1926.65(b)(4).

The objectives of this document include but are not limited to:

- Statement of Safety and Health Policy
- Site Description and Contamination Characterization
- Safety and Health Risk Analysis and Activity Hazard Analysis
- Regulations
- Staff Organization/Administration
- Hazard Communication Training
- Medical Surveillance
- Exposure Monitoring
- Health and Safety Equipment
- Standard Operating Procedures
- Identification and evaluation of potential and unanticipated hazards
- Definition of levels of protection required for certain work activities
- Establishment of work zones
- Formation of emergency action plans
- Development of personnel training
- Development of decontamination procedures (personal and equipment)
- Heat and Cold Stress
- Emergency Equipment and First Aid Requirements
- Spills Enclosure Program
- Logs, Reports and Recordkeeping

- Inspections and Audits
- Permit Required Confined Space Entry Program

P. Gioioso & Sons views the HMMH&SP as an important document that is necessary to the success of the site work. Every effort has been made to insure that the HMMH&SP will be in compliance with the requirements of the AUL, the City of Cambridge Asbestos Ordinance and applicable federal, state and local regulations and is consistent with the requirements of the specifications.

The purpose and intent of the HMMH&SP is to protect workers from exposure to oils and hazardous materials and to ensure that the site work is conducted in a safe manner. The on-going program will be directed at recognizing and dealing with the specific hazards at the site as needed to protect employees.

Along with site personnel safety, a second major objective is to perform site operations in such a manner as to minimize the possibility of fire, explosion, or any unplanned or sudden release of hazardous waste contaminants into the environment that could adversely affect local receptors. The HMMH&SP has been developed to meet these essential objectives and ensure the safe execution of this project.

The HMMH&SP is a dynamic document and will be constantly reviewed and modified throughout the duration of the project at the site work, to ensure flexibility and adaptability as changes occur and new situations develop. These changes will be reviewed and/or accepted by the Project Manager and the Certified Industrial Hygienist from Covino Environmental Associates (Covino). Any changes to the plan may necessitate additional training.

Standard Operating Procedures (SOPs) may be attached to this HMMH&SP for preventing accidents and protecting personnel from occupational illness for all operations having significant accident potential. These procedures are required to be read and observed by all workers, on-site personnel and visitors to the site. These SOPs are generic in nature and may be modified to fit the

specific needs of this project. They are included for general reference only and are not a specific requirement of this HMH&SP.

Maintaining effective communication is important to assuring the safe completion of the project. P. Gioioso & Sons will notify the City of Cambridge and if appropriate, W.R. Grace & Co.-Conn orally and in writing as quickly as possible should any unforeseen safety hazard or condition becomes evident during the performance of the work.

1.3 Applicable Regulatory Requirements

The site specific HMH&SP shall be consistent with the requirements of:

1. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) including amendments as stated in Federal Register March 6, 1989: 9294-9336 (Final Rule, 29.CFR 1910.120 "Hazardous Waste Operations and Emergency Response").
2. United States Environmental Protection Agency (EPA) Standard Operating Safety Guidelines, Office of Emergency and Remedial Response, Hazardous Response Support Division. Revised November 1984.
3. National Institute of Occupational Safety and Health NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance (OSHG) Manual for Hazardous Site Activities, October 1985, Department of Health and Human Services (DHHS), NIOSH Publ. No. 85-115.
4. Massachusetts Department of Environmental Protection Laws, Regulations and Policies:
 - a) WSC-94-400 "Interim Remediation Waste Management Policy for Petroleum Contaminated Soils"
 - b) WSC 00-425 "Construction Activities in Contaminated Areas"
 - c) BWP 94-037 "Reuse and Disposal of Contaminated Soils at Landfills"
 - d) COMM-97-001 "Reuse and Disposal of Contaminated Soil at Massachusetts Landfills"
 - e) WSC-130-91 "Short Term Measures Policy"
 - f) WSC-401-91 "Policy for Investigation, Assessment, and Remediation of Petroleum Releases"
 - g) WSC-89-004 "Minimum Standards for Analytical Data for Remedial Response Actions Under MGL 21(e)"

- h) 310 CMR 30.00 - The Commonwealth of Massachusetts Hazardous Waste Regulations.
 - i) 310 CMR 40.00 - The Commonwealth of Massachusetts Contingency Plan
 - j) 310 CMR 7.15 – Air Quality (Asbestos)
 - k) 453 CMR 6.00 – Training and Certification
5. 454 CMR Commonwealth of Massachusetts Construction Industry Rules and Regulations.
6. OSHA Construction Asbestos Standard 29 CFR 1926.1101
7. Other federal regulations, codified in the Code of Federal Regulations, and consensus standards developed by ANSI and ACGIH are referenced in the HMM&SP. These include:
- a) ACGIH: (2009) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
 - b) ANSI Z358.1 (1990) Emergency Eyewash and Shower Equipment
 - c) 29 CFR 1904: Recording and Reporting Occupational Safety and Health Injuries and Illnesses.
 - d) 29 CFR 1910: General Industry Standards
 - e) 29 CFR 1926: Construction Industry Standards
 - f) 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response
 - g) 40 CFR 260-270 EPA Hazardous Waste Regulations
 - h) 49 CFR 172 Department of Transportation Hazardous Materials Tables, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.(For transporters of hazardous waste).
8. City of Cambridge Asbestos Regulations – Chapter 8.61
9. Activity and Use Limitation MGL c21E, 310 CMR 40.0000 for the W.R. Grace & Co. - Conn property

1.4 Definitions

The following definitions shall be used throughout this Hazardous Materials Health and Safety Plan.

1. On-site Personnel - Personnel employed by P. Gioioso & Sons, any subcontractor hired by P. Gioioso & Sons, and any employee of the Owner, Owner's representative, state or local regulatory authorities.
2. Contractor/Subcontractor Personnel - Any employees hired by a contractor or subcontractor for this project. The contractor or subcontractors involved with soil intrusive activities shall develop their own HMH&SP specific for the site activities they will be performing.
3. Owner – City of Cambridge Department of Public Works
4. Property Owner - W.R. Grace & Co. - Conn
5. Visitor - Anyone other than On-site Personnel.
6. Site Safety and Health Officer (SSHO)- The designated “competent person” responsible for overseeing site safety activities for P. Gioioso & Sons or their personnel. P. Gioioso & Sons or their designee will provide an SSHO to implement this plan. The SSHO will be on site during all work performed within the enclosure.
7. Site - For the purpose of the HMH&SP, the site shall be all the area within the project limits as defined by the Site Plan.
8. Monitoring - The use of direct or indirect reading field instrumentation to provide information regarding the levels of gases and vapors or other airborne contaminants which are or may be released during site activities. Monitoring is conducted to evaluate employee exposures to toxic materials as well as off-site migration of airborne contaminants. Perimeter air monitoring will be performed within 50 feet of the enclosure. Refer to Section 6 of the HMH&SP.
9. Physician - A licensed Physician with experience in the practice of occupational medicine.
10. Certified Industrial Hygienist - A person certified by the American Board of Industrial Hygiene (ABIH). The CIH will be Mr. Scott D. Herzog of Covino Environmental Associates.
11. Licensed Hazardous Waste Site Cleanup Professional (LSP) - A Licensed Site Professional is an individual licensed by the Commonwealth of Massachusetts, Department of Environmental Protection (DEP) to provide environmental direction

regarding hazardous materials on listed sites. The LSP designation is given to individuals based on their experience and qualifications in the environmental field. The LSP for the Contractor is Tim Toomey of Subsurface Remediation Technologies, Rowley, MA. The LSP representing the City of Cambridge is Richard K. Quateman of Kleinfelder ▪ S E A , Cambridge, MA.

1.5 Minimum Requirements

This HMH&SP shall include the following subjects:

- a. Site Description and Evaluation
- b. Names of key personnel for site safety and health
- c. Health and Safety Assessment and Risk Analysis for each site task
- d. Training & Education
- e. Personal Protective Equipment
- f. Medical Surveillance
- g. Air Monitoring
- h. SOP's, Engineering Controls
- i. Site Control Measures
- j. Personnel Hygiene and Decontamination
- k. Logs, Reports, and Housekeeping
- l. Emergency Equipment and First Aid
- m. Emergency Response Plan
- n. Heat/Cold Stress Monitoring
- o. Vapor Control
- p. Fire/Explosion
- q. Temporary Facilities
- r. Site Control
- s. Action Levels and Responses

SECTION 2 - ORGANIZATION AND SAFETY RESPONSIBILITY

2.1 Introduction

Implementation of the comprehensive safety and health program is a key management responsibility. The HMH&SP will include a listing of health/safety personnel, and a description of their specific responsibilities for implementation of the program. Clear lines of authority, consistent with good operating policies and procedures, have been established for enforcing safety compliance. The qualifications of the site safety and health personnel are included in the appendices.

2.2 Line Management/Chain-of-Command

P. Gioioso & Sons will serve as the General Contractor for this phase of the project.

Mr. Mario Romania of P. Gioioso & Sons will be the Project Manager. The Project Manager has overall accountability for contractual issues on this project, for the selection of subcontractors and for scheduling and timetable for work. The Project Manager also has overall accountability for implementation of the HMH&SP by P. Gioioso and subcontractor employees.

Mr. Sam Doolan of P. Gioioso & Sons will be the Project Superintendent. The Superintendent has accountability for day-to-day operations at the site, for activities of the subcontractors, for implementation of the HMH&SP by P. Gioioso employees and subcontractors, to conduct periodic safety meetings and to investigate accidents and near misses on the site.

2.3 Site Safety and Health Officer (SSHO)

The Site Safety and Health Officer (SSHO) responsibilities for this project will be provided by P. Gioioso & Sons. **Mr. Sam Doolan** of P. Gioioso will serve as the SSHO and will provide safety on-site for P. Gioioso & Sons personnel. A SSHO from Covino Environmental Associates will be the alternate in the event the SSHO is not available. Contact information is found at Section 9 of this HMH&SP.

The experience of the SSHO shall include work at Level D and Modified Level D sites; specialized training in personal and respiratory protective equipment, program implementation, and use of air monitoring instrumentation and methodology; a working knowledge of Federal and state safety and health regulations; current certification in first aid and cardio-pulmonary resuscitation; and 40 hour OSHA HAZWOPER training, current refresher certificates, and medical monitoring approval in addition to supervisory training.

The SSHO will monitor work locations for employee health and safety purposes, as well as document any employee exposures and/or substance releases that may occur through the course of this project. The SSHO is trained and experienced to be proficient in the proper use and limitations of all equipment that he may be utilizing. The SSHO is responsible for operating the equipment, assisting in implementing the HMH&SP and performing any other duties assigned to him. The SSHO is also to be empowered to deny access to the site or restrict the presence of any persons (under his control), and also has the authority to cease activities on-site if and when conditions present uncontrollable risks to site personnel and off-site receptors. The SSHO shall also be responsible for coordinating, conducting and documenting any required training activities, performing and maintaining record keeping duties, and carrying out any other duties specified by site management.

The SSHO will be the main contact for any on-site emergency situation. Except in an emergency, the SSHO may modify the approved HMH&SP only after consultation and concurrence of the CIH and P. Gioioso & Sons.

The SSSHO will be familiar with all matters pertinent to this project and shall assist and represent the CIH in implementation of the HMMH&SP as required. This includes field supervision; maintaining contamination control zones; enforcing safe work practices and decontamination procedures; ensuring proper use of personal protective equipment; and communicating modified safety requirements to site personnel.

2.4 Certified Industrial Hygienist (CIH)

The CIH for this project will be **Scott D. Herzog**, CIH of Covino. Mr. Herzog has been certified by the ABIH as a Certified Industrial Hygienist. The duties of the CIH will be to develop, implement, and oversee the Health and Safety program, and the HMMH&SP. This plan includes a description for an on-site air-monitoring program, conducting initial site-specific training, and providing continued support for all health and safety activities as required. The CIH will be responsible for directing and approving any changes to the HMMH&SP with concurrence of P. Gioioso & Sons or their designated representatives.

The CIH will be available to be on site at the beginning of construction activities, at the start-up of each new task or operation, to attend meetings and as needed throughout the project for consultation as requested by the client.

2.5 Preconstruction Safety Conference

Prior to the start of soil intrusive work, the Contractor shall conduct a safety conference to discuss the hazards anticipated on the site, training on hazard recognition, response to emergencies, explanation of site activities, purchasing safety supplies, identifying safety personnel, decontamination procedures, levels of PPE required, air monitoring activities, and other topics relevant to the safety of site workers. The safety conference will apply to all P. Gioioso employees and their subcontractors. Attendance at safety meetings shall be mandatory.

2.6 Training and Site Briefing/Education

The SSHO or his designee will present a safety briefing to inform employees, contractors, subcontractors, and visitors who will be performing work in or entering the Exclusion Zones (EZ) or Contaminant Reduction Zones (CRZ) during field operations. This briefing will cover the special hazards and procedures to control these hazards. All prime and subcontractor employees, Project Engineer's representatives and visitors shall complete this briefing before working in identified portions of the site. A copy of training records for all workers completing this training shall be kept by P. Gioioso & Sons and submitted with the HMMH&SP.

The SSHO shall keep records of training for all site personnel and site visitors. Copies of the training records for all workers associated with the project will be made available upon request. All workers and visitors shall sign a daily log before entering the CRZ or EZ. The locations of the CRZ and EZ areas are identified by the limits of the excavation(s) and enclosure(s). A copy of the records will become a part of the permanent project documentation.

Sections 02082 and 01108 of the Project Specifications establish the following qualifications for work that involves disturbance of soil under the protective cover.

All personnel of Gioioso & Sons or their subcontractors shall receive 40 hours of hazardous waste operations training in accordance with 29 CFR 1910.120 or appropriate training as asbestos abatement workers and supervisors.

All personnel of P. Gioioso & Sons or their subcontractors shall receive a minimum of two hours of site-specific asbestos-related training (general awareness) for all persons involved in operations conducted within areas where asbestos fibers are presumed to be present:

P. Gioioso & Sons employees and subcontractor employees that do not perform soil intrusive activities or are working outside the limits of the work area, including office personnel, fence installation and truck drivers who remain in vehicles do not have to be licensed as abatement workers/supervisors. Workers within the area where ACM is presumed to be present but who do not perform intrusive work in contaminated soil will receive at a minimum, two hours of asbestos general awareness training.

2.6.1. Training Requirements

This plan will go into effect at any time when performing soil intrusive activities that disturb the protective layer or other site activities that are covered under the AUL; when employees are exposed or have the potential to be exposed to a hazardous material at concentrations which exceed an applicable OSHA standard; in the event of a release or an emergency situation occurs such as encountering unanticipated drums, storage tanks or pockets of petroleum contaminated soils; in areas where the level of VOC's exceeds 1 ppm above the background for a period of ten minutes continuously, in areas where there is visible evidence of asbestos fibers, oils or hazardous materials or other indicators that employees may be exposed to elevated levels of degradation products from fill or other chemicals. **It is anticipated that most or all of the work for the project will be performed at Level D or Modified Level D. Soil excavation and other activities within the enclosure until the protective cover is restored will be performed using Level C. The length of the soil excavation work within the enclosure is expected to be five days. A decision to upgrade PPE above Level C represents a change in condition at the site.**

In addition to training for oils and hazardous materials, Massachusetts requires all workers on active public construction sites to attend a ten-hour, one-day construction safety course. This focuses on general construction site safety and is separate from training to deal with oils and hazardous materials.

All P. Gioioso & Sons personnel or their subcontractors and subcontractor employees who will be entering any of the EZ or CRZ areas will be required to provide proof of having received training which meets the initial 40-hour and current annual 8-hour refresher training for

hazardous waste site workers as described in 29 CFR 1910.120 and 29 CFR 1926.65. This initial training includes the three days of supervised on-site training. All site personnel are required to have Hazard Communication Training which meets the OSHA Construction Industry requirements detailed in 29 CFR 1926.59. Proof of this training for each worker will be provided as necessary.

Workers who will be incidental to the site work, such as individuals working in project trailers or those who work in Support Zones and who will not be coming into contact with excavated or removed soil from the site do not require Hazard Communication training but will be required to attend a site safety briefing from the SSHO. Drivers of trucks hauling dirt from the site do not require Hazard Communication training provided they remain in their trucks and demonstrate that they have received Hazard Communication training during the previous twelve-month period.

2.6.2. Site Safety and Health Briefing

P. Gioioso & Sons personnel covered by this HMH&SP will be required to read and understand this document. It is the responsibility of the CIH to ensure that site personnel understand the materials presented in the HMH&SP. Prior to any on-site activity involving a disturbance of the protective Cover, all on-site personnel and visitors will be required to attend a site safety and health briefing from the SSHO or other designated, qualified person. This is applicable to all on-site personnel located within the Exclusion, Contaminant Reduction, and Support Zones who are involved with site work, and all visitors who will enter either the Exclusion or Contamination Reduction Zones. Periodic updates will be undertaken by the SSHO when operational or site conditions change or when designated refreshers are so warranted. The topics to be covered by the training include the entire contents of the HMH&SP with emphasis on emergency procedures, areas of restricted access, methods of decontamination, asbestos awareness and general safety.

A brief daily safety "tailgate" meeting will be held for all on-site personnel and shall be conducted by the SSHO or his designee. Notes of the subjects covered and a list of those attendees at the daily meeting will be maintained for the documentation package.

2.7 Medical Surveillance

All affected on-site personnel shall provide evidence of a medical examination when required which meets the requirements of 29 CFR 1910.120(f) and 29 CFR 1926.65(f). Medical examinations are required by OSHA once the HMH&SP goes into effect for the following employees involved in hazardous waste operations:

- 1.) All employees who are exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators for 30 days or more per year;
- 2.) All employees who wear a respirator for 30 days or more per year; or
- 3.) All employees who are injured or develop signs and symptoms related to overexposure from an emergency incident involving hazardous substances or health hazards.

These employees shall have a medical examination within the last twelve months prior to the start of the project. They shall have medical examination following any recordable illness or injury. The physician must provide a written opinion that an employee can return to work without restrictions following an OSHA recordable illness or injury.

The CIH shall detail, in conjunction with the Physician, the scheduling of examinations, certification of fitness to use respiratory protection, and compliance with OSHA RPP and PPE requirements. The results will be evaluated by a board-certified physician to determine if the employees are physically fit for the work to be performed, including the use of respirators.

The physician will specify the content of the exams, the need for additional tests and frequency using the guidelines of the referenced documentation. The following areas should be addressed in the examination: complete medical and occupational history (initial only), general physical exam including evaluation of all organ systems, pulmonary function testing including FVC and

FEV_{1.0}, blood chemistry screening profile (i.e. SMAC 20/25), urinalysis with microscopic examination, eye exam and visual acuity, audiometric testing, chest x-ray (as directed by the physician), electrocardiogram (as directed by the physician), cardiac stress test (as directed by the physician), and biological monitoring (as directed by the physician).

2.7.1 Arsenic/Lead/Chromium/Cadmium/Mercury

P. Gioioso & Sons employees or their subcontractor workers will be involved in the machine and occasionally hand excavation of soil and fill. Site characterization data from a proximate public right-of-way indicates the potential exists for the presence of arsenic, lead, cadmium, chromium and mercury. These metals were found in varying concentrations but in all cases were detected above the laboratory reporting limits but below RCS-1 limits. These metals are typical of developed industrial areas. The final standard for lead in the construction industry requires initial medical surveillance consisting of biological monitoring to include blood lead and ZPP level only where employees are exposed to or have the potential for exposure to lead at concentrations at or above the action level.

In Covino's opinion, based on the concentrations of metals reported in the soil, the size of the project, known documentation of the property use for fill, the duration of the project and Covino's experience at other sites where comparable levels of lead have been found, the potential for P. Gioioso & Sons employees to be exposed to lead and other metals above regulated levels is considered to be low during soil excavation in contaminated areas and very low during all remaining site activities. Personal monitoring of employees during soil excavation activities **is not** required to meet the requirements of the "initial determination" under the OSHA Lead standard given the elevated levels of lead measured on the site.

Full-shift personal breathing zone samples should be collected for P. Gioioso & Sons employees in the event they engage in intrusive work that has the potential to exceed the OSHA standard for lead of 50 micrograms per cubic meter of air ($\mu\text{g}/\text{M}^3$), as a time-weighted average (TWA) exposure or 5 $\mu\text{g}/\text{M}^3$ for cadmium. These individuals are not required to have specific medical monitoring as defined by the "initial determination" requirement in 29 CFR 1926.62(m) unless

exposures exceed the Action Level for lead. Medical surveillance will be made available to employees in the event they are exposed to lead above the Action Level more than 30 days each year.

P. Gioioso & Sons employees and their subcontractors may have contact with soil. OSHA has a Construction Industry standard, 29CFR 1926.62 and a General Industry standard, 29 CFR 1910.1025 for lead. Other metals are covered under Construction industry standards.

2.7.2 Semi-Volatile Organic Compounds

P. Gioioso & Sons employees or their subcontractors may contact SVOC's present in historically filled soils. SVOC's were reported in all samples at concentrations above lab reporting limits. Of these only acenaphthalene was present at concentrations above RCS-1 in one boring, and benzo(a)pyrene was reported present at levels above S-1 in three of the eight borings. Typically, these materials pose a greater risk by skin contact than by inhalation. Based on Covino's experience at other sites where comparable levels of SVOC's have been found, the potential for P. Gioioso & Sons employees to be exposed to SVOC's is very low.

2.7.3 Asbestos-Containing Materials (ACM)

P. Gioioso & Sons employees or their subcontractors may encounter asbestos-containing fibers or asbestos containing materials in soil throughout the site while excavating soil and fill. An Activity and Use Limitation to protect public health due to the potential presence of asbestos fibers in soil is in effect over the area in which the utility work on W.R. Grace & Co. - Conn property is to be conducted. All soil excavation work within the enclosure is performed as if it was asbestos fiber-contaminated. Smaller pieces of ACM may be present in the soil and may cause fibers to be released as the excavation proceeds. Exposure to ACM may cause diseases including asbestosis and mesothelioma.

2.7.4 Petroleum Hydrocarbons

There is a potential for the presence of petroleum hydrocarbons in soil due to its urban nature. No specific data exists on the presence of petroleum hydrocarbons in the soil to be excavated.

2.7.5 Polychlorinated Biphenyls

No PCB's were detected above the laboratory reporting limits in the soil samples collected by SEA from within public rights-of-way proximate to the W.R. Grace & Co. - Conn property. Public records of environmental conditions on the W.R. Grace & Co. - Conn property do not indicate that PCB's are present.

2.8 Emergency Medical Care

Emergency medical care services are available at Somerville Hospital. Somerville Hospital is located at 230 Highland Avenue, Somerville, Massachusetts. The telephone number is (617) 591-4500. The hospital is located approximately two miles from the project site. The hospital should be notified about the potential hazards associated with the site. Ambulance services are available twenty-four hours per day, by contacting the City of Cambridge Emergency Medical Services. The emergency telephone number is 9-1-1. Massachusetts has an enhanced 911 system that identifies the location from any land-based telephone. Any employees who are seriously injured on site should be transported to the hospital by EMS personnel.

Section 8.10 contains information regarding emergency transport to the hospital. A map showing the emergency route to the hospital is shown on Figure 4. A copy of the map and directions will be kept in each Supervisor's vehicles.

Once the Plan is in effect, at least one person trained in Red Cross First Aid/CPR/Universal Precautions for Bloodborne Pathogens or the equivalent will be available on-site at all times when workers are present. Documentation of current training shall be posted in the project trailer.

The SSHO is currently trained in First Aid, CPR, and Universal Precautions. A fully stocked and equipped first aid kit capable of treating minor injuries and first responder treatment will be maintained on site at all times in the project trailer.

2.9 Accident Reporting and Recordkeeping

The Contractor will immediately notify the City of Cambridge and will evaluate whether to notify W.R. Grace & Co.-Conn of any accident/incident. Within two working days of any reportable accident, the Contractor will complete and submit an Illness/Injury Accident Report. If the illness or injury is recordable as defined by OSHA, such illness or injury will be recorded on the OSHA 300 log for the project.

Note the OSHA Recordkeeping regulations require that all accidents involving a fatality or three or more persons sent to the hospital for treatment from a single event must be reported to the Area Office of OSHA within eight (8) hours following the accident, or notification of the accident.

2.10 Site Emergency Equipment

The Contractor will provide ANSI approved portable eyewash units in accordance with ANSI Z358.1, a portable first aid kit, and 10 pound dry chemical fire extinguishers of sufficient quantity for MWRA with a minimum rating of 2A:10B:10C in the following locations:

- Project trailer
- Supervisor's vehicles

The locations of this safety equipment shall be marked with a sign, and workers informed in the "tailgate" meetings, when the location of the safety equipment is changed. Any safety equipment required for confined space entry will be brought to the project trailer if it is needed on a project site. This equipment includes safety harnesses, wristlets, retrieval lines, a tripod (required for entering manholes or other utilities with fixed openings), air horns, and two-way radios.

2.11 Daily Safety Inspections

The SSHO or designee will conduct daily safety inspections of the site to determine compliance with the HMMH&SP on the site. The designated areas have been identified as **Sites 1 and 2. Site 1 is the only area where soil excavation will take place.** These inspections will be systematic and will follow good safety and health procedures. The SSHO will conduct a minimum of two visual inspections per day during work activities. The SSHO will advise the Project Supervisor of any unsafe acts or actions observed, and will record observations in a daily log book and present these findings at the subsequent daily safety briefing. These inspections will become a part of the permanent project record.

2.12 Safety Responsibility

The ultimate responsibility for the health and safety of the individual employee rests with the employee himself, and his or her colleagues. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety as well as that of fellow employees and the general public which might be affected by site activities. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel as designated above.

Should any employee find himself or herself in a potentially hazardous situation the employee shall immediately discontinue the hazardous procedure(s) and either personally effect appropriate preventative or corrective measures, or immediately notify the Project Manager or SSHO of the nature of the hazard. In the event of an immediately dangerous or life-threatening situation, the employee always has "stop work" authority.

Extenuating circumstances such as budget or time constraints, equipment breakdown, changing or unexpected conditions, etc., never justify unsafe work practices or procedures. In fact, under

stressful circumstances, all project personnel must be mindful of the temptation to consciously or unconsciously compromise health and safety standards, and must be especially safety conscious.

2.13 Site Security

The general contractor is responsible for maintaining security on the job site. This includes limiting access to authorized individuals, and managing traffic flow to prevent accidents. The work area is located behind Grace Building 23. Alewife Brook Parkway has heavy vehicular traffic at all times, however the site activities will not be impacted by the traffic. The area around the project is largely residential. There is automobile traffic on Seagrave Road and Columbus Avenue as well as the side streets off these two streets. All access to/from the site for workers and trucks will be through Magoun Street to Whittemore Avenue. Access to the enclosure will be secured and protected by a lockable rigid enclosure on the decon station. All employees should consider themselves responsible for construction-related security or otherwise securing the access to the enclosure when leaving the site at the conclusion of the work day. W.R. Grace & Co.-Conn security will periodically check the enclosure during non-working hours as a part of their normal rounds. Any damage to or forced entry into the enclosure will be reported to P. Gioioso & Sons. Contact information is available in Section 9.

The City of Cambridge and W.R. Grace & Co.-Conn will be notified regarding the nature and schedule of the project, so that site access and security may be assured during non-working hours. The names and emergency telephone numbers will be available for personnel during off-shift hours.

2.14 Noise, Dust & Odor Control

Control of noise and dust on and off the site will be critical to the success of this project. A dust control and an odor control program will be implemented during this project. A perimeter monitoring program will be established in accordance with the AUL and City of Cambridge Asbestos Ordinance to document that the controls in place are effective. Work will be halted if

visible emissions are observed from the enclosure as a result of this work. Visible emissions from non-suspect sources such as vehicle exhaust or road dust will not be considered cause for work stoppage. Refer to Section 6 for further details.

2.15 Subcontractor Support

Each contractor and subcontractor hired by P. Gioioso & Sons has a contractual obligation to perform their work utilizing safe methods and to comply with the Health and Safety Plan for this project, OSHA regulations, and all other applicable federal, state and local requirements.

SECTION 3 - SITE CHARACTERIZATION AND ANALYSIS

3.1 Site Information

Information regarding the characterization of the overall CAM 400 site has been reviewed in preparation for this HMH&SP. Although the data was not from the W.R. Grace & Co. - Conn site, Covino reviewed the results to obtain general background information as a part of the development of this HMH&SP, as the data could be predictive of conditions on the W.R. Grace & Co. - Conn site and is used for reference purposes only.

This HMH&SP was prepared for site excavation activities performed during the initial phase of this project to address the potential for the presence of asbestos fibers and other contaminated materials that may be present in the soil.

3.1.1 Asbestos-Containing Materials

Previous testing has identified the presence of asbestos fibers in soil on W.R. Grace & Co- Conn property. P. Gioioso & Sons employees or their subcontractors may encounter asbestos-containing materials throughout the site while excavating soil and fill. An Activity and Use Limitation to protect public health due to the potential presence of asbestos fibers in soil is in effect over the area in which the utility work is to be conducted. All soil excavation work within the enclosure is performed as if it was asbestos-contaminated.

3.1.2 Lead

Lead is more hazardous by inhalation than by ingestion but is toxic by both routes. If ingested or inhaled, lead causes irritation to the skin, eyes and respiratory tract. Lead is a neurotoxin and affects the central nervous system, kidneys, blood and reproductive systems. The symptoms of lead poisoning include abdominal pain and spasm, nausea, vomiting and headache. Lead is a cumulative poison. The maximum measured concentration of lead was below the S-1 limit for lead of 300 mg/kg.

3.1.3 Chromium

Chromium is toxic by inhalation and ingestion. Chromium causes sinusitis, nasal septum, allergic and irritation dermatitis and respiratory irritation. The highest concentration of chromium present was below the S-1 standard of 30 mg/kg.

3.1.4 Cadmium

Cadmium is toxic by inhalation and ingestion. Cadmium is a cumulative toxin and accumulates in the liver and kidneys as well as in muscles and bones. There is evidence that cadmium causes cancer in animals, and it is classified as a "probable" human carcinogen. The highest concentration of cadmium was below the S-1 standard of 2 mg/kg.

In addition, other metals were also reported at concentrations below S-1 limits. These included barium, zinc and mercury.

3.1.5 Petroleum Hydrocarbons and VOC's

Sampling was performed for total petroleum hydrocarbons but not for volatile petroleum hydrocarbons (VPH). The levels of TPH in the borings were all typically below S-1 levels. Naphthalene was detected in one boring at a concentration below the S-1 standard of 4 mg/kg. No other VOC's were detected above the lab reporting limits. No elevated PID readings were reported except in one boring where a reading of 14.1 parts per million was measured.

3.1.6 PCB's

No detectable levels of PCB's including the entire panel of Aroclor compounds were reported in the samples. The S-1 standard for total PCB's is 2.0 mg/kg. .

3.1.7 Polycyclic Aromatic Hydrocarbons

Low levels of several PAH compounds were measured throughout the CAM 400 site. Only benzo(a) pyrene and acenaphthalene were present in concentrations above the respective S-1 limits. Other PAH's were present at levels below S-1 limits.

In summary, contaminated soil containing asbestos fibers as well as the potential for other hazardous materials including metals, SVOC's and petroleum hydrocarbons will be anticipated during soil excavation. The use of engineering controls, dust mitigation and PPE in selected areas and work practices will be used to reduce the potential for employee exposure.

Levels of PPE are defined in Section 5. The use of engineering controls will limit potential for nuisance odors in the work area and at the property line.

3.2 Physical Hazards

Review of the site location reveals that there are physical hazards that exist at the site that are or may be of concern, include but are not limited to:

1. Potential pedestrian and vehicle traffic (including struck by other vehicles) in the vicinity of the project site.
2. Operation of heavy machinery, including excavators, trenchers, and trucks.
3. Proper use of trench boxes or other trenching techniques.
4. Excavation stability from inflow of groundwater, and soil stability.
5. Entry into permit-required confined spaces.
6. Lockout/Tagout especially in the event "hot taps" are required for utilities support.
7. Exposure to temperature extremes and noise.
8. Electrical shock from overhead or buried power lines.
9. Falls from elevated levels.

Caution should be exercised when near heavy machinery on the site. The entire area is a hard hat, safety glasses and safety shoe area. Hard hats shall be non-conductive and shall meet the specifications of ANSI Z89.1, "Protective Headwear for Industrial Workers". Reflective safety vests will be used by all workers doing utility work in or near active heavy equipment on site and

when working on public roadways. Safety shoes will conform to ANSI standards. Workers will be advised of all known hazards at the site prior to startup and thereafter as needed.

Employees will be encouraged to be observant of site safety and health hazards and to report them directly to the SSHO or to the SSHO through their supervisor. Other potential hazards that could cause injuries or illnesses include slips, trips, falls, bumps, cuts, pinch points, falling objects, and crushing injuries, typical of every construction-related job site.

The location of all underground utilities, including electrical lines; natural gas lines; water and sewer lines; and telephone lines must be identified and clearly marked before starting excavation work. These should be coordinated through DIGSAFE and the City of Cambridge. The toll-free DIGSAFE telephone number for New England is (888) DIG-SAFE.

3.3 Chemical Health Hazards

Site workers should always be alert for unrecognized or previously undiscovered or unanticipated hazards. Potential hazards include:

- Inhalation of potentially toxic vapors including components of gasoline and total petroleum hydrocarbons; contact with underground storage tanks or buried drums.
- Inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of food, or tobacco products inadvertently contaminated with potentially toxic materials;
- Dermal exposure to substances which may effect the skin directly or which may exhibit other toxic effects via percutaneous (skin) absorption;

Based upon historical experience, the potential routes of exposure to hazardous compounds are through dermal contact, inhalation or ingestion. The risk of exposure by any route of contact is considered low to low-moderate for the entire project.

Exposure via ingestion can be controlled effectively by the use of personal protective equipment such as gloves, boots, and disposable coveralls, good personal hygiene habits, and a ban on smoking, eating and drinking in the contaminated areas. Employees will be required to wash

their hands before eating, drinking or smoking. Soap, water and disposable towels will be provided at wash stations.

Similarly, dermal exposure can be virtually eliminated by good personal hygiene, the use of gloves and appropriate personal protective clothing, and conscientious personal decontamination procedures. All soil and water should be treated as if it was contaminated and the contaminants are capable of being absorbed through intact skin.

Air monitoring within the exclusion zone will be performed for the protection of employees by the SSHP for P. Gioioso & Sons or their designee. Ambient air monitoring at the perimeter of the work zone will be conducted by the SSHO for P. Gioioso & Sons in accordance with the City of Cambridge ordinance, Chapter 8.61.040 and the AUL. Perimeter air samples will be collected to document the control measures implemented. In the event ACM is identified in the perimeter air samples at a concentration that exceeds 0.01 fibers/cubic centimeter (f/cc) of air, work on the excavation shall be halted and the controls reviewed. The Contractor will notify the City of Cambridge and W.R. Grace & Co. - Conn in the event air sampling at the perimeter of the Exclusion Zone exceeds 0.01 f/cc of air. **It is anticipated that most or all work for the project will be performed in Level D or Modified Level D. All work inside the enclosure will be performed in Level C until the protective cover has been restored. A decision to upgrade PPE above Level C constitutes a change in condition.**

3.4 Unanticipated Hazards

The following conditions and situations are not anticipated at this site and therefore safety procedures appropriate to them are not included in this HMMH&SP: The need to handle or open drums or containers which may contain hazardous substances; encountering underground storage tanks or buried drums; unanticipated releases; activities requiring personal protective equipment more extensive than Level C; field work in non-illuminated areas during periods of darkness, and work during periods of severe weather and/or high wind.

If any of these conditions are encountered, all work will be suspended, the area will be marked off and the SSHO will immediately contact the City of Cambridge, W.R. Grace & Co. -Conn, and the CIH in order to define a proper response.

3.5 Confined Space Entry

Entry into permit-required confined spaces may be anticipated by P. Gioioso & Sons personnel or by the subcontractors during this project. The project does entail excavation of soils to a depth up to 6 to 8 feet for placement of new lines with connections to existing utilities. The excavation will be largely by powered machine and occasionally by hand. The Contractor will utilize appropriate trench boxes or trenching techniques as described in Section 3.6. The soil is described as soft and consists largely of sand. The potential for sidewall collapse is moderate and ACM is assumed to be present in soils to be excavated. Once the contaminated soil has been removed, then only an engulfment or entrapment potential should be considered as a condition for determining the need for an Entry Permit. Based on the work description, it is not likely that work in Permit-Required Confined Spaces will be required, however the topic is addressed in the event it becomes necessary.

3.5.1 Entry Permits

In all situations where trenching exceeds five feet in depth and where there is a potential for a hazardous atmosphere, employees are required to use the procedures described in SOP#4, Confined Space Entry Procedures, located in the Appendix. It is unlikely this condition will be encountered on this site since the maximum depth of excavation is anticipated to be largely below six feet. If entry to a permit-required confined space is required, this will constitute a change in condition. All employees who may be required to enter a permit-required confined space shall have been trained in Confined Space Entry, in compliance with the OSHA requirements. This section describes and addresses compliance with the OSHA standard, "Permit-Required Confined Spaces"

Prior to entering a Permit-Required Confined Space, an Entry Permit shall be issued by the Entry Supervisor. This permit will outline the requirements for PPE, air monitoring, emergency backup, egress equipment, lockout/tagout requirements, and any special circumstances. The entry permit will be re-issued on a daily basis, and will be valid only for that day. The SSHO shall serve as the entry supervisor for this project. Air monitoring, using a four-gas meter and a VOC meter shall be used to check air quality prior to and intermittently throughout the entry period.

The permit will be canceled at the conclusion of the task or at the end of the day whichever comes first. In the event a task lasts longer than one day, a new permit will be issued for each succeeding day. The completed permit will be retained for a minimum of one year beyond the end of the calendar year in which it was issued. (Dec.31, 2011 for permits issued through the end of 2010).

The entry supervisor will determine all PPE and rescue equipment to be used in conjunction with the entry. An attendant will remain outside the excavation and will maintain visual communication with the entrant(s) at all times.

3.6 Shoring and Trenching

In the event any walls and faces of any of the excavations are more than four feet deep, they shall be properly supported using "a trench box or lateral bracing system of soldier piles and sheeting as indicated by the dimensions of the opening, and the degree of soil stability". All trenching and excavation work shall be performed only by trained individuals. It is planned to have a trench box system at the perimeter of the excavated soil.

A stairway, ladder or ramp or other means of egress shall be provided to limit lateral travel to 25 feet to reach a point of egress, in accordance with 29 CFR 1926.651(c)(2).

3.7 Site Inspections by the SSHO

At least twice each shift during field operations in Exclusion and Contaminant Reduction Zones once the Plan is in effect, the SSHO shall visually inspect the enclosure where activities by P. Gioioso & Sons or their subcontractors are underway for compliance with this Plan. Deficiencies in compliance will be corrected upon discovery and noted in the daily site log and reviewed in the subsequent daily safety briefing. This log will become a part of the documentation package at the completion of the project.

3.8 Hazard Analysis/Risk Assessment

A limited hazard analysis and risk assessment is presented by task. The objective is to identify and plan for hazards that might be encountered in this project, and do not include emergency planning for remote events. The assessment also defines the appropriate control measures to minimize the risk to on-site employees, as well as to the general public.

Hazard Analysis/Risk Assessment

TASK	HAZARD CODES	CONTROLS	EMPLOYEE RISK	PUBLIC RISK
Mobilization/ Demobilization	4, 6, 7, 9,10	Traffic control, Motor vehicle safety	Low	Low
Install Perimeter Fence	7, 9, 10	Motor vehicle safety, safe machine work practices	Low	Low
Erect enclosure	4, 7, 9, 14	Safe machine work practice, Motor vehicle safety, PPE, dust control	Low-Moderate	Low
Soil excavation	1, 2, 3, 4, 5, 7, 9, 11	Safe machine work practices, PPE, dust control	Low-Moderate	Low
CIPP Work (Invert)	1, 2, 3, 7, 9	PPE, Respiratory Protection	Low-Moderate	Low

TASK	HAZARD CODES	CONTROLS	EMPLOYEE RISK	PUBLIC RISK
Removal and replacement of PVC lines	4, 5, 6, 7, 9, 11, 13	PPE, Respiratory Protection, Confined Space procedures, dust control	Moderate	Low
Manhole connection work	4, 5, 6, 7, 9, 11, 12, 13	Safe machine work practice, Motor vehicle safety, PPE, dust control	Low-Moderate	Low-Moderate
Trenching/Shoring	1, 2, 3, 4, 5, 7, 8, 9, 11, 13	Trench/Shoring system, safe machine work practices, motor vehicle safety, PPE, dust control	Low-Moderate	Low-Moderate
Soil sampling and analysis	1, 2, 3	PPE, air monitoring program	Low - Moderate	Low
Stockpiling of soil inside enclosure.	1, 4, 7, 9, 10	Safe machine work practices, dust suppression, truck covers, air monitoring program, truck decon program, traffic control	Low - Moderate	Low
Groundwater treatment (If needed) - performed by subcontractor	1, 2, 3, 4, 6, 7, 9, 13	PPE, safe machine work practices, air monitoring, GFCI protection, truck decon	Low - Moderate	Low

Key To Hazards:

- 1 - Inhalation of Vapors or Dust
- 2 - Ingestion of contaminated soil
- 3 - Skin Penetration/Absorption of Toxic Chemicals
- 4 - Heavy Machinery Operation (Accidents, Crushed by, Struck by)
- 5 - Confined Space Entry
- 6 - Exposure to Temperature Extremes
- 7 - Exposure to Noise
- 8 - Electrical Shock
- 9 - Slips, Trips, Falls, Other Miscellaneous Construction Accidents
- 10 - Pedestrian Accident (Motor Vehicle)

- 11 - Trenching/Shoring Hazards
- 12 - Contact with Underground Tanks, Utility Lines
- 13 - Lockout/Tagout
- 14 - Contact with rodents, poison ivy, snakes, ticks etc.

SECTION 4 - SITE CONTROL

Site control zones will be established in order to contain contamination within the smallest area possible. The SSHO will ensure that each employee has the proper personal protective equipment for the area or zone in which he or she is to perform work. Only authorized persons will be permitted access to Exclusion and Contamination Reduction Zones. All entrance to these areas will be restricted by means of regulated personnel flow. And only trained, authorized employees are authorized to enter. The purpose of this site-specific Health and Safety Plan (HMH&SP) is to establish in detail the procedures and protocols necessary for protecting of workers and the general public from potential hazards associated with contaminated soil encountered during the excavation, backfilling, handling, analysis, and disposing of excavated soils.

This section shall define the work zone delineations, site communication, and site access control measures to be employed.

4.1 Exclusion Zone (EZ)

The Exclusion Zones (contamination work zones) is the area(s) where lead, chromium, cadmium and other metals, SVOC's, petroleum hydrocarbons and asbestos fiber contamination may exist. These areas have been designated as Site 1 and Site 2..

The Exclusion Zone shall include and encompass areas designated for soil excavation associated with the handling of contaminated soils fully contained within the enclosure, commonly referred to as the Hot Line.

The tented enclosure for Site 1 will be designed with two separate entry points -- one for employees and a second for heavy equipment and roll-offs for soil. Each will be designed with a decon area. The enclosure for Site 2 will have one entry point as heavy equipment will not be required for the excavation within the vault.

Special precautions will be taken to insure that pedestrians and non-essential persons are not allowed near the excavation equipment during the excavation and trenching operations. Caution tape and/or traffic cones will be used to delineate the travel lanes for personnel, trucks and heavy equipment. The enclosure will be secured with a lockable door and a rigid frame around the decon areas for non-work hours. No eating or smoking is allowed anywhere within the area of the Site.

The required protective equipment for use by personnel working in or entering any Exclusion Zone or Contaminant Reduction Zone is specified in Section 5. Access to the Exclusion Zone or Contaminant Reduction Zone is restricted to On-Site and Contractor personnel who are wearing the proper personal protective equipment and who have received the required site training and medical clearance. All workers will sign in the log book in the Support Zone prior to entering the Exclusion Zone.

4.2 Contamination Reduction Zones (CRZ)

The CRZ is a buffer zone between the Exclusion Zone and the Support Zone, and is located at the interface of the two zones. Personnel, equipment and vehicle decontamination stations such as washing stations will be located in this area and will be marked by barrier tape or similar means. The CRZ serves as an area to decontaminate personnel, equipment, and vehicles prior to entering the support zone. If necessary, clothing change facilities for reusable PPE shall be located in the contamination reduction zone. The CRZ will be a zone extending approximately 20 feet beyond the EZ on one or more sides as required for site access. All access to the EZ shall be through the CRZ.

4.3 Support Zone (Non-Contaminated)

This is the area outside of the Contaminant Reduction Zone, where there is no potential for contact with contaminants. The Support Zone contains the following: work rest area, support

operations, radio communications, transportation, and storage facilities. The support zone is located outside the limits of the designated exclusion zones, and away from areas designated as contaminated soil handling. Eating and drinking of fluids are permitted only in this area and only after site workers have properly decontaminated themselves. A description of the decon process and location is found in Section 7.

4.4 Dust and Odor Controls

Air monitoring and dust and odor control programs are being implemented for this project; the air monitoring program is described in Section 6.0.

A dust and odor suppressant program will be in effect as a part of the HMM&SP. In the event odors are encountered during soil excavation, stop operations temporarily and apply odor suppressant foams or other chemicals on the exposed surface. Products such as Earthbind® or the equivalent are useful for dust suppression and soil stabilization. The roll-offs will be loaded with soil, covered, sealed and decontaminated within the enclosure.

Water mists, calcium chloride and other recognized dust suppression techniques will be implemented in the event other controls are not effective. The contractor will notify the CIH who will conduct additional monitoring as needed, using a more sensitive monitoring technique. If visible dust is observed outside the enclosure, work will be temporarily halted. Visible emissions from non-suspect sources such as vehicle exhaust or road dust will not be considered grounds for work stoppage.

All roll-offs, excavators and other heavy equipment used inside the Site 1 enclosure and all hand tools used for excavation within the Site 2 enclosure will be cleaned, decontaminated and visually inspected by the SSHO before leaving the enclosure. Trucks and support vehicles that remain outside the enclosure do not have to be decontaminated since they will not come into contact with soil from within the enclosure.

Indications of "overt" contamination as defined by Massachusetts DEP include but are not limited to the following:

- 1) staining or unusual color to the soil;
- 2) unusual or blackish color to trench or excavation water;
- 3) visible sheen or rainbow on top of the groundwater entering the trench or excavation;
- 4) smells of gasoline, oils, or solvents coming from the soils or water;
- 5) buried drums, tanks, or suspicious structures;
- 6) excavate contains DNAPL or percent levels of oils or hazardous materials.
- 7) signs or symptoms of hydrogen sulfide or reactive cyanide exposure.

Personnel, vehicles and equipment used during the handling of soils, and hazardous chemicals and materials shall be decontaminated before leaving the EZ using work site procedures contained in the HMM&SP.

4.5 Site Communication

The active work site is a small one and there will be considerable heavy equipment working on site. This creates the potential for accidents, especially as the equipment moves on and off the site and trucks carrying soil need to exit the site. It is critical to maintain two-way communication on site at all times, to protect the safety of on-site employees, and to expedite the decision making process, in the event contamination is encountered. All requests for emergency services will take place through the Contractor. W.R. Grace & Co – Conn will be notified of any requests for emergency services to that appropriate security arrangements may be made to protect facility employees.

The job supervisor(s) will carry a two-way radio or cellular telephone and will be in continuous contact with the site personnel in the event emergency services are required.

Verbal communication and hand signals may be used to communicate among workers on the site. Compressed air horns could also be used to play an integral part in the communication

process. They should be used to signal evacuation of a work site in the event of an emergency situation such as a spill, release, uncontrolled fire, or explosion. In addition, visual and voice or radio communications must be maintained at all times while working on-site.

The following signals will be used to indicate an emergency situation:

- One long blast repeated three times at five second intervals - Man down
- Three short blasts repeated three times at five second intervals - Evacuate site
- Alternating short and long blasts - All clear

The evacuation area and rally point will be located just outside Building 23 at the perimeter of the Alewife Center parking lot. This area will be posted with a sign and a yellow flag. In the event of an emergency when evacuation is ordered, ALL P. Gioioso & Sons employees and subcontractor employees will cease work and will meet at the rally point.

4.6 Signs

The Contractor shall post warning signs designed to provide guidance and direction to on-site personnel and visitors. The signs at the job trailer or Supervisor's vehicle shall be posted in locations approved by the Project Engineer, and should be large enough to visibly see from a reasonable distance.

Visitor Signs:	Signs shall be posted directing all visitors to the project trailer.
No Smoking:	No smoking signs shall be posted in areas of high visibility immediately adjacent to the Exclusion Zones.
Asbestos:	Asbestos caution signs shall be posted on the outside of the enclosure by the personnel and equipment entry points.

4.7 Engineering Controls

Special engineering controls are anticipated for this project. There are plans to use continuous forced ventilation of the tented enclosure during site activities and soil excavation to remove

vehicle exhaust and provide safe working conditions. All equipment within the enclosure will be diesel-powered and will be equipped with appropriate functioning tailpipe scrubbers and/or catalytic converters. No gasoline-powered equipment will be permitted within the enclosure. At a minimum, the enclosure ventilation will be provided by two 2,000 cubic feet per minute exhaust blowers with HEPA filtration. This will provide a minimum of eight to ten air changes per hour inside the enclosure. Temporary heating may be required based on ambient weather conditions during site activities. Dust suppression in the form of light water sprays, foams, dust suppressants, and calcium chloride will be implemented as required to control dusting during truck loading activities and excavation.

Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the SSHO may pose a safety hazard to the workers, or nearby members of the community. Weather forecasts shall be monitored during the construction period. In the event of high wind or storm warnings, the Contactor shall evaluate the need to cease work for the duration of that event(s).

4.8 Site Control Measures

Solid waste and contaminated materials encountered shall be managed in a manner that ensures the protection of health, safety, public welfare and the environment. The intent is to re-use most of the soil on-site. A six-inch cap of clean soil will be placed on top in accordance with the AUL. W.R. Grace & Co - Conn will be the generator of any soil requiring disposal from the enclosure and shall approve the disposal location and sign Bills of Lading (BOL) or manifests used for tracking soil shipments. If Bills of Lading are used for soil shipment, The City's LSP shall sign and stamp the BOL as the LSP-of-Record for the MCP Release Abatement Measure (RAM) Plan to be submitted to MassDEP by the City for Post-Response Action Outcome (RAO) Statement excavation activities. Debris deemed unsuitable and/or surplus by the Owner's Representative shall be removed and disposed off-site.

4.8.1 Access and Egress Patterns

Specific movement patterns of both project personnel and equipment through designated site zones shall be maintained during routine operations at the project site. The following movement pattern will be utilized to assure compliance with this plan and the movement shall be monitored by the SSHO or other project management personnel.

Access Procedure

1. All site personnel are to log in at project trailer prior to proceeding on-site.
2. Access to the exclusion zone and decontamination reduction zone shall be limited to on-site, contractor personnel and approved visitors. Visitors shall be restricted to the Support Zone, unless approved by the Project Manager and the SSHO. These personnel shall have proper protective equipment and provide proof of training.
3. All personnel shall proceed to the exclusion zone through designated entrance locations that are clearly marked.
4. Access of routine personnel shall be monitored by the SSHO or other on-site project management personnel.
5. All equipment will have access to the exclusion zone through appropriate equipment routes.

Exiting Procedure

1. All personnel shall exit the exclusion zone through the designated personnel decontaminated reduction zone.
2. Prior to proceeding from the CRZ to the support zone all personnel are required to undergo designated decontamination activity.
3. Once decontamination is complete, site personnel may proceed to the support zone prior to leaving the site. Do not reenter the EZ or CRZ.
4. All equipment on-site shall proceed from the exclusion zone to the CRZ and undergo appropriate decontamination prior to proceeding to exiting the enclosure.
5. Adherence to these specific exiting procedures shall be monitored by the SSHO or other appropriate project supervisory personnel.

4.8.2 Operation Procedures

The following procedures shall be maintained during routine activity associated with the site control procedures:

1. A copy of this HMMH&SP shall be maintained on-site.
2. All personnel shall be instructed in the contents of the plan.

3. Proper delineation of site control zones will be maintained and signs placed in visible locations.
4. Copies of access and egress procedures will be posted on the project bulletin board located at the command center.
5. Access and exiting routes are contained in this report for both equipment and personnel. They shall also be posted on the project bulletin board located in the support zone.
6. Any modifications to the plan including delineation of work zone boundaries shall be approved prior to implementation and all personnel shall be briefed in the modification prior to implementation.

SITE OPERATING PROCEDURES/SAFETY GUIDELINES

The following general work practice guidelines are intended to prevent injuries and adverse health effects. These guidelines represent the minimum standard procedures for reducing potential risks associated with the project and are to be followed by all site workers at all times.

- ** All safety equipment and protective equipment shall be worn at all times in designated areas, by all persons, in conformance with the HMM&SP.
- ** Always observe the buddy system. Never enter or exit site alone, and never work alone in an isolated area. Never wander off by yourself.
- ** Always maintain a line-of-sight.
- ** Practice contamination avoidance. Never sit down or kneel, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects.
- ** No eating, drinking, or smoking outside the designated Support zone.
- ** In the event Personal Protective Equipment is ripped or torn, work shall stop and it shall be removed and replaced as soon as possible.
- ** Be alert to any unusual changes in your own condition; never ignore warning signs. Notify SSIHO as to suspected exposures or accidents.
- ** A vehicle will be readily available exclusively for emergency use at all times when workers are on site. All personnel going on-site shall be familiar with the most direct route to the nearest hospital.
- ** In the event of direct skin contact, the affected area shall be washed immediately with soap and water.

- ** Note wind direction. Personnel shall remain upwind whenever possible during on-site activities.
- ** Never climb over or under refuse or obstacles.
- ** Hands and face must be thoroughly washed before eating, drinking, etc.
- ** Any modifications to this safety plan MUST be approved by the SSHO and the CIH.

SECTION 5 - PERSONAL PROTECTIVE EQUIPMENT

5.1 Introduction

Personal protective equipment (PPE) is the major method used to minimize potential employee exposure to site contamination. The levels of protection for on-site personnel have been based on OSHA requirements. All P. Gioioso & Sons personnel and their contractors on-site shall have their own personal safety equipment which will be used according to the direction of the SSHO. All contractors and subcontractors are required to provide their own PPE in accordance with their site-specific HMH&SP. All PPE shall be kept cleaned and maintained in a proper manner. Personnel will have been trained in the proper use and maintenance of PPE. It is the responsibility of the Contractor to supply and maintain all required PPE in a usable fashion.

At a minimum, all P. Gioioso & Sons employees and visitors will be required to have ANSI-approved hardhats, steel toe safety shoes or boots and safety glasses whenever on active work sites. Additional PPE as prescribed in this plan shall be worn on-site at all times. Loose sleeves, cuffs, loose clothing, ties, or other objects that may become entangled in machinery are not permitted. Reflective vests will be used whenever working in or around automotive or truck traffic. Never walk within the swing radius of equipment and make certain the operator/helper see you and know where you are.

OSHA has implemented a standard on personal protective equipment, 29 CFR 1910.132. This standard defines approved types of PPE for eye and face protection, head, and foot protection. The appropriate types of PPE shall be designated for the hazards of the particular task. All PPE shall comply with the appropriate ANSI designation as referenced in the standard.

Based on the information provided in the site characterization reports, controls will be implemented to reduce the potential for personnel to be exposed to contaminants at levels above the OSHA Permissible Exposure Limits (PELs), ACGIH Threshold Limit Values (TLVs), or encounter conditions that are Immediately Dangerous to Life and Health (IDLH). The greatest

potential for exposure will be inhalation of dust containing lead, chromium and cadmium as well as dust containing these and other metals and ACM that may be released to the air as the soil material is excavated.

Based on concentrations of metals in the soil and the potential for ACM, the site is generally considered to have a very low to low hazard evaluation. Contingencies have been made to upgrade the site if necessary. It is anticipated that most if not all of the work by P. Gioioso & Sons personnel will be performed at Level D or Modified Level D, given the site activities and the hazards at the site. All activities within the tented enclosure will use Level C from the start of intrusive activities until the protective cover is restored. The length of soil excavation is expected to be five days.

PPE for all remaining work outside of the tented enclosure will be set at Level D in all clean areas and in support locations and Modified Level D in areas where skin contact with hazardous materials may occur. These include areas where "overt" contamination is identified. For purposes of worker protection within the context of this HMM&SP, this will occur either when indicated on the Air Monitoring Plan (Page 42) for action on Upgrade/Downgrade; or when visible contamination is observed as defined in this plan by DEP criteria (visual or olfactory) during soil-intrusive work.

The following criteria may be used as guidelines for making this determination in soil samples: VPH samples which exceeded 100 mg/kg, TPH samples which exceeded 1,000 mg/kg or lead levels exceed 300 mg/kg. In addition, if levels of VOC's exceed 10 ppm for a period of ten minutes continuous, if levels of airborne dust exceed 0.25 mg/m^3 for ten minutes, if asbestos fiber levels inside the enclosure exceed 0.1 f/cc or if visible dust is observed from work or other activities performed within an asbestos-regulated area, then this may also be trigger for Upgrade/Downgrade. If any conditions requiring protection above Level C, work will be stopped and the HMM&SP will be reviewed by the Project Manager and the CIH to reflect the more critical requirements of this level of work is prepared. **Any work performed using a PPE Level**

above Level C will be considered a change in condition. The Owner or Owner's representative will be notified as soon as practical.

5.2 Description of the Levels of Protection

The following is a brief description of levels of protection to be used by site personnel:

- Level D:
- Work Clothes
 - Safety Shoes with Outer Rubber Slush Boots (for water)
 - Gloves
 - Hard Hat
 - Safety Glasses w/ side shields
 - Reflective Vest (in high traffic areas and after dusk)
- Modified Level D:
- Tyvek or dust-resistant cloth coveralls - Dry work and areas of low contamination
 - Outer Rubber Slush Boots
 - Outer Chemically Resistant Gloves - Butyl/Neoprene
 - Hard Hat
 - Safety Shoes
 - Safety Glasses w/ side shields or goggles
 - Reflective Vest (in high traffic areas and after dusk)
- Level C:
- Half -face respirator with organic vapor/P-100 cartridges
 - Tyvek uncoated disposable coveralls
 - Outer Rubber Boots
 - Outer Chemically Resistant Gloves - Butyl/Neoprene
 - Hard Hat
 - Safety Shoes
 - Safety Glasses w/ side shields or goggles
 - Reflective Vest (in high traffic areas and after dusk)

5.3 Preliminary Minimum Protection Level for Workers by Site Activity

P. Gioioso & Sons personnel or their subcontractors will be performing most of these activities. The following represents the recommended minimum levels of PPE to be utilized while performing these tasks:

Mobilization/Demobilization.....	Level D
Fence Installation.....	Level D
Enclosure Construction.....	Level D
CIPP Work.....	Modified Level D
Excavation and Handling of Fill/Natural Soils by Contractor (clean).....	Level D
Excavation, loading of asbestos-contaminated soils,.....	Level C
laying pipe, backfilling soil inside enclosure	
Soil stockpiling of imported clean soil and handling clean fill	Level D
on-site by Contractor.	
Soils sampling and analysis (by Contractor)	Level D

5.4 Action Levels for Upgrade/Downgrade of Level of Protection

The action levels for the upgrade or downgrade of worker personal protective equipment have been based upon information published by the American Conference of Governmental Industrial Hygienists (ACGIH), the Occupational Safety and Health Administration (OSHA), and the United States Environmental Protection Agency (US EPA). The action levels are based upon established Permissible Exposure Limits (OSHA), Threshold Limit Values (ACGIH), and Short-Term Exposure Limits (ACGIH). The action levels have been established for each work activity/contaminant present.

5.4.1 ACM

The OSHA PEL for asbestos on a construction site is 0.1 fibers per cubic centimeter (f/cc). Personal samples will be collected for workers involved with asbestos abatement activities. In the event samples for asbestos are greater than 0.1f/cc, employees will be required to use half-face air purifying respirators at a minimum when performing soil excavation work inside the tented, ventilated enclosure.

5.4.2 Total Volatile Organics

The action level of 10 ppm sustained for ten minutes will be used for upgrade and downgrade of PPE using a level of total volatile organic compounds. In the event TPH is encountered, a level of 0.5 ppm for benzene will also be used as an upgrade/downgrade, based on one-half of the PEL for benzene.

The upper level of 250 ppm for VOCs for air-purifying respirators was established using five times the TLV for toluene. The level of 5 ppm for benzene is also based on 5 times the TLV for that compound. If levels for TVOC's exceed 250 ppm, or for benzene, 5 ppm for five minutes, then all work will cease, and the workers shall leave the work area, until additional assessment is made in conjunction with the CIH. If the level of protection will be upgraded above Level C, all work will temporarily cease and the CIH will be notified. Additional engineering controls will be implemented. This will not be performed until the HMM&SP is reviewed and amended to reflect the change in site conditions and controls.

5.4.3 Lead/Chromium/Cadmium &Particulates

Levels of lead, arsenic, chromium and cadmium in soils may be present, based on extrapolation of data from nearby properties. The concentrations are generally very low so it is unlikely that respiratory protection will be required in this project. In the event that airborne dust levels are elevated, half-face air-purifying respirators equipped with HEPA (P-100) filters and organic vapor cartridges will provide a high level of protection, where Level C is required. HEPA, now called (P-100) filters by definition, remove 99.97 percent of all particulates greater than 0.3 microns in size, and the organic vapor cartridges remove volatile organic compounds up to 1000 ppm in concentration. Airborne dust will be substantially larger sized particles. The protection factor afforded by the respirator will vary from individual to individual based on their ability to fit the respirator, and properly donning the respirator in use. Fit protection factors in excess of 10 are normally associated with half-face air purifying respirators.

Periodic visual observations and monitoring for total suspended particulate will be used as a surrogate measurement for lead, arsenic and cadmium exposures during excavation of fill. A limit based on a measurement of total suspended particulate of 0.25 mg/M^3 in the breathing zone is suitable to protect employees from exposures to lead and other metals. Using an estimated maximum value of lead of 600 mg/kg , twice the S-1 limit for lead in soil, at a dust limit of 0.25 mg/M^3 will be used as the criteria to upgrade protection to Level C, and a limit of 0.25 mg/M^3 will be used to implement dust suppression measures. The calculations are as follows:

$$\text{TSP Reading: } 0.6 \text{ mg/kg} \times 10^{-3} \times 0.25 \text{ mg/M}^3 \times 1,000 \text{ } \mu\text{g/mg} = 0.15 \text{ } \mu\text{g/M}^3. (< 1 \% \text{ of AL for lead})$$

5.5 Respiratory Protection

It is unlikely respiratory protection may be required for on-site personnel exposed to suspected hazardous contaminants through inhalation. Initially, excavation activities are assigned a protection level of Modified D or Level C, based on the job responsibility and the contamination present within the soils. This may be up or downgraded, based on initial monitoring results. In the unlikely event that volatile organic compounds are determined to be present at levels requiring an upgrade, then half-face respirators will be used.

If upgrading the site above Level C is necessary, all work will be stopped temporarily, and the HMM&SP will be reviewed. All employees who are required to wear air purifying respiratory equipment will be required to show proof of medical examination to the SSHO that indicates that the employee is capable of wearing such a device. Proof of initial and periodic training and qualitative or quantitative fit testing for use of air purifying respirators is also necessary.

5.6 Standard Operating Procedures for Respirators

In the event air contaminants are detected at levels requiring an upgrade, a half-face respirator with HEPA (P-100) filters and organic vapor/P-100 cartridges will be used. Respirators shall be cleaned daily according to procedures prescribed by the manufacturer. Cartridges will be used and replaced at least daily, or at any time if breakthrough is detected while in use. Negative and positive pressure fit checks will be performed daily by each individual respirator wearer upon donning the respirator. The following checks shall be performed on a daily basis in addition to the above:

- Exhalation Valve - pull off plastic cover and check valve for debris or for tears in the neoprene valve (which could cause leakage). Also check valve cover for tightness.
- Inhalation Valves (two) - screw off cartridges and visually inspect neoprene valves for tears. Make sure that the inhalation valves and cartridge receptacle gaskets are in place.
- Make sure a protective lens cover is attached to the lens. Lenses are expensive to replace and should be protected at all times.
- Make sure you have the right cartridge. Cartridges are not interchangeable among respirators.
- Make sure that the face piece harness is not damaged. The serrated portion of the harness can fragment which will prevent proper face seal adjustment.
- Make sure the speaking diaphragm retainer ring is hand tight (if applicable).

A detailed description of the respirator program is contained in SOP Number 2 attached to this HIMH&SP.

SECTION 6 - AIR MONITORING INSTRUMENTATION

6.1 Introduction

The following is a listing of on-site monitoring instrumentation that will be employed during the course of the site work for the determination of the level of protection to be worn by the site workers. Personnel who will be operating this instrumentation shall be fully trained and experienced in its use and operation. Monitoring within the enclosure and at the perimeter of the enclosure will be performed by the SSHO for P. Gioioso or their designee.

6.2 Site Monitoring Equipment for Employee and General Public Protection

- Photoionization Detector with 10.2 eV probe .
- Total Suspended Particulates (Dust-Trak or equivalent) - Used as needed for perimeter measurements and exclusion zone in breathing zone.
- Sample pumps for asbestos fibers

The photoionization monitor may be an H-Nu Model PI-101, Thermo Environmental Instruments OVM Model 580 B, Mini-RAE or the equivalent. The PID should be equipped with a 10.2 eV lamp to maximize sensitivity for TPH compounds. As an alternative, a Flame Ionization Detector (FID) may be used on site, however it is not recommended.

At a minimum exposure monitoring and air sampling during "Exclusion Zone" activities shall be performed in the breathing zone of the worker and at the upwind and downwind limits of the Exclusion Zone, and recorded at the following frequencies:

Total Organic Vapors: Surveyed and recorded at least every 60 minutes whenever measurements at the perimeter of the work area exceed 1 ppm above background for ten minutes, or 10 ppm for ten minutes in the excavation.

Total Particulates: Surveyed and recorded at least every 60 minutes and whenever measurements exceed 0.25 mg/M^3 within the enclosure or 0.075 mg/M^3 at the perimeter to the enclosure.

6.3 Air Monitoring Plan

6.3.1 Sampling for Asbestiform Fibers

Air monitoring for asbestos fibers will be performed within the enclosure for employee protection and air monitoring will be performed around the perimeter of the exclusion zone will be performed to assure the effectiveness of the controls in place.

Personal samples will be collected on individuals working within the enclosure. The personal samples will be collected by the SSHO or designated representative for P. Gioioso. The samples will be collected by drawing air through 25 mm mixed cellulose ester membranes using personal sampling pumps. The samples will be collected at flow rates of 2.0 to 2.5 liters per minute for the entire shift. Personal samples will be brought to an asbestos laboratory licensed in the Commonwealth of Massachusetts where they will be analyzed using phase contrast microscopy in accordance with NIOSH Method 7400.

Perimeter air samples will be collected in accordance with Section 2082 of the Specifications. Area air samples will be collected up to 50 feet from the boundary of the enclosure. The samples will be collected by drawing air through 25 mm mixed cellulose ester membranes at a flow rate of 8 to 10 liters per minute for a minimum period of two hours. The samples will either by analyzed on site or at an asbestos laboratory licensed in the Commonwealth of Massachusetts where they will be analyzed using phase contrast microscopy in accordance with NIOSH Method 7400. The analyst performing the analysis shall be on the Asbestos Analyst Registry.

In the event any two exclusion zone perimeter samples in a twenty-four hour period exceed 0.01 f/cc, the industrial hygienist for P. Gioioso will notify the City of Cambridge and W.R. Grace & Co. – Conn. All work will temporarily stop until the sampling is repeated. The work practices in use will be reviewed to make certain the best available practices are being implemented. Work will resume once the cause has been identified and corrected.

6.3.2 Sampling for Dust

Measurements will be collected for airborne dust periodically throughout the day when soil intrusive activities are underway within the enclosure. In addition, monitoring and increased soil wetting is required when there is visual evidence of dust. This monitoring will be performed visually and using direct-reading instrumentation. A meter capable of measuring total suspended particulates, such as a Dust-Trak or equivalent shall be used to measure airborne particulate levels. Work will be halted if visible dust is observed from work or other activities performed within an asbestos-regulated area. The general contractor will perform monitoring for airborne dust around the perimeter of the exclusion zone.

A level of 0.25 mg/M^3 is established for work within the enclosure. The limit is based on the use of particulate as a surrogate for metals and is described in Section 5.4.3. A level of 0.075 mg/M^3 is used for perimeter monitoring and is based on one-half of the National Ambient Air Quality Standard of 0.15 mg/M^3 for a twenty-four hour average concentration. If the dust level is exceeded and the source is from activity within the enclosure, work will be temporarily stopped until the dust suppression activities are reviewed. If the source is determined to be from non-work related activities (i.e. passing traffic or ambient conditions), no corrective actions will be required.

6.3.3 Sampling for VOC's

Monitoring for VOCs is performed with a 10.2 eV photoionization detector (PID) to measure total volatile organic compounds during excavation of fill during soil intrusive activities. The results of the monitoring will be used to implement engineering and work practice controls and to make upgrade and downgrade decisions in the level of required PPE.

A level of 10 ppm for a period of ten minutes will be used for activities inside the enclosure. A level of 1 ppm above the background for a period of ten minutes will be used for perimeter monitoring. Monitoring will also be performed in the event that odor complaints are received from abutters.

Given the potential for lead, chromium and cadmium exposure and the potential for ACM in the fill material, the data on the concentrations in the soil and the potential for employee exposure, it is Covino's professional opinion that risk to P. Gioioso & Sons employees is very low to low. It is Covino's opinion that the collection of full-shift breathing zone samples for lead, chromium and cadmium to comply with the "initial determination" requirements of 29 CFR 1926.62 OSHA Construction Lead and the chromium and cadmium standards is not required.

6.4 Calibration

When an instrument is used to monitor airborne concentrations of a known substance, it should be calibrated to that specific substance at a concentration comparable to the action levels or concentrations anticipated in the field. Since this is rarely the case, an instrument is typically calibrated in the field with a gas that is representative of the instrument's response to the widest variety of substances. In the case of the PIDs, isobutylene is typically used. The dust monitors are calibrated at the factory. Typically, no field calibration of the dust meters is required.

The direct reading air monitoring instruments used at the site must be returned to the factory and calibrated and checked out on an annual basis. The calibration must also be checked in the field at least two (2) times per day, including the beginning and ending of the shift, to establish a frame of reference and to verify that the instrument is working properly. The results of the calibration will be noted in the daily log.

6.5 Recording Air Monitoring Data

All particulate concentrations detected above the action levels at the exclusion zone and work zone boundary shall be recorded. The location, date, time, monitoring device, calibration data, and weather conditions (temperature, wind speed and direction) shall all be recorded on monitoring log sheets. Copies of all monitoring log sheets shall be included in the weekly report to the Engineer upon request. A summary of the sampling data, including the actions taken, and their effectiveness shall be included in the weekly report as well.

Information gathered during the air monitoring program shall be used by the SSHO to determine appropriate measures to be taken to protect employees, contractors and subcontractors during:

1. Soil excavation, trenching and removal
2. Soil stockpiling
3. Soil classification
4. Soil transport and removal

6.6 Air Monitoring Responsibilities

The CIH has established air monitoring strategies and sampling frequency to characterize and quantify any airborne release and transport of contaminants during soil excavation. These strategies and protocols address appropriate air monitoring for volatile organic compounds in the active work zones of the site and at the active site perimeter. The program is part of the HMM&SP. Monitoring will be performed by the SSHO for P. Gioioso & Sons or their designee

6.7 Prework Baseline Monitoring

Prior to commencement of work, the SSHO should establish and document a baseline concentration for asbestos fibers at the property line and at the perimeter of the exclusion zone. This establishes the contribution from non-project related sources such as automotive traffic, and local commerce that may impact on the project area. Since the work site is within a quarter-mile of Routes 2/3/16, a major commercial thoroughfare, the potential exists that background ACM and particulate levels may be elevated.

Air Monitoring Plan

Notes:

1. The duration of the monitoring measurements will be continuous.
2. All measurements will be taken in the breathing zone of the workers.
3. Readings for upgrade and downgrade decisions will be for a continuous 5 minute period.

Possible	Measuring	Initial Level	Level	Action
Soil Excavation Stockpiling/Reuse Sampling	TPH PID	Level D Modified D	>Background and < 10 ppm	Maintain at Level D or Modified D. At 5 ppm TVOC, start benzene monitoring
			>10 ppm and <250 ppm	Stop Work, Upgrade to Level C
			>250 ppm	Stop Work and Evacuate
Inside enclosure	Total Susp. Particulates Visual and/or Dust Trak	Level D	> Background < 0.25 mg/M ³	Maintain at Level D or Modified D.
			> 0.25 mg/M ³	Stop Work. Upgrade to Level C.
Perimeter	Total Susp. Particulates		> 0.075mg/M ³	Initiate Dust Suppression Program
Intrusive work Inside enclosure	ACM Personal Sampling	Level D	> 0.1 f/cc	Stop work and upgrade to Level C
Perimeter ¹	ACM Area Sampling	Level D	> 0.01 f/cc	Stop work and evaluate
Perimeter ¹	VOC's Area Sampling	Level D	> 1 ppm/10 min	Stop work and evaluate
Inside enclosure	VOC's PID	Level D/C	> 10 ppm/10 min	Stop work and upgrade to Level C (unless already at Level C for excavation)

1. Perimeter is defined herein as fifty feet (50') outside of the enclosure.

SECTION 7 - DECONTAMINATION

7.1 Introduction

Appropriate decontamination activities will be conducted whenever site workers have completed performing soil intrusive activities in the area(s) where contamination is known to exist, and where exposure to this contamination could cause risk to health of on-site workers in the absence of PPE defined for that area. Soil excavation will be limited to the vented enclosures. The excavator, roll-offs and all equipment used within the Site 1 enclosure and hand excavation tools within the Site 2 enclosure will be decontaminated and visually inspected by the SSHO before it is removed. Trucks and other vehicles that remain outside the enclosures do not require decontamination because they do not come into contact with soil from the excavation. The excavation will have a layer of crushed stone on top of the new lines. The trench in Site 2 will be backfilled with concrete. Decontamination water will be re-directed into the excavation using berms and similar measures. If decontamination water inadvertently falls on unpaved areas the top six inches of soil in that area will be removed and replaced with clean soil. If soils are stockpiled on unpaved surfaces, the top six inches of soil in that area shall be excavated following stockpile removal and replaced with clean soil.

\ The sign in/sign out record shall have a category to reflect that all equipment used in the Exclusion Zone has been decontaminated.

7.2 Personnel Decontamination

Decontamination procedures will be followed by all personnel leaving the Exclusion Zone. Under no circumstances (except emergency evacuation) will personnel be allowed to leave the site prior to decontamination. A three-chambered decontamination facility will be used as a personnel decontamination station. A potable water wash station will be available for washing hands and face. Designated locations will be identified for decontamination of personnel and equipment using portable barriers or stanchions, and barrier tape.

When worn, disposable items (i.e., Tyvek or dust-resistant cloth coveralls, inner gloves, and overboots) will be changed on a daily basis as required unless there is a reason to change sooner. Respirator cartridges will be changed daily, unless more frequent changes are deemed appropriate, such as breakthrough.

Portable wash down facilities such as water buckets, sprayers, hoses or other designated equipment will be available in the decontamination area for wash down and cleaning of personnel and equipment. All personnel will wash their face and hands before leaving the site. Given the short duration of the project, and the time of year, it is not anticipated that a wash facility will be required for employee decontamination. Portable bathrooms and wash stations will be provided by the General Contractor as described in Section 8.7 in this document, and in accordance with OSHA regulations on Sanitary Facilities.

If non-disposable equipment (i.e., boots, gloves, respirators, etc.) are visibly contaminated, they should be washed before leaving the contamination reduction zone for the next site. This water will be discharged back to the ground unless otherwise directed with guidance from the LSP. Workers are to segregate and store their personal protective equipment separate from their personal clothing. In no circumstances are workers allowed to take from the site or wear home any contaminated clothing or equipment.

7.3 Small Equipment Decontamination

Small equipment will be protected from contamination as much as possible by covering the instruments with plastic (to the extent feasible) without hindering operation of the unit. Contaminated equipment will be cleaned as needed. The units will be checked, standardized, recharged as necessary for the next day's operation, and then prepared with new protective coverings. Hand tools including shovels and buckets will be pressure washed and inspected by the SSHO before removal.

7.4 Heavy Equipment Decontamination

All equipment that shall enter the designated exclusion zone will be required to undergo decontamination prior to exiting from the enclosure. All decontamination activity will be undertaken at the location designated within the Site Control Plan. Care shall be exercised when loading lined roll-offs to prevent spillage of soil on the ground. The rolloffs will be lined off-site and delivered to the site with the plastic overlapping the outsides of the rolloff. Once filled, the plastic on the roll-offs will be pulled over the top of the soil, sealed with spray adhesive and taped. The outside of the roll-offs will be cleaned and washed, and the wash water discharged as described above. The roll-offs will be stored adjacent to the enclosure for a period not to exceed 48 hours prior to removal. The excavator will be first brushed to remove caked on soil and then pressure washed until visibly clean.

7.5 Disposal of Decontaminated Materials

All protective gear, decontamination fluids (for both personnel and equipment), and other disposal materials will be disposed of in accordance with the soil management plan and applicable regulations. Soiled personal protective equipment will be collected and placed in drums for later disposal.

SECTION 8 - EMERGENCY/CONTINGENCY PLANNING

8.1 Emergency/Contingency Plan

This section identifies the emergency contingency planning undertaken for operations at the site, and includes further information to be used under emergency conditions such as emergency telephone numbers, routes to emergency medical facilities and emergency signals.

8.2 Evacuation

Withdrawal Upwind - When conditions which endanger the safety or health of workers warrant moving away from the work site, the crew will relocate upwind at a distance of approximately 100 feet or farther, as indicated by site monitoring instruments. W.R. Grace & Co – Conn will be notified for the protection of facility employees in the event of an evacuation. The side of the Alewife Center parking lot will be used as the rally point for the Contractor employees in the event evacuation is ordered. This area will be discussed as safety meetings and marked with a sign and a yellow flag. In the event of withdrawal, the SSHO and a member of the crew (the buddy system must be used) may return to the work site to determine if the condition noted is transient or persistent.

If persistent levels of air contaminants remain, an alarm should be sounded to notify personnel of the situation and the need to leave the site. The site management will be notified of conditions. This alarm will be given using both a compressed air horn and portable radios, using a pre-arranged signal or tone, or message as described in the HMM&SP:

The following signals will be used to indicate an emergency situation:

- One long blast repeated three times at five second intervals - Man down
- Three short blasts repeated three times at five second intervals - Evacuate site
- Alternating short and long blasts - All clear

When site access is restricted, thus hindering escape, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes. The Contractor and/or subcontractors will have designated "counters" with the responsibility to account for all employees and visitors in the event of an evacuation.

Site Evacuation - When conditions warrant site evacuation, the work party will proceed upwind of the work site and notify the SSHO, security force, and field office of site conditions. The Project Manager, Site Foreman or SSHO have authority to order an evacuation of the site.

In the event that an emergency condition is identified, the Contractor shall notify the City of Cambridge Fire Department utilizing 911. The Fire Department shall have jurisdiction for providing communications to the greater community.

8.3 Chemical Release

In the event of any spill, release or discovery of soil, water or groundwater contamination, notice should be given to Somerville Hospital (See Section 8.9), W.R. Grace & Co - Conn and the Project Engineer as soon as possible after such discovery to insure the safety of those working on the site as well as for making proper notification for regulatory reporting requirements. Any such required reporting to MADEP should be made by W.R. Grace & Co - Conn as the Property Owner or their designated LSP with the exception that, any release caused by the contractor must be reported by the contractor or the contractor's LSP to the DEP within the timeframe provided under the MCP.

8.4 Emergency Medical Treatment/First Aid

First aid will be rendered to any person injured on-site, as appropriate by any individual trained in First Aid/CPR. At least one trained person will be on site at all times during soil excavation work. First aid kits will be kept in the project trailer and in a Supervisor's vehicle. Following initial treatment, the injured person will then be transported for further examination and/or

treatment. The preferred transport method is a professional emergency transportation service; however, when this is not readily available or would result in excessive delay, other transport is authorized. Under no circumstances will injured persons transport themselves to a medical facility for emergency treatment.

If an injury occurs in an Exclusion Zone area, provisions for decontamination of the victim will be made. However, life-threatening conditions may preclude normal decontamination procedures. In such cases, arrangements will be made with the medical facility and transporter to provide for the situation.

8.5 Heat Stress

SOP #3 deals with the signs, symptoms and first aid for heat stress victims. Monitoring for heat stress should begin whenever the work area temperature exceeds 70° F. All employees will be trained in recognition of the signs and symptoms of heat stress and will be required to do proper monitoring whenever they feel it is necessary. Any employee who feels that they are suffering the effect of heat stress shall inform the SSHO immediately.

P. Gioioso & Sons employees shall follow the recommendations for monitoring requirements, and suggested work/rest schedules for heat stress found in the ACGIH-02, TLV Booklet (2008). For workers who wear semi-permeable or impermeable clothing (i.e. Saranex or PVC coated Tyvek), the technical guidelines in NIOSH Publication 85-115 shall be observed. The project is scheduled to start in the Fall of 2010, and site activities will continue for about eighteen months. Given the duration of the contract, the level of PPE for most tasks and an opportunity for acclimatization, heat stress is not likely to become a significant issue on this project.

The procedures for monitoring heat stress shall be to measure the radial heart rate (pulse) during a 30 second interval at the beginning of a rest period. If the heart rate exceeds 110 beats per minute, shorten the next work cycle by one-third, while keeping the rest period the same length. If the heart rate exceeds 110 beats per minute at the beginning of the next rest period, shorten the following work cycle by one-third. Continue monitoring and shortening work cycles until the

heart rate is less than 110 beats per minute. Fluids will be available in the Support Zone for employees to maintain fluid intake during warm work periods.

8.6 Cold Stress

SOP #3 deals with the signs, symptoms and first aid for cold stress victims. Monitoring for cold stress should begin whenever the work area temperature drops below 50° F. Employees should be aware of the symptoms of cold stress and frost bite. If any signs or symptoms appear, report it immediately. The project is scheduled to start in the Fall of 2010, and site activities will continue for about eighteen months. Cold stress is not likely to become an issue for this project. In the event of extreme cold conditions, procedures to monitor and avoid cold stress shall be followed in accordance with the current TLV's for Cold Stress as recommended by ACGIH. This includes the use of layered clothing, periodic breaks in a heated area, and the use of warm non-alcoholic beverages.

8.7 Illumination

Site operations will not be permitted without adequate lighting: a least 5 foot candles is required for work on the site. Therefore, unless provisions are made for artificial light, downrange operations must halt in time to permit personnel and equipment to exit the Exclusion Zone and proceed through decontamination before dusk. Equally, operations will not begin in the morning until lighting is adequate.

8.8 Sanitation

Provisions have been made for temporary sanitation facilities for the work force. At a minimum, the provision of toilet facilities will meet the requirements of 29 CFR 1910.120(n), which includes one facility for less than 20 employees, or one toilet and one urinal for every 40 employees, up to 200; then one of each for every 50 employees. Facilities shall be provided to allow employees to wash hands and face with soap and water at breaks, end of shift and when using sanitary facilities.

8.9 Emergency Information

EMERGENCY RESPONSE

Primary

EMERGENCY NUMBERS

AMBULANCE	9 - 1 - 1 (City of Cambridge)
POLICE DEPARTMENT	9 - 1 - 1 (City of Cambridge)
FIRE DEPARTMENT	9 - 1 - 1 (City of Cambridge)
HOSPITAL	Somerville Hospital (Cambridge Health Alliance) 230 Highland Avenue (Emergency Department) Somerville, MA
HOSPITAL CONTACT:	(617) 591-4500 (Main Number)

EMERGENCY ROUTES TO From site, head west on Whittemore Avenue toward Kimball Street. Take 1st **RIGHT** on Kimball Street. Take 1st **RIGHT** on Columbus Avenue. Continue 0.2 miles. Turn **RIGHT** on Massachusetts Avenue. Continue 1.0 mile. Turn **LEFT** on Beech Street. Continue 0.1 miles. Turn **RIGHT** on Elm Street. Immediate turn **LEFT** on Willow Avenue. Turn **RIGHT** on Highland Avenue. Continue 0.5 miles. Follow signs for Emergency Department. Travel Time 8 minutes.

OTHER EMERGENCY NUMBERS

DEP: Northeast - Wilmington	PHONE: (978) 694-3200
DEP Emergency Telephone	PHONE: (888) 304-1133
MASSACHUSETTS STATE POLICE Troop H-4 - 250 Leverett Circle, Boston	PHONE: (617) 727-6780
Massachusetts Poison Control	PHONE: (800) 222-1222
City of Cambridge Dept. of Public Works	PHONE: (617) 349-4800

Date of HASP: March 7, 2011

W.R. Grace & Co.-CONN – David Croce	PHONE 617.498-4416
City of Cambridge Inspectional Services	PHONE: (617) 349-6100
P. Gioioso & Sons – Mario Romania	CELL: (617) 592-3791 OFFICE: (617) 364-5800
P. Gioioso & Sons – Sam Doolan	CELL: (617) 592-3782 OFFICE: (617) 364-5800
EMP – Ted Patch	CELL: (781) 254-8364 OFFICE: (781) 834-3822
Covino Environmental, Inc. CIH - Scott Herzog	PHONE: (781) 933-2555 CELL : (978) 460-1904 EMERGENCY: (781) 933-2555 and follow directions to leave emergency page.
Bruno Cardarelli, Kleinfelder • S E A Chief Resident Engineer	CELL: (617) 799-4374
DIGSAFE	(888) DIG-SAFE

PROCEDURES FOR HANDLING PERSONNEL WITH EXCESSIVE EXPOSURE TO CHEMICALS OR CONTAMINATED SOIL

Decontamination will be done at a location that is convenient to the area where the Emergency Response actions are occurring, in an upwind location. The decision to decontaminate a victim is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving treatment. If decontamination does not interfere with essential treatment, it will be performed and will include a wash, rinse and/or cut off of protective clothing and equipment.

If decontamination cannot be done, the victim will be wrapped in blankets, plastic or rubber to reduce contamination of other personnel. Emergency and off-site medical personnel will be

alerted to potential contamination. A site person familiar with the incident and the chemicals will be sent if available.

Fire/Explosion

Upon notification of a fire or explosion on-site, all personnel will evacuate the site, immediately proceed upwind to the agreed upon evacuation location. The City of Cambridge Fire Department and W.R. Grace & Co – Conn shall be alerted along with the Project Manager. Upon their arrival, the senior responding officer for the Fire Department shall assume the role of incident commander. All P. Gioioso & Sons personnel shall take directions from the incident commander and assist with any given directions.

Personal Protective Equipment Failure

If any site personnel experience a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the exclusion zone. Re-entry shall not be permitted until the equipment has been repaired or replaced.

Other Equipment Failure

If any other equipment on-site fails to operate properly, the SSHO shall be notified to determine the effect of this failure on continuing operations on-site. If the failure affects the safety of on-site personnel or prevents completion of the tasks, all personnel shall leave the exclusion zone until the situation is evaluated and appropriate actions taken.

In all situations, when an on-site emergency results in evacuation of the exclusion zone, all personnel shall not re-enter until:

1. The conditions resulting in the emergency have been corrected.
2. The hazards have been reassessed.
3. The Site Safety Plan has been reviewed.
4. All site personnel have been briefed on any changes in the HMM&SP.

SECTION 9 - RECORDKEEPING, LOGS, AND REPORTS

9.1 General Requirements

All required records, logs and forms will be maintained according to the appropriate regulations. This includes all safety inspection reports, site entry log, accident/incident reports, monitoring log, medical certifications, first aid/CPR, 40 hour training, current 8-hour refresher training, current 8-hour supervisor training, hazard communication training, air monitoring results, etc.

All exposure and medical monitoring records will be maintained according to OSHA 29 CFR 1910.20 (Access to Records), 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response) and 29 CFR 1926.

All personnel conducting activities that may involve direct contact with asbestos fibers, including soils, loading trucks and sealing filled truck lining will have at minimum, 32 hours of asbestos abatement worker's training and be certified by the Massachusetts DOS as abatement workers. All removal activities will be overseen by a DOS-certified abatement supervisor.

9.2 Daily Safety Inspection Logs

The daily safety inspection log will include as a minimum:

1. Date
2. Area (site specific) checked
3. Employees in a particular area
4. * Equipment being utilized by employees
5. Protective clothing being worn by employees
6. Protective devices being used
7. Contractor's Personnel
8. Visitors
9. Designated State and Federal Representatives
10. Air Monitoring Data
11. Site Safety and Health Officer signature and date

9.3 Other Reports

Other reports to be maintained by the SSHO include a weekly report detailing the monitoring results, actions taken, and the results of those actions; minutes of required safety meetings; and a phase-out report to be prepared at the conclusion of the project. All reports will be maintained in duplicate by P. Gioioso & Sons .

STANDARD OPERATING PROCEDURE

NUMBER 1

Personal Protective Equipment Program

Standard Operating Procedure
Personal Protective Equipment Program

I. PURPOSE

To provide minimum requirements for protection of employees, visitors and contractors from injury or ill health through the proper selection and use of Personal Protective Equipment (PPE).

II. PROGRAM RESPONSIBILITIES

- A. The Site Safety and Health Officer is the personal protective equipment administrator and has the responsibility to:
1. Coordinate the program.
 2. Insure that annual training is conducted.
 3. Review the program annually.
- B. Supervisors are responsible for informing workers of the personal protective equipment requirements within their department/area. The supervisor will also ensure that workers have been instructed in the proper donning, wearing, removal and the cleaning or disposal procedures for such equipment, and that the worker has understood the instructions. The supervisor will provide additional instructions as needed, and will strictly enforce site rules related to PPE use.
- C. Workers are responsible for properly donning, wearing, removing, cleaning, and disposing of the required protective equipment.
- D. The Site Health and Safety Officer (SSHO) is responsible for ensuring that Contractors provide their own protective equipment as specified in this Program.
- E. The SSHO is responsible for maintaining the site PPE inventory control program.
- F. The Project Manager and SSHO are responsible for the purchase of PPE, including respiratory protection.

III. GENERAL REQUIREMENTS

- A. Employees shall only use personal protective equipment supplied by the company.
- B. Visitors will be supplied with the appropriate personal protective equipment.
- C. Personal protective equipment requirements are posted in the site specific Health and Safety Plan.

- D. Disposal of PPE and cleaning of reusable PPE is governed by the procedures specified in the Respirator Program.
- E. Written procedures governing the safe use of PPE that might be required in an emergency are contained in this Standard Operating Procedure. These plans also contain the training requirements for emergency PPE.

IV. CHEMICAL PROTECTIVE CLOTHING

- A. Selection of Chemical Protective Clothing (CPC) will be based on the following:
- Manufacturers' instructions and degradation, penetration permeation data
 - Published literature such as the ACGIH Guidelines Selection of Chemical Protective Clothing
- Selected clothing will be contained in the HMH&SP.

V. PPE INSPECTION

- A. Respirators will be inspected in accordance with the Respiratory Protection Program.
- B. Other PPE should be inspected prior to use by the wearer. Inspection considerations should include: obvious signs of contamination; tears and holes; proper function of closures; seams, etc. Sample PPE inspection checklists are found in Standard Operating Procedure 2.
- C. PPE stored for emergency use should be inspected monthly.

VI. STORAGE

Storage of PPE at the site will follow the following general guidelines.

- A. Boots are decontaminated and stored on a boot rack at the hot line to dry.
- B. Disposable protective clothing may be stored before use at the hot line. However, a covering or other method should be provided to prevent contamination. Disposable clothing articles are placed in waste containers at the hot line after being removed. Disposable clothing is not to be reused.
- C. Respirators are stored in accordance with the Respiratory Protection Program. They should not be stored in the open air in contaminated areas.
- D. Reusable PPE should be stored in accordance with manufacturer's instructions to prevent equipment failure.
- E. Potentially contaminated coveralls worn under disposable coveralls, are stored in containers in a separate area from street clothing.

VII. WORK MISSION DURATION

Since the work mission durations vary from site to site and task to task, it will be the responsibility of the Project Manager and the SSHO to maintain adequate supplies of PPE and breathing air to accomplish the work mission and comply with this program.

STANDARD OPERATING PROCEDURE

NUMBER 2

Respiratory Protection Program

AIR PURIFYING RESPIRATORY PROTECTION

RESPIRATOR TRAINING OUTLINE

- A. Training of respirator wearers in the use, field maintenance, capabilities and limitations of respirators is given initially upon employment to all employees whose work will require the use of respirators, or where an employee changes into a job classification which requires respiratory protection. Retraining is given at least annually thereafter. No employee is allowed to wear a respirator in a work situation until he or she has been trained.
- B. Each employee is trained as follows:
1. Instruction in the nature of the respiratory hazards, and what may happen if the respirator is not used properly.
 2. An explanation of the engineering and administrative control measures being used and why respirators are needed to provide protection.
 3. Instruction in the selection, use, sanitary care, maintenance, proper storage, and limitations of each applicable respirator type.
 4. Demonstrations and practice in proper fitting, wearing, adjusting, and checking the face-to-face piece seal of each applicable respiratory type.
 5. An opportunity to handle the respirator and to wear it in a safe atmosphere for an adequate period of time to ensure familiarity with the characteristics of the respirator.
 6. An opportunity to wear the respirator in a test atmosphere (such as atmospheres generated by smoke tubes or isoamyl acetate) to demonstrate that the respirator protects the worker.
 7. Instructions in how to recognize and cope with emergency situations requiring respiratory protection.
 8. An explanation of the requirement for a self-contained breathing device for work in unknown concentrations and immediately dangerous to life or health (IDLH) atmospheres, and for fire fighting.
 9. An explanation of the medical surveillance program as it relates to the use of respiratory protective equipment.
 10. An explanation of the requirements for maintaining the respirator gas-tight seal, including beard and facial hair policies; and the policy prohibiting the use of contact lenses while wearing respirators.

- C. Records of the training given each individual are placed in the employees training record file.

Respirator Fit Test Form

Employee Name		
Respirator Type (1)		
Face Piece (2)		
Make, Model		
Size		
Cartridge Used		
Test (3)		
Normal Breathing		
Deep Breathing		
Side to Side		
Up and Down		
Speaking		
Bending		
Jogging		
Normal Breathing		
Sensitive to Smoke		
Pass (P) or Fail (F)		

Comments: _____

Person Conducting Fit Test: _____ Date: _____

(1) Respirator Type: AP (air purifying); SA/SCBA (supplied air with SCBA escape bottle); SCBA (self-contained breathing apparatus)

(2) Face Piece: F (full face); H (half mask)

(3) Test: IS (irritant smoke); QN (quantitative)

Monthly Written Respiratory Protection Program Evaluation

11 Points of 29 CFR 1910.134

- 1. There are written standard operating procedures governing the selection and use of respirators.
- 2. Respirators are selected on the basis of hazards to which the worker is exposed.
- 3. Approved or accepted respirators are used when they are available.
- 4. The user is instructed and trained in the proper use of respirators and their limitations.
- 5. Where practical, the respirators are assigned to individual workers for their exclusive use.
- 6. There are regular inspection and evaluations to determine the continued effectiveness of the program.
- 7. Persons will not be assigned to tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work and use the equipment; i.e., medically qualified.
- 8. Respirators will be regularly cleaned and disinfected.
- 9. Respirators will be stored in a convenient, clean and sanitary location.
- 10. Respirators used routinely will be inspected during cleaning.
- 11. Appropriate surveillance of work area conditions and degree of employee exposure or stress will be maintained.

Reviewed by: _____ Date of Review: _____

STANDARD OPERATING PROCEDURE

NUMBER 3

First Aid for the Identification of Heat Exhaustion or
Heat Stroke, and Hypothermia

IDENTIFICATION AND TREATMENT OF HEAT EXHAUSTION OR HEAT STROKE

1. Heat Exhaustion

A. Symptoms: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, his skin is clammy, and he may perspire profusely. The pulse is weak and fast, breathing is shallow. The victim may faint unless he lies down. This may pass, but sometimes it persists and, while heat exhaustion is generally not considered life-threatening, death could occur.

B. First Aid: Immediately remove the victim to the decontamination area in a shady or cool area with good air circulation. Remove all protective outer wear. Call a physician. Treat the victim for shock. (Make the victim lie down, raise feet 6-12 inches, maintain body temperature but loosen all clothing.) If the victim is conscious, it may be helpful to give sips of water. Transport victim to a medical facility.

2. Heat Stroke

A. Symptoms: This is the most serious of heat casualties due to the fact that the body excessively overheats. Body temperatures often are between 107-110° F. The victim will have a red face and may not be breathing. First there is often pain in the head, dizziness, nausea, depression, and a dryness of the skin and mouth. Unconsciousness follows quickly and death is imminent if exposure continues. The attack will usually occur suddenly. Heat stroke is always serious.

B. First Aid: Immediately evacuate the victim to a cool and shady area in the Decontamination Reduction Zone. Remove all protective outer wear and all personal clothing. Lay the victim on his back so that the head and shoulders are slightly elevated. It is imperative that the body temperature be lowered immediately. This can be accomplished by applying cold wet towels, ice bags, etc., to the head and groin. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place in a tub of cool water. The main objective is to cool without chilling. Give no stimulants. Transport the victim to a medical facility as soon as possible.

IDENTIFICATION AND TREATMENT OF FROSTBITE

Frostbite is a localized injury, resulting from a freezing of tissue. It is most common to the fingers and toes due to reduced circulation in the extremities and on the face and ears as they are most commonly exposed (uncovered) to the weather.

For frostbite to occur, there must be subfreezing temperatures. It is most prevalent in very cold temperatures or when cold temperatures are extenuated by the wind (wind chill).

A. Symptoms

1. Pre-Frostbite - Affected area feels painfully cold, but usually flushed (red-rosy) in color.
2. First Degree Frostbite (frost nip - Crystallization in superficial tissues. Affected area no longer feels cold, and is completely numb. Skin coloration is a small P. Gioioso & Sonsor grayish-yellow waxy patch. Immediate treatment will completely reverse the condition with no ill effects.
3. Second Degree (Deep) Frostbite - A deep freezing of the fluids in the underlying soft tissues. Symptoms and treatment are the same as for above. Usually results in a death of tissue, blistering, black skin, loss of toes, etc., with possible complications from gangrene.

B. First Aid

1. Cover and protect the affected part
2. Provide extra clothes
3. Bring indoors as soon as possible
4. Give warm drink
5. Re-warm frozen part quickly by immersing in warm water (if thawed and refrozen, warm at room temperature)
6. Do not rub - causes tissue death
7. Do not apply direct heat

8. Do not break blisters
9. Do not allow to walk after feet thaw
10. Discontinue warming as soon as part becomes flushed
11. Exercise thawed part
12. Separate fingers and toes with sterile gauze
13. Elevate frostbitten parts
14. Seek medical attention because of chance of infection, or gangrene.

C. Treatment

For all frostbite - rapid re-warming (thawing) as soon and as quickly as possible is the preferred treatment. Do not warm tissue that will only be refrozen, or warm feet if they are to be walked upon. Second degree frostbite requires medical attention and the victim should not be re-exposed to the cold.

D. Prevention

1. Fatigue, cigarettes, alcohol, lack of food and drink, clothing which restricts circulation, and any other factors which reduce circulation will contribute to frostbite.
2. Properly insulate all body parts. Extreme cold may require a face mask. Use insulated gloves and boots.
3. Winds and wetness will accentuate frostbite. Keep dry and do not expose skin to the wind.
4. Be observant of each other. Look at ears, rosy cheeks, etc. Often the victim does not realize he has frostbite.

IDENTIFICATION AND TREATMENT OF HYPOTHERMIA

Hypothermia is a systematic lowering of the body temperature. Extreme cases (core temperature below 90° F) result in death of the victim. Hypothermia is the most common cause

of death for persons involved in outdoor wilderness sport activities. It does not require freezing temperatures and, in fact, can occur in ambient temperatures as high as 70° F. Wind and wetness greatly accentuate hypothermia due to the enhanced cooling. Typical hypothermia conditions are a rainy, windy day with 50° F air temperatures.

A. Symptoms

1. First Stage: goose bumps, shivering, feeling chilly
2. Second Stage: violent shivering, blue lips, pale complexion, feeling extremely cold
3. Third Stage: no longer feel cold, lack of coordination, mild unresponsiveness, drowsiness, stumbling
4. Fourth Stage: failing eyesight, victim barely responsive, cannot speak, barely able to or cannot walk.
5. Fifth Stage: coma and rapid death

B. Treatment

For all levels - remove wet, frozen or restrictive clothing. Dry the victim. Re-warming should be via an external heat source which completely envelopes the victim - a warm vehicle, a warm room, a sauna, a tub of warm water, by placing the victim in a sleeping bag with another person(s), etc. - and not a source of radiant heat which will warm only one side of the victim. Be prepared to administer CPR. Do not give the victim alcohol.

1. First Stage: Put on hat, shirt, additional clothing, wind breaker, etc. Eat and drink. Exercise on tense muscles.
2. Second Stage: Same as above, only more so. Warm drinks and re-warm if possible.

NOTE: In hypothermia beyond second stage, the victim can no longer warm himself and must have an external heat source.

3. Third Stage: Re-warming, warm food and drink.
4. Fourth Stage: Remove wet or cold clothing and gradually re-warm victim so that blood trapped in extremities is re-warmed before it is circulated back into inner body to prevent afterdrop. Afterdrop is a further lowering of the body core temperature which results from recirculation of cold blood. Avoid hot, radiant heat sources which will warm surface blood before inner blood has been warmed. Do not give warm drinks which fool the body internally into feeling it is warm. Fourth stage hypothermia victims are best treated by supervised, experienced medical help, as complications can cause death. Place victim in warm vehicle and evacuate immediately to a medical facility.
5. Fifth Stage: Gradual re-warming, but requires sophisticated medical help to prevent death from aftershock (a recirculation of chilled blood causing heart fibrillation).

C. Prevention

1. Wear proper clothing which will insulate the body, keep it dry and break the wind.
2. Cover the head, neck, wrists, and ankles in particular, as heat loss is most prevalent from these points.
3. Eat and drink warm fluids. Avoid eating snow.
4. Keep active to raise body temperature.
5. Avoid fatigue, alcohol, smoking and drugs.
6. Be aware of team members' condition and note symptoms.

STANDARD OPERATING PROCEDURE

NUMBER 4

Confined Space Entry Policy

CONFINED SPACE ENTRY PROCEDURES

A. Confined Space Classification

OSHA has recently implemented the "Permit-Required Confined Space Entry" Standard. This regulation establishes a series of requirements for spaces which meet the definition of a permit-required confined space. In this project, trenches or excavations in excess of five feet in depth which will be entered by employees, meet the definition of a confined space. For each of these spaces, if there is a potential for exposure to an oxygen-deficient, toxic, or combustible environment, or if there is the potential for entrapment or engulfment due to soil stability, or rain, that space meets the definition of a permit-required confined space.

Entry into confined spaces may be required by subcontractor employees. Utility work is a major portion of this project. Manhole entry into new and existing utilities will be required throughout the project. It is not anticipated that entry by J. H. Welch & Sons personnel will be required. Employees have been trained and in the event entry is required for inspection, it will be performed in conjunction with the subcontractor.

Entry to this space requires the issuance of an entry permit, along with a series of requirements for training, supervision of the entry, and preparation for a rescue, should one be required. Prior to entry, the trench or excavation must also be properly trenched, shored, or benched to prevent spillage of dirt into the hole where workers are present.

B. Entry Procedures

Team Size - A minimum of three workers is required for each confined space activity (two entry and one standby; or one entry, one rescue, and one standby).

The one entry/one rescue/one standby arrangement should only be used when the confined space is relatively small and/or the entry person will be in the line of sight at all times. In this instance, the rescue person acts as the second person in the "buddy system."

The two entry/one standby arrangement is used when the area of the confined space is larger, and the tasks may take the worker away from the entryway. Again, care must be taken with this arrangement because the standby person cannot enter the confined space and attempt rescue unless adequately protected (i.e., respiratory and dermal) and replaced by another qualified standby person.

This number of workers is the minimum buddy for these activities and, in most cases, should only be used for relatively nonhazardous confined spaces. Additional crew may be needed if entering a permit-required confined space. Additional crew could include rescue, decontamination, and line-of-sight personnel.

C. General Entry Procedures

The following steps must be taken when entering a confined space:

1. Inspect all pieces of equipment to ensure they are in good working order. **DO NOT ENTER CONFINED SPACE WITH DEFECTIVE EQUIPMENT.**
2. Conduct a background check to identify all potential hazards that may be encountered in the confined space. Determine if there is a potential for fire/explosion hazards, as well as a potential for a toxic or oxygen-deficient atmosphere.
3. Before entry, the atmosphere inside the confined space must be tested. An attempt should be made to test the atmosphere without opening the entryway (i.e., through a vent line or a small opening). If the entryway must be opened to test and only low levels are expected in the confined space, crack open entryway, test breathing zone first, and then test the confined space. If potentially high levels are expected in the breathing zone, respiratory protection should be worn prior to opening the entryway cover.
4. If explosive, toxic, or oxygen-deficient atmosphere is detected, purge or ventilate the confined space prior to entry. Retest the atmosphere three times at 5-minute intervals. A person can enter the confined space without respiratory protection only if all three test results are below the Permissible Exposure Limit/Threshold Limit Value (PEL/TLV), 10 per cent of the LEL, and above 19.5 per cent oxygen (all three conditions must be met).

(NOTE: Any downward deflection of the readings on the oxygen meter from background (i.e., 20.9 per cent) should be viewed as a potential for an IDLH atmosphere. Unless contaminants are known to be nontoxic, do not enter the confined space without respiratory protection if the oxygen level is below background.)

5. Blank, double block and bleed, or otherwise isolate, lockout, and tag all chemical, physical, and/or electrical hazards wherever possible. Reduce all forms of energy to a zero energy state.
6. If using an air-purifying respirator or if an IDLH and/or explosive atmosphere exists, air monitoring must be on a continuous basis. If respiratory protection is not used and there is potential for atmospheric conditions to change due to work practices or conditions, air monitoring should be done periodically. In all these cases, a 5-minute escape pack must be used.
7. Record all results of the tests for hazardous conditions including the location, time, date, weather (if applicable), and readings on the PID, combustible gas meter, oxygen deficiency meter, Drager tubes, and any other equipment.
8. Wear appropriate clothing for site conditions, as determined by the Site Safety and Health Officer (SSHO).
9. A safety belt or harness with lifeline must be worn if hazardous conditions exist, although good safety precautions dictate their use regardless of "existing" conditions. If the

diameter of the entryway is less than 18 inches, the wrist-type harness must be used and special provisions made if a supplied air respirator is necessary.

10. One person (standby) must remain at the entryway at all times and must keep continuous contact with the person entering the confined space. Contact can be maintained by line-of-sight, listening for sounds, the safety line, and/or radio. The standby person must not enter the confined space unless another trained person is available to act as standby, and he/she is equipped with adequate respiratory and dermal protection. (In most cases, respiratory protection would be an airline respirator or SCBA.)
11. Do not smoke when working in or near confined spaces and do not take flash-lighted photographs when explosive gases are known or suspected to be present.
12. Do not rely on permanent ladders because they are often in poor condition. If they must be used, be sure of footing. Inspect permanent ladders for deterioration before entering and while descending. Try each step with one foot, while standing on the step above. When in doubt, use a portable ladder of adequate height to reach 3 feet above opening or a rope ladder, or lower the entry person using the tripod. If a portable ladder is used, it should be tied off, if possible; otherwise, it should be held in place by the standby person.
13. Do not work without adequate lighting. Use only "explosion-proof" lights or hand lamps.
14. The entry person must not remain in the confined space if he/she becomes even slightly drowsy, faint, dizzy, or otherwise uncomfortable. Many of the gases that cause the most problems are odorless, tasteless, and invisible.

D. MANHOLE/SEWER ENTRY

There are no reported plans to enter manholes or sewers as a part of this project. The following information is included in the event the scope changes to include such activities. The Plan should be reviewed at that point, prior to any entry to a manhole or sewer. When preparing to enter a manhole/sewer, the following safety measures must be taken:

1. Inspect all pieces of equipment to ensure they are all in good working order. **DO NOT ENTER CONFINED SPACE WITH DEFECTIVE EQUIPMENT.**
2. Park the vehicle near the manhole (do NOT leave the vehicle running). If the manhole is in the street, it is best to park so as to detour oncoming traffic around the manhole. The vehicle's emergency flashers and portable yellow warning beacon must be ON. The vehicle serves as protection from oncoming traffic, can be used to store emergency equipment (e.g., SCBA and first aid kit), and can be used in an extreme emergency to slowly pull an injured person from the confined space if a tripod with hoist attachment is unavailable or inoperative.
3. Erect portable barricades or cones around the manhole and in front of the vehicle to see that traffic is adequately diverted and to prevent pedestrians from falling in. Reflective vests should be worn so that workers are visible to approaching traffic.

4. If there are openings large enough to admit sampling tubes, test for the presence of explosive and toxic gases before removing each manhole cover. Otherwise, raise one side of the cover using the cover hook or pick, prop it slightly open, and conduct the tests.
5. If toxic or explosive gases are detected in the sewer, report this immediately to the local Fire Department and/or Department of Public Works.
6. Record the results of tests for hazardous conditions, including location, manhole number (if applicable), time and date, weather (if applicable), and the readings on the PID, combustible gas meter, oxygen deficiency meter, and Drager tube.
7. Remove manhole covers with a cover hook or pick; do not improvise. Be careful of fingers and toes; the cover is usually heavy and difficult to handle. Unless the cover is extremely heavy, it is safer for only one worker to handle it.
8. Test the atmosphere; if a toxic, flammable, or oxygen-deficient atmosphere exists, ventilate the sewer. Depending on the hazard, ventilation can be accomplished in a variety of ways: for example, (1) remove and vent the adjoining upstream and downstream manhole covers, as soon as possible, and well in advance of entering the manhole (high hazard); and (2) vent the manhole in which entry will occur (very low hazard). If a blower is used, it is desirable to establish a flow of air in the sewer, in one manhole and out another. Ensure that the air intake is well away from automobile exhaust, and combustible and/or toxic atmospheres. Appropriate traffic control measures must be taken by barricading or otherwise marking the open manholes.
9. After ventilating, test for explosive and toxic gases and oxygen deficiency in the manhole at ground level and at the bottom; record results. If entering the sewer itself, make the same tests at the manholes at either end. If ventilation is necessary, monitor the atmosphere in the manhole while work progresses, or continue operation of the blower. Continuous monitoring (i.e., equipment ON during entire entry) is imperative because conditions within the sewer may change rapidly. Do not enter a manhole while there is an oxygen deficiency without a pressure-demand, air-supplied breathing apparatus. If the oxygen level is lower than 20.9 per cent of background, caution must be taken because an IDLH atmosphere may exist.
10. When entering manholes or tanks, wear hardhats, protective clothing, and unless inappropriate, respiratory protection and safety belt or harness with lifeline. If the manhole is less than 18 inches in diameter, a wrist-type harness must be used and special provisions made if air-supplied respirators are necessary. When working in manholes greater than 12 feet deep, in the sewer itself, or where potential exists for gases to appear unexpectedly, a 5-minute emergency egress air supply is required (unless the time required to don the emergency respirator is greater than what would be needed to exit the manhole.)
11. At least one person (i.e., standby) must remain at the manhole at all times and must keep continuous contact with the person entering the sewer. Contact can be maintained by line-of-sight, listening for sounds, and the safety line and/or radio. The standby person must not enter the manhole unless another trained person is available to act as standby and has adequate respiratory and dermal protection available. (in most cases, respiratory

protection will be an airline respirator or SCBA). The standby/rescue person should be suited up (but not yet on air) before the work crew enters the confined space.

12. Do not smoke when working in or near manholes. Do not take flash-lighted photographs when explosive gases are known or suspected to be present.
13. Do not rely on the manhole ladders because they are often in poor condition. If they must be used, be sure of footing. Inspect manhole ladders for deterioration before entering and while descending. Try each step with one foot, while standing on the step above. When in doubt, use a portable or rope ladder of adequate height to reach 3 feet above the manhole opening, or lower the entry person using the tripod. If a portable ladder is used, it should be tied off if possible; otherwise, it should be held in place by the standby person.
14. Do not work without adequate lighting. Use only "explosion-proof" lights or hand lamps in the manhole or sewer.
15. The entry person must not remain in the manhole or sewer if he/she becomes even slightly drowsy, faint, dizzy, or otherwise uncomfortable. Remember that carbon monoxide, carbon dioxide, methane, and hydrogen sulfide, which cause the most trouble, are odorless (hydrogen sulfide has a distinct odor only during initial exposure), tasteless, and invisible.

STANDARD OPERATING PROCEDURE

NUMBER 5

Underground Utilities

UNDERGROUND UTILITIES

Underground utilities pose hazards to workers involved in drilling, excavation, soil vapor contaminant analysis, and other invasive operations. These hazards include electrical hazards, explosion, chemical exposure, asbestos exposure and asphyxiation, as well as costly and annoying hazards associated with damaging communication, sewer, water, and/or irrigation lines.

The estimated location of underground installations, including sewer, telephone, fuel, electric, water lines, or other underground installations that reasonable may be expected to be encountered during invasive work shall be determined prior to the start of any invasive work. This may be determined by contacting appropriate utilities, contacting a utility clearance service, using site maps and prominent site features, using a pipe and cable locator, etc. Buried utilities encountered during invasive operations must be protected while digging to prevent risks to site personnel and damage to the utilities. The Contractor must request and received an assessment of the site from DIGSAFE. The telephone number for DIGSAFE in Massachusetts is (888) DIGSAFE.

QUALIFICATIONS OF CIH AND SSO

Scott D. Herzog
Senior Consultant/Business Development

Covino Environmental Associates, Inc.
300 Wildwood Avenue Woburn, MA
Phone: 781.933.2555 Fax: 781.932.9402

EDUCATION

West Virginia College of Graduate Studies/West Virginia University
M.S. Chemical Engineering, 1978

Northeastern University
B.S. Chemical Engineering, 1974

CERTIFICATIONS

Certified Industrial Hygienist, Comprehensive Practice, # 1685, American Board of Industrial Hygiene (1979)

Certified Industrial Hygienist, Engineering Aspects, # 2104, American Board of Industrial Hygiene (1982)

PROFESSIONAL EXPERIENCE

Mr. Herzog has over 35 years of comprehensive environmental health and safety experience serving both public and private sector clients. As a Senior Consultant, Mr. Herzog develops and implements regulatory compliance programs for clients. He also conducts third-party audits of company programs, directs process safety and risk management activities and provides expert witness testimony in areas of his expertise. He serves as a technical consultant to identify new, emerging environmental health and safety issues.

Mr. Herzog conducts industrial hygiene exposure assessments, indoor air quality evaluations, noise surveys, microbial assessments and inspections of HVAC systems. He specializes in the design of engineering controls and local exhaust ventilation. Mr. Herzog works with clients including property managers and insurance companies to evaluate water and smoke-damaged properties. He develops Health & Safety plans for construction sites and provides expert direction in site remediation and emergency response.

Previously, Mr. Herzog was a Vice President/Senior Project Manager with OccuHealth, Inc. and a Senior Project Manager with Certified Engineering/Levine Fricke Recon (now LFR). Prior to entering consulting, Mr. Herzog was a senior industrial hygienist with Olin Corporation, United Technologies and Union Carbide.

HIGHLIGHTS OF EXPERIENCE

Conducted initial asbestos surveys in over 100 schools in Massachusetts under AHERA.

Conducted asbestos surveys in over 200 buildings involved in litigation throughout the United States and Canada.

Performed mold assessments in over 100 commercial properties and residences to determine causation of mold growth and water damage.

Provided health and safety support following a black water release in a major hospital in southeast Massachusetts.

Provided industrial hygiene support for manufacturing and research facilities. Evaluated and coordinated safety, hygiene and occupational health concerns as well as development of audit programs.

Developed and implemented a third-party key findings audit for eight dairy products plants in New England.

Assisted in the development of dispersion modeling techniques and environmental impact studies to assess the need for engineering controls.

Developed Site-Specific Health and Safety Plans for over 100 construction sites in New England.

ADDITIONAL TRAINING

Health & Safety Aspects of Nanotechnology

PCB's in Building Materials, 2008

Biosafety & Biosecurity: Minimizing Risks in the Laboratory, 2009

All Day Technical Industrial Hygiene Conferences, 2001 – Current

Indoor Air Quality Association Technical Workshops, 2004 - Current

PROFESSIONAL AFFILIATIONS

American Industrial Hygiene Association 1974-Current

American Academy of Industrial Hygiene 1979-Current

American IAQ Council 2001-Current

Member, Indoor Air Quality Association 2007-Current

AIAQC/IAQA New England Chapter Director 2002-Current

Chair and Member-AIHA Workplace Environmental Exposure Limits Committee (1982-1989)

Member, AIHA Indoor Air Quality Committee (1985-1987)

AIHA New England Chapter President-Elect/President 2001-2002

AIHA Connecticut River Valley President-Elect/President 1984-85

PRESENTATIONS/PUBLICATIONS

“Emergency Response Planning in Healthcare Facilities” - Soc. Hospital Engineers

“Moisture, Building Structures & Mold”– Presentations to ARS Technical Seminar, ASSE

“Vapor Intrusion: Determining Remediation Levels”, Environmental Business Council, 2009

“Engineering Controls for Copper and Brass Alloys” – Industrial Hygiene Aspects of Plant Operations, Wiley Interscience, 1987

“How Healthy Is Your Office?” – Connecticut Architect/Specifier, 1990

“Confined Space Entry For Sewer Invert Operations” - AIHCE

Technical papers on industrial hygiene recordkeeping, respirator cartridge testing/evaluation, QA sampling for ethylene oxide - AIHCE

MATERIAL SAFETY DATA SHEETS

International Chemical Safety Cards

CHRYSOTILE

ICSC: 0014

CHRYSOTILE Serpentine chrysotile White asbestos $Mg_6Si_4H_8O_{18} / Mg_6(Si_4O_{10})(OH)_8$ Molecular mass: 554 CAS # 12001-29-5 RTECS # CI16478500 ICSC # 0014 UN # 2590 (white asbestos)			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
• INHALATION	Cough.	Breathing protection. Closed system and ventilation.	
• SKIN		Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• EYES			First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Evacuate danger area! Consult an expert! Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Well closed.	Use dust-proof packaging. UN Hazard Class: 9 UN Packing Group: III	
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0014	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993		

International Chemical Safety Cards

CHRYSOTILE

ICSC: 0014

I M P O R T A N T D A T A	PHYSICAL STATE; APPEARANCE: WHITE, GREY, GREEN OR YELLOWISH FIBROUS SOLID.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation.
	PHYSICAL DANGERS:	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: 2 fibres/cc (as TWA) A1 ppm; mg/m ³ (ACGIH 1992-1993). MAK: class III A1 (1993).	EFFECTS OF SHORT-TERM EXPOSURE:
		EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the lungs , resulting in pulmonary fibrosis and mesothelioma. This substance is carcinogenic to humans.
PHYSICAL PROPERTIES	Melting point: see Notes°C	Relative density (water = 1): 2.55
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air.	
NOTES		
The substance is heat resistant up to 500°C and completely decomposed at temperature of 1000°C. Smoking enhances harmful effects. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. The recommendations on this Card also apply to other forms of asbestos.		
Transport Emergency Card: TEC (R)-913		
ADDITIONAL INFORMATION		
ICSC: 0014		CHRYSOTILE
© IPCS, CEC, 1993		
IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.	

MSDS Number: L2347 * * * * * Effective Date: 09/15/09 * * * * * Supercedes: 07/05/07

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 800-858-2151
CHEMTREC: 1-800-12-9380

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3897

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers should be used only in the event of direct contact emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-552-2537) for assistance.

LEAD METAL

1. Product Identification

Synonyms: Granular lead, pigment metal; C.I. 77575
CAS No.: 7439-92-1
Molecular Weight: 207.19
Chemical Formula: Pb
Product Codes:
J.T. Baker: 2256, 2266
Mallinckrodt: 5668

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Lead	7439-92-1	95 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate (Life)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. See also Ingestion.

Ingestion:

POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

Skin Contact:

Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, redness and pain.

Eye Contact:

Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.

Chronic Exposure:

Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted.

Aggravation of Pre-existing Conditions:

Persons with pre-existing kidney, nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:

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

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard. Powder/dust is flammable when heated or exposed to flame.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or

waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Can produce toxic lead fumes at elevated temperatures and also react with oxidizing materials.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Areas in which exposure to lead metal or lead compounds may occur should be identified by signs or appropriate means, and access to the area should be limited to authorized persons. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For lead, metal and inorganic dusts and fumes, as Pb:

-OSHA Permissible Exposure Limit (PEL): 0.05 mg/m³ (TWA)

For lead, elemental and inorganic compounds, as Pb:

-ACGIH Threshold Limit Value (TLV): 0.05 mg/m³ (TWA), A3 animal carcinogen

ACGIH Biological Exposure Indices (BEI): 30 ug/100ml, notation B (see actual Indices for more information).

For lead, inorganic:

-NIOSH Recommended Exposure Limit (REL): 0.1 mg/m³ (TWA)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face high efficiency particulate respirator (NIOSH type N100 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency particulate respirator (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain

eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1025).

9. Physical and Chemical Properties

Appearance:

Small, white to blue-gray metallic shot or granules.

Odor:

Odorless.

Solubility:

Insoluble in water.

Density:

11.34

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

1740C (3164F)

Melting Point:

327.5C (622F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

1.77 @ 1000C (1832F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Does not decompose but toxic lead or lead oxide fumes may form at elevated temperatures.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Ammonium nitrate, chlorine trifluoride, hydrogen peroxide, sodium azide, zirconium, disodium acetylide, sodium acetylide and oxidants.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:

Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Lead and other smelter emissions are human reproductive hazards. (Chemical Council on Environmental Quality; Chemical Hazards to Human Reproduction, 1981).

Carcinogenicity:

LEAD METAL

EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Lead (7439-92-1)	No	No	2B

12. Ecological Information

Environmental Fate:

When released into the soil, this material is not expected to leach into groundwater. This material may bioaccumulate to some extent.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

Ingredient	TSCA	EC	Japan	Australia
Lead (7439-92-1)	Yes	Yes	Yes	Yes

Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Lead (7439-92-1)	Yes	Yes	No	Yes

Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catg.
Lead (7439-92-1)	No	No	Yes	No

Ingredient	CERCLA	-RCRA-	
		261.33	8(d)
Lead (7439-92-1)	10	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 Reactivity: No (Pure / Solid)

WARNING:

THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: None allocated.

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 1 Reactivity: 0

Label Hazard Warning:

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

Label Precautions:

- Do not get in eyes, on skin, or on clothing.
- Do not breathe dust.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

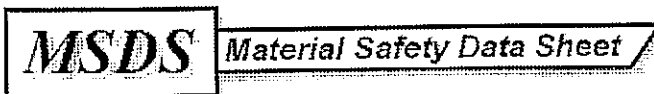
Disclaimer:

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Prepared by: Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: C0132 * * * * * Effective Date: 11/21/08 * * * * * Supersedes: 02/16/06



From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-562-2537) for assistance.

CADMIUM OXIDE

1. Product Identification

Synonyms: None
CAS No.: 1306-19-0
Molecular Weight: 128.41
Chemical Formula: CdO
Product Codes: 1234

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Cadmium Oxide	1306-19-0	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! CONTAINS CADMIUM. CANCER HAZARD. AVOID CREATING DUST. CAN CAUSE LUNG AND KIDNEY DISEASE. CAN CAUSE CANCER. Risk of cancer depends upon duration and level of exposure. MAY BE FATAL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN AND EYES. AFFECTS BLOOD AND PROSTATE. MAY AFFECT THE REPRODUCTIVE SYSTEM.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Cadmium absorption is most efficient via respiratory tract. Inhalation of dust may produce irritation, headache, metallic taste and/or cough. Severe exposures may produce shortness of breath, chest pain, and flu-like symptoms with weakness, fever, headache, chills, sweating, nausea and muscular pain. Can cause pulmonary edema, liver and kidney damage and death. Symptoms from inhalation may be delayed for as much as 24 hours.

Ingestion:

Toxic. Ingested cadmium salts may cause severe and sometimes fatal poisonings. Symptoms can include severe nausea, vomiting, diarrhea, abdominal pains, choking, dizziness, and salivation. Kidney and liver dysfunction may occur. Although as little as 10 - 20 mg of soluble cadmium salts have produced severe toxic symptoms when ingested, death probably requires several hundred mg by oral route.

Skin Contact:

May cause irritation with redness and pain.

Eye Contact:

May cause irritation, redness and pain.

Chronic Exposure:

Chronic exposure to cadmium, even at relatively low concentrations, may result in kidney damage, anemia, pulmonary fibrosis, emphysema, perforation of the nasal septum, loss of smell, male reproductive effects, and an increased risk of cancer of the lung and of the prostate. Decrease in bone density, renal stones, and other evidence of disturbed calcium metabolism may be observed.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye problems, blood disorders, prostate problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

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

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Wipe off excess material from skin then immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

See 29 CFR 1910.1027, Appendix A for additional treatment information.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. If involved in a fire, this material can emit very toxic fumes of cadmium.

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush to the sewer. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Threshold Limit Value (PEL):

5 ug/m³ of Cadmium (TWA), 2.5 ug/m³ (Action Level)

-ACGIH Threshold Limit Value (TLV) :

0.01 mg/m³ total dust, 0.002 mg/m³ respirable fraction for cadmium and compounds, as Cd;

listed as A2, suspected human carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face high efficiency particulate respirator (NIOSH type N100 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency particulate respirator (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. See OSHA 1910.1027 for additional respirator information. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing cadmium compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1027).

9. Physical and Chemical Properties

Appearance:

Fine, brown crystals or powder.

Odor:

Odorless.

Solubility:

Insoluble in water.

Density:

8.15

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

1559C (2838F) Sublimes.

Melting Point:

950C (1742F) crystals decompose; < 1426C (< 2598F) powder.

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

1.3 mbar @ 1000C

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Toxic cadmium oxide fumes may be formed at high temperatures (> 900C).

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Explodes when heated with magnesium. Cadmium dust presents a fire/explosion hazard if reacted with oxidizing agents, metals, hydrogen azide, zinc, selenium, or tellurium.

Conditions to Avoid:

Dusting and incompatibles.

11. Toxicological Information

Toxicological Data:

Oral rat LD50: 72 mg/kg; inhalation mouse LC50: 250 mg/m³/2-hour; Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Reproductive effects recorded on humans. May cause teratogenic effects.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Cadmium Oxide (1306-19-0)	Yes	No	1

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CADMIUM COMPOUND, N.O.S. (CADMIUM OXIDE)
Hazard Class: 6.1
UN/NA: UN2570
Packing Group: III
Information reported for product/size: 500G

International (Water, I.M.O.)

Proper Shipping Name: CADMIUM COMPOUND, N.O.S. (CADMIUM OXIDE)
Hazard Class: 6.1
UN/NA: UN2570
Packing Group: III
Information reported for product/size: 500G

International (Air, I.C.A.O.)

Proper Shipping Name: CADMIUM COMPOUND, N.O.S. (CADMIUM OXIDE)
Hazard Class: 6.1
UN/NA: UN2570
Packing Group: III
Information reported for product/size: 500G

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

CADMIUM OXIDE

Ingredient	TSCA	EC	Japan	Australia
Cadmium Oxide (1306-19-0)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	DSL	NDSL	Phil.
Cadmium Oxide (1306-19-0)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302- RQ	TPQ	-----SARA 313----- List	Chemical Catg.
Cadmium Oxide (1306-19-0)	100	100*	No	Cadmium comp

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Cadmium Oxide (1306-19-0)	1	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 Reactivity: No (Pure / Solid)

WARNING:
 THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2X
Poison Schedule: S6

WHMIS:
 This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0

Label Hazard Warning:
 DANGER! CONTAINS CADMIUM. CANCER HAZARD. AVOID CREATING DUST. CAN CAUSE LUNG AND KIDNEY DISEASE. CAN CAUSE CANCER. Risk of cancer depends upon duration and level of exposure. MAY BE FATAL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN AND EYES. AFFECTS BLOOD AND PROSTATE. MAY AFFECT THE REPRODUCTIVE SYSTEM.

Label Precautions:
 Do not breathe dust.
 Do not get in eyes, on skin, or on clothing.
 Keep container closed.
 Do not enter storage areas unless adequately ventilated.
 Use only with adequate ventilation.
 Wash thoroughly after handling.

Label First Aid:
 If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.

Product Use:
 Laboratory Reagent.

Revision Information:
 MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

International Chemical Safety Cards

ICSC: 0013

ARSENIC

ARSENIC
 Grey arsenic
 Metallic arsenic
 As
 Atomic mass: 74.9

CAS # 7440-38-2
 RTECS # CG0525000
 ICSC # 0013
 UN # 1558
 EC # 033-001-00-X

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight if in the form of fine powder or dust when exposed to hot surfaces or flames.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Cough. Diarrhoea. Shortness of breath. Sore throat. Vomiting. Weakness. Grey skin.	Closed system and ventilation.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• EYES	Redness.	or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Diarrhoea. Nausea. Sore throat. Unconsciousness. Vomiting (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment (extra personal protection: complete protective clothing including self-contained breathing apparatus).		Provision to contain effluent from fire extinguishing. Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. T symbol R: 23/25 S: (1/2-)20/21-28-45 UN Hazard Class: 6.1 UN Packing Group: II Marine pollutant.
SEE IMPORTANT INFORMATION ON BACK			

ICSC: 0013

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

ARSENIC

ICSC: 0013

I M P O R T A N T A R S E N I C	PHYSICAL STATE; APPEARANCE: ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.
	PHYSICAL DANGERS:	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	CHEMICAL DANGERS: Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens causing fire and explosion hazard. Reacts with nitric acid, hot sulfuric acid. Toxic arsine gas may be formed in contact with acid or acidic substances and certain metals, such as galvanized or light metals.	EFFECTS OF SHORT-TERM EXPOSURE: The substance irritates the eyes, the skin and the respiratory tract. The substance may cause effects on the circulatory system, nervous system, kidneys and gastrointestinal tract, resulting in convulsions, kidney impairment, severe hemorrhage, losses of fluids, and electrolytes, shock and death. Exposure may result in death. The effects may be delayed. Medical observation is indicated.
	OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: ppm; 0.01 mg/m ³ (as TWA) A1 (ACGIH 1994-1995).	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the mucous membranes, skin, kidneys, liver, resulting in neuropathy, pigmentation disorders, perforation of nasal septum and tissue lesions. This substance is carcinogenic to humans.
PHYSICAL PROPERTIES	Sublimation point: 613°C Relative density (water = 1): 5.7	Solubility in water: none
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment.	
NOTES		
The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC # 0377), Arsenic trichloride (ICSC # 0221), Arsenic trioxide (ICSC # 0378), Arsine (ICSC # 0222).		
ADDITIONAL INFORMATION		
ICSC: 0013		ARSENIC
© IPCS, CEC, 1993		
IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.	

International Chemical Safety Cards

ICSC: 0029

CHROMIUM

CHROMIUM
 Chrome
 (powder)
 Cr (metal)
 Atomic mass: 52.0

CAS # 7440-47-3
 RTECS # GB4200000
 ICSC # 0029

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible if in very fine powder. Gives off irritating or toxic fumes (or gases) in a fire.	No open flames if in powder form.	In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
• INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
• SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
• EYES	Redness.	Face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place (extra personal protection: P2 filter respirator for harmful particles).		Fireproof. Separated from strong oxidants.	
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0029		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993	

International Chemical Safety Cards

ICSC: 0029

CHROMIUM

I	PHYSICAL STATE; APPEARANCE:	ROUTES OF EXPOSURE:
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M P O R T A N T D A T A	STEEL GREY LUTROUS METAL. PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air. CHEMICAL DANGERS: Reacts violently with strong oxidants such as hydrogen peroxide, causing fire and explosion hazard. Reacts with diluted hydrochloric and sulfuric acids. Incompatible with alkalis and alkali carbonates. OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: ppm; 0.5 mg/m ³ (as TWA) (ACGIH 1994-1995).	The substance can be absorbed into the body by inhalation of its aerosol and by ingestion. INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. EFFECTS OF SHORT-TERM EXPOSURE: EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact may cause skin sensitization.	
	PHYSICAL PROPERTIES	Boiling point: 2642°C Melting point: 1900°C	Relative density (water = 1): 7.14 Solubility in water: none
	ENVIRONMENTAL DATA		
	NOTES		
	Explosive limits are unknown in literature. Depending on the degree of exposure, periodic medical examination is indicated.		
	ADDITIONAL INFORMATION		
	ICSC: 0029		CHROMIUM
	© IPCS, CEC, 1993		
	IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.	

=====
MSDS Safety Information
=====

FSC: 9150
MSDS Date: 05/10/1992
MSDS Num: BWGBW
LIIN: 00N056507
Product ID: PETROLEUM HYDROCARBONS AND ADDITIVES
MFN: 01
Responsible Party
Cage: 06550
Name: INGERSOL-RAND CO
Address: 2724 6TH AVE S
Box: 24046
City: SEATTLE WA 98124-0046
Info Phone Number: 206-624-0466
Emergency Phone Number: 615-672-0321
Proprietary Ind: Y
Published: Y

=====
Contractor Summary
=====

Cage: 06550
Name: INGERSOL-RAND CO
Address: 2724 6TH AVE S
City: SEATTLE WA 98124-0046
Phone: 206-624-0466

=====
Ingredients
=====

Name: *** PROPRIETARY ***

=====
Health Hazards Data
=====

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route Of Entry Inds - Inhalation: YES

Skin: NO

Ingestion: YES

Carcinogenicity Inds - NTP: NO

IARC: NO

OSHA: NO

Effects of Exposure: CHLOROCARBON MATLS HAVE PRDCED SENSIT OF MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & COULD HAVE SIMILAR EFT IN HUMANS. ADRENOMIMETICS (EG, EPINEPHRINE) MAY BE CONTRA-INDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY/CHRONICALLY EXPOS TO CHLOROCARBONS(FPN). INGEST: HARMFUL/FATAL IF SWALLOWED. (EFTS OF OVEREXP)

Explanation Of Carcinogenicity: NOT RELEVANT

Signs And Symptions Of Overexposure: HLTH HAZ: INHAL: IRRIT OF RESP TRACT, DIZZ, NAUS, LT HEAD, HDCH, LOSS OF COORDINATION. CIRCULATORY DEPRESS HAS BEEN REPORTED. EYES: MAY CAUSE IRRIT & CONJ. SKIN: RPTD/PRLNG CNTCT MAY CAUSE DEFAT TYPE OF DERM. INHAL OF TRICHLOROETHANE HAS BEEN KNOWN TO CAUSE CIRCULATORY DEPRESS. SINCE PROD CONTAINS 1,1,1 (SUPDAT)

Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.

First Aid: INGEST: IF A LARGE VOLUME OF THIS MATERIAL IS SWALLOWED, GIVE A LARGE AMOUNT OF WATER. DO NOT INDUCE VOMITING. CALL MD IMMEDIATELY. INHAL: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF NECESSARY. CALL MD IMMEDIATELY. EYES: IRRIGATE IMMEDIATELY WITH CLEAN, COOL WATER FOR AT LEAST 15 MINITES. CALL MD IMMEDIATELY. SKIN: WASH AFFECTED AREA WITH SOAP & WATER. REMOVE CLOTHING & LAUNDER.

=====
Handling and Disposal
=====

Spill Release Procedures: ABSORB SPILLS WITH ABSORBENT CLAY, DIATOMACEOUS EARTH

OR OTHER SUITABLE MATERIAL. KEEP OUT OF SEWERS AND WATERCOURSES. IF SPILLED INTO A WATERCOURSE, CALL THE COAST GUARD TOLL FREE NO: 1-800-424-8802.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSE OF AT AN APPROVED WASTE OR DISPOSAL SITE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.
Handling And Storage Precautions: AVOID CONTACT WITH SKIN. AVOID INHALATION OF VAPOR AND MIST. DO NOT STORE OR HANDLE NEAR HIGH HEAT OR STRONG OXIDIZERS.
Other Precautions: NO SMOKING IN AREA OF USE. DO NOT USE IN THE GENERAL VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFACES. HEAT AND/OR UV RADIATION MAY CAUSE THE FORMATION OF HCL AND/OR PHOSGENE (FP N).

=====
Fire and Explosion Hazard Information
=====

Flash Point Method: COC
Flash Point Text: SUPDAT
Extinguishing Media: CARBON DIOXIDE FOAM, DRY CHEMICAL FOAM, SAND, EARTH, WATER FOG.
Fire Fighting Procedures: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire/Explosion Hazard: THERMAL DECOMP PRODS MAY INCL HCL & PHOSGENE (FP N). TOX FUMES GIVEN OFF AT 932F (500C). THIS PROD IS AVAIL IN SPRAY CANS & AS SUCH, CNTNRS MAY EXPLODE.

=====
Control Measures
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Respiratory Protection: NONE REQUIRED UNDER ORDINARY CONDITIONS OF USE. NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: NO SPECIAL REQUIREMENT UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: NONE REQUIRED.
Work Hygienic Practices: REMOVE OIL SOAKED CLTHG & LAUNDER BEFORE REUSE. WASH SKIN THORO W/SOAP & WATER AFTER HNDLG. KEEP AWAY FROM FOOD & FEED.
Supplemental Safety and Health: USERS OF "L" VERSION OF SHOULD CONSULT "LR" VERSION FOR ADDITIONAL INFO (FP N). FL PT: PRESS OF NON-FLAMM SOLV MODIFIES FL PT AS DETERMINED BY COC. EFTS OF OVEREXP: TRICHLOROETHANE, USE OF EPHINE PHRINE/SIMILAR ACTING DRUGS SHOULD BE AVOIDED. USE OF THESE DRUGS MAY CAUSE MYOCARDIAL IRRITABILITY. UNDER NO

=====
Physical/Chemical Properties
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B.P. Text: >600F,>316C
Vapor Pres: <0.1
Spec Gravity: 0.9
Solubility in Water: NEGLIGIBLE
Appearance and Odor: YELLOW COLOR; SWEET SMELLING ODOR.
Percent Volatiles by Volume: 20

=====
Reactivity Data
=====

Stability Indicator: YES
Stability Condition To Avoid: HIGH HEAT AND HIGH ENERGY IGNITION SOURCES.
Materials To Avoid: STRONG OXIDIZERS, CAUSTIC SODA, CAUSTIC POTASH, SODIUM-POTASSIUM ALLOYS.
Hazardous Decomposition Products: HYDROGEN CHLORIDE, TRACES OF PHOSGENE, CARBON MONOXIDE, OXIDES OF ANTIMONY & NITROGEN, COF*2.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT

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Toxicological Information
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Ecological Information
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MSDS Transport Information
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=====
Regulatory Information
=====

=====
Other Information
=====

=====
HAZCOM Label
=====

Product ID: PETROLEUM HYDROCARBONS AND ADDITIVES

Cage: 06550

Company Name: INGERSOL-RAND CO

Street: 2724 6TH AVE S

City: SEATTLE WA

Zipcode: 98124-0046

Health Emergency Phone: 615-672-0321

Label Required IND: Y

Date Of Label Review: 12/28/1994

Status Code: C

Label Date: 12/28/1994

Origination Code: G

Eye Protection IND: YES

Skin Protection IND: YES

Signal Word: WARNING

Respiratory Protection IND: YES

Health Hazard: Moderate

Contact Hazard: Slight

Fire Hazard: None

Reactivity Hazard: None

Hazard And Precautions: ACUTE: INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEAT (FP N). INGESTION: HARMFUL/FATAL IF SWALLOWED. VOMITING CAN CAUSE ASPIRATION INTO LUNGS WHICH MAY RESULT IN CHEMICAL PNEUMONIA. INHALATION: IRRITATION OF RESPIRATORY TRACT, DIZZINESS, NAUSEA, LIGHT HEADEDNESS, HEADACHE, LOSS OF COORDINATION. CIRCULATORY DEPRESSION. EYES: MAY CAUSE IRRITATION & CONJUNCTIVITIS. SKIN: REPEATED/PROLONGED CONTACT MAY CAUSE DEFATTING TYPE OF DERMATITIS. CHRONIC: NONE LISTED BY MANUFACTURER.

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Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

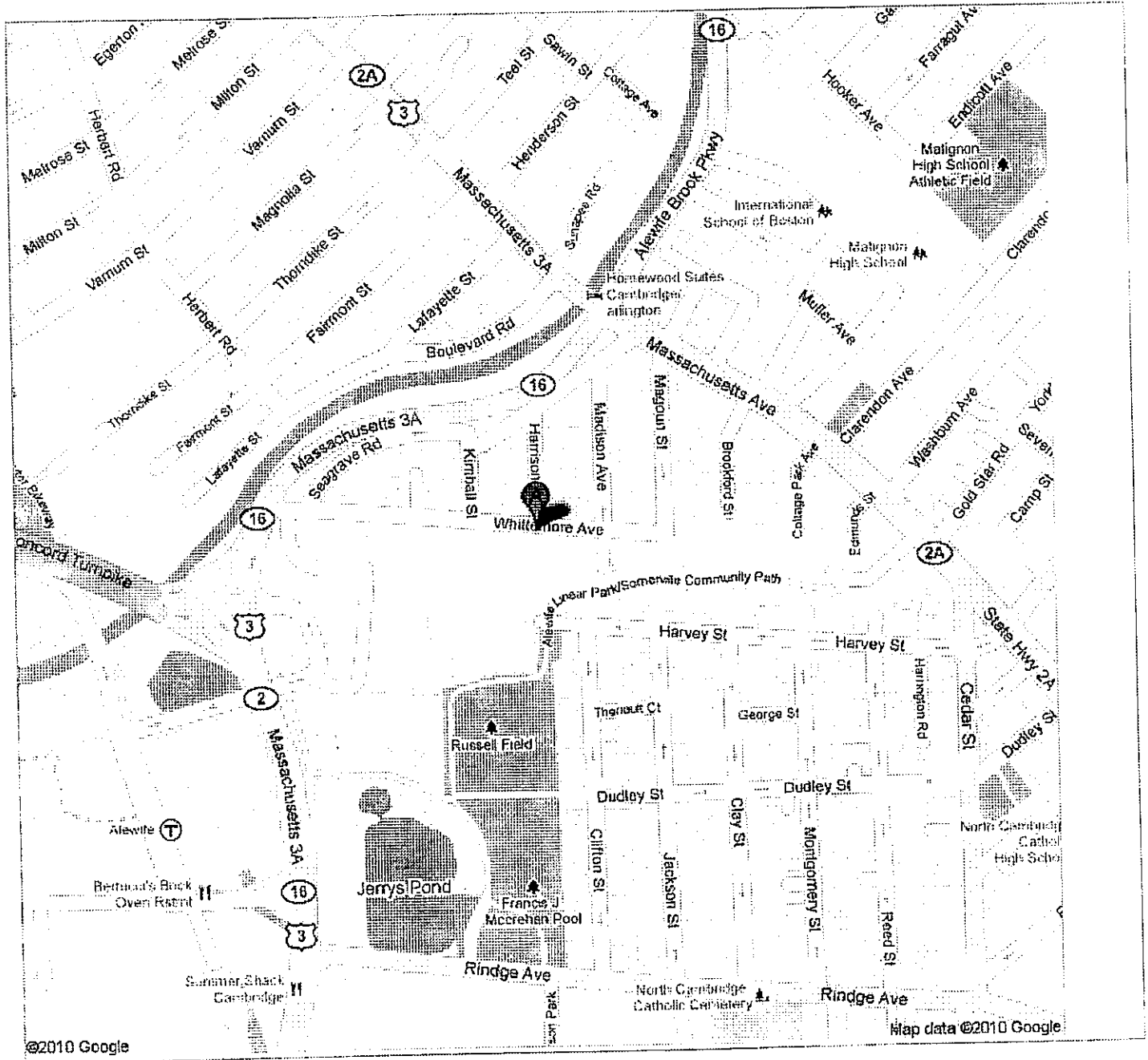

LOCATION OF SITE/DIRECTIONS TO HOSPITAL

DRAFT



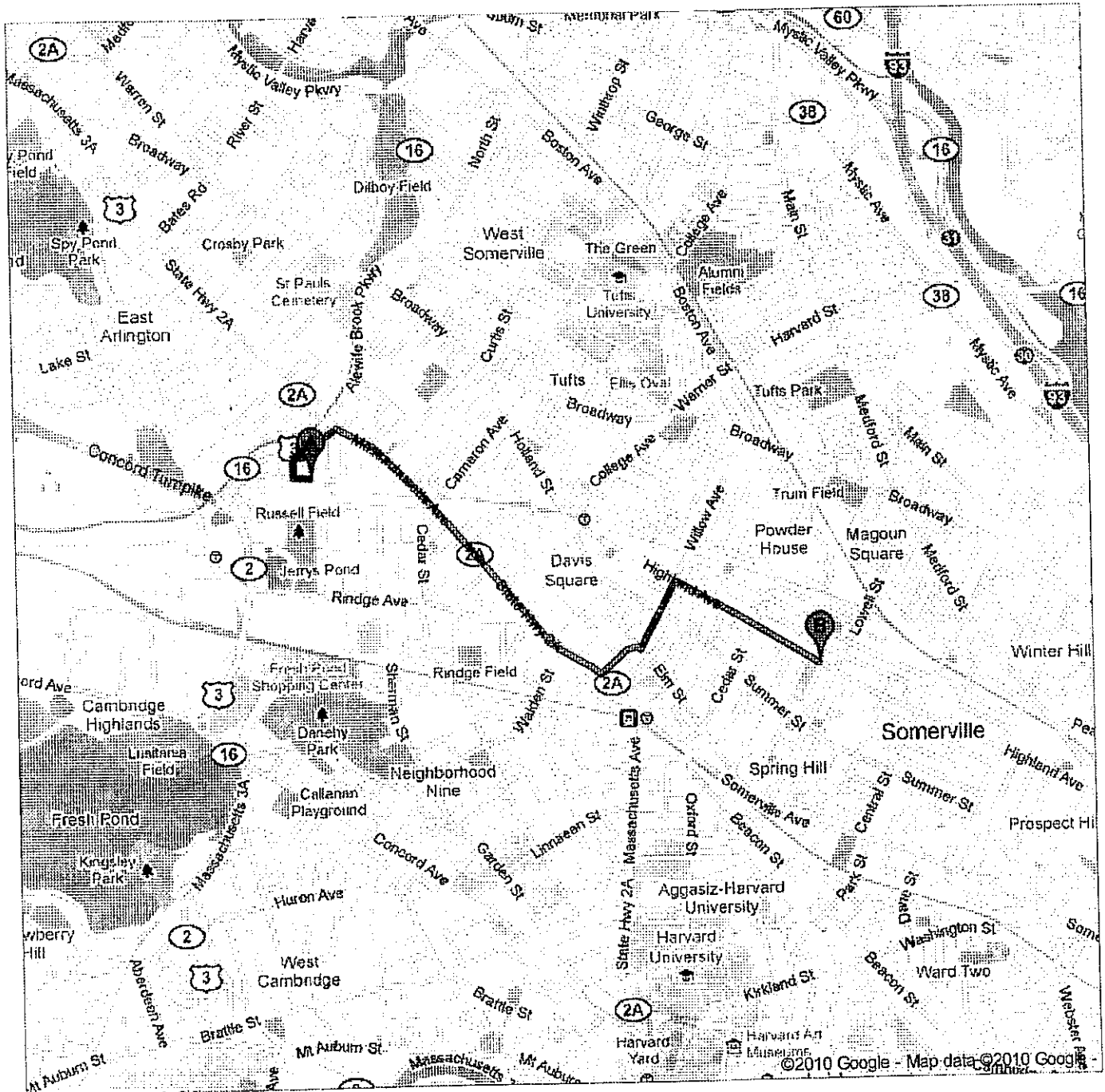
Address 62 Whittemore Ave
Cambridge, MA 02140

Get Google Maps on your phone
Text the word "GMAPS" to 466453














Directions to 230 Highland Ave, Somerville, MA 02143
2.1 mi - about 9 mins
ROUTE TO EMERGENCY HOSPITAL



©2010 Google - Map data ©2010 Google

 62 Whittemore Ave, Cambridge, MA 02140

-
1. Head west on **Whittemore Ave** toward **Kimball St**
go 256 ft
total 256 ft
 -  2. Take the 1st right onto **Kimball St**
go 295 ft
total 0.1 mi
 -  3. Take the 1st right onto **Columbus Ave**
go 0.2 mi
total 0.3 mi
 -  4. Turn right at **Massachusetts Ave**
About 3 mins
go 1.0 mi
total 1.3 mi
 -  5. Turn left at **Beech St**
About 1 min
go 0.1 mi
total 1.4 mi
 -  6. Turn right at **Elm St**
go 43 ft
total 1.4 mi
 -  7. Turn left at **Willow Ave**
About 2 mins
go 0.2 mi
total 1.7 mi
 -  8. Turn right at **Highland Ave**
Destination will be on the right
About 2 mins
go 0.5 mi
total 2.1 mi

 230 Highland Ave, Somerville, MA 02143

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

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Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

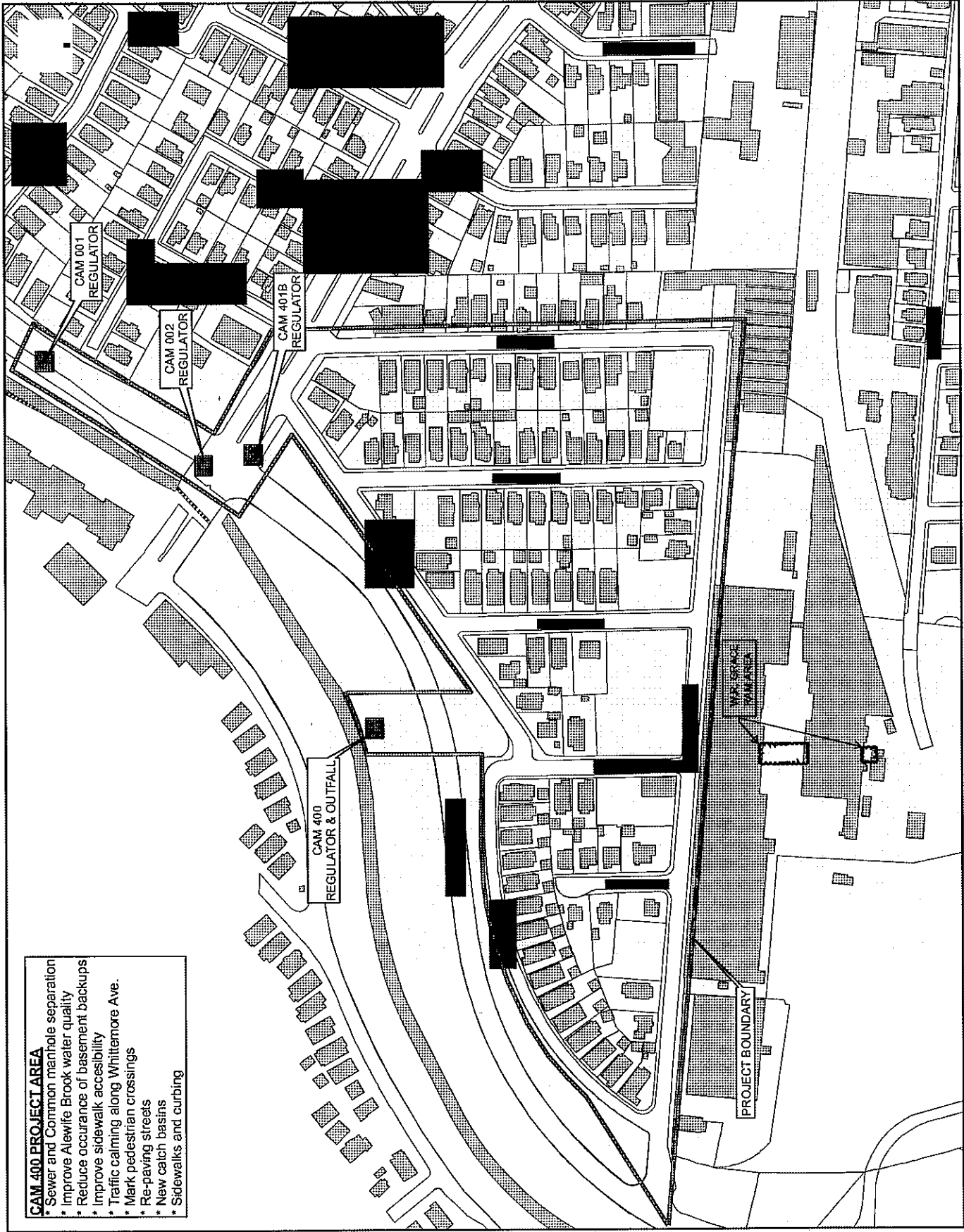
SITE SAFETY SIGN-IN SHEET

DRAFT

PROJECT LOCATION/DESIGN OF ENCLOSURE

DRAFT

LOCATION OF SITE/DIRECTIONS TO HOSPITAL



- CAM 400 PROJECT AREA**
- * Sewer and Common manhole separation
 - * Improve Alewife Brook water quality
 - * Reduce occurrence of basement backups
 - * Improve sidewalk accessibility
 - * Traffic calming along Whittemore Ave.
 - * Re-paving streets
 - * New catch basins
 - * Sidewalks and curbing



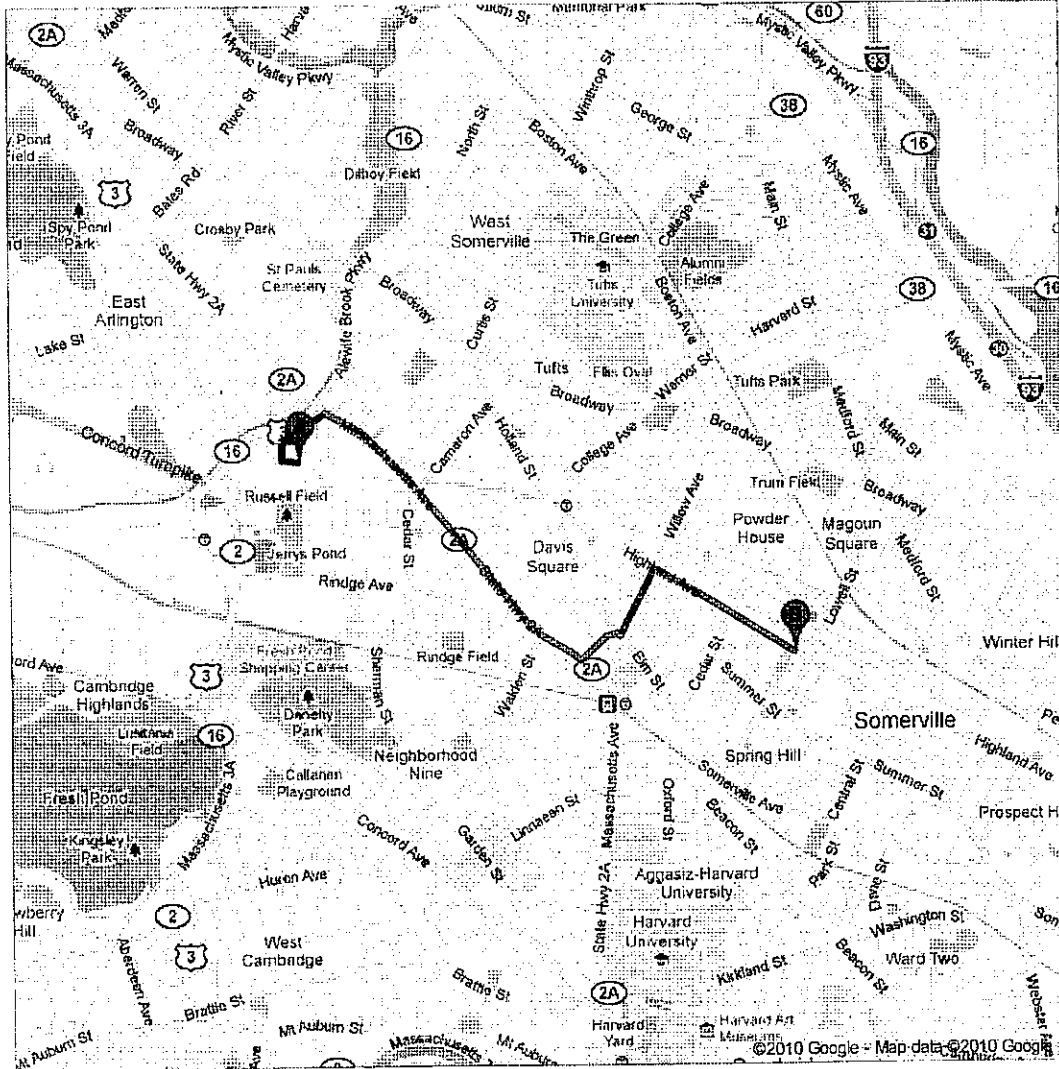
S E A
 S E A CONSULTANTS INC.
 100 STATE STREET, SUITE 200
 CAMBRIDGE, MA 02142


CAM 400 SEWER SEPARATION/ FLOATABLES CONTROL PROJECT AREA
 CITY OF CAMBRIDGE, MA













Directions to 230 Highland Ave, Somerville, MA 02143
2.1 mi – about 9 mins
ROUTE TO EMERGENCY HOSPITAL



 62 Whittemore Ave, Cambridge, MA 02140

-
- | | |
|--|---------------------------|
| 1. Head west on Whittemore Ave toward Kimball St | go 256 ft
total 256 ft |
|  2. Take the 1st right onto Kimball St | go 296 ft
total 0.1 mi |
|  3. Take the 1st right onto Columbus Ave | go 0.2 mi
total 0.3 mi |
|  4. Turn right at Massachusetts Ave
About 3 mins | go 1.0 mi
total 1.3 mi |
|  5. Turn left at Beech St
About 1 min | go 0.1 mi
total 1.4 mi |
|  6. Turn right at Elm St | go 43 ft
total 1.4 mi |
|  7. Turn left at Willow Ave
About 2 mins | go 0.2 mi
total 1.7 mi |
|  8. Turn right at Highland Ave
Destination will be on the right
About 2 mins | go 0.5 mi
total 2.1 mi |

 230 Highland Ave, Somerville, MA 02143

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

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SITE SAFETY SIGN-IN SHEET

PROJECT LOCATION/DESIGN OF ENCLOSURE

Figure 1
Site Location

MassGIS Color 2005 Orthophoto Map



Bldg. 23

Enclosure
Locations (Approx.)



300 Wildwood Avenue
 Woburn, MA 01801
 Tel: 781.933.2555
 Fax 781.932.9402
 email: mail@covinoinc.com

Covino Project 10.01508

Client:
 Environmental Management
 Professionals
 94 Sawyer Lane
 Marshfield, Massachusetts

Site:
 Building 23
 WR Grace & Co.
 Cambridge, Massachusetts

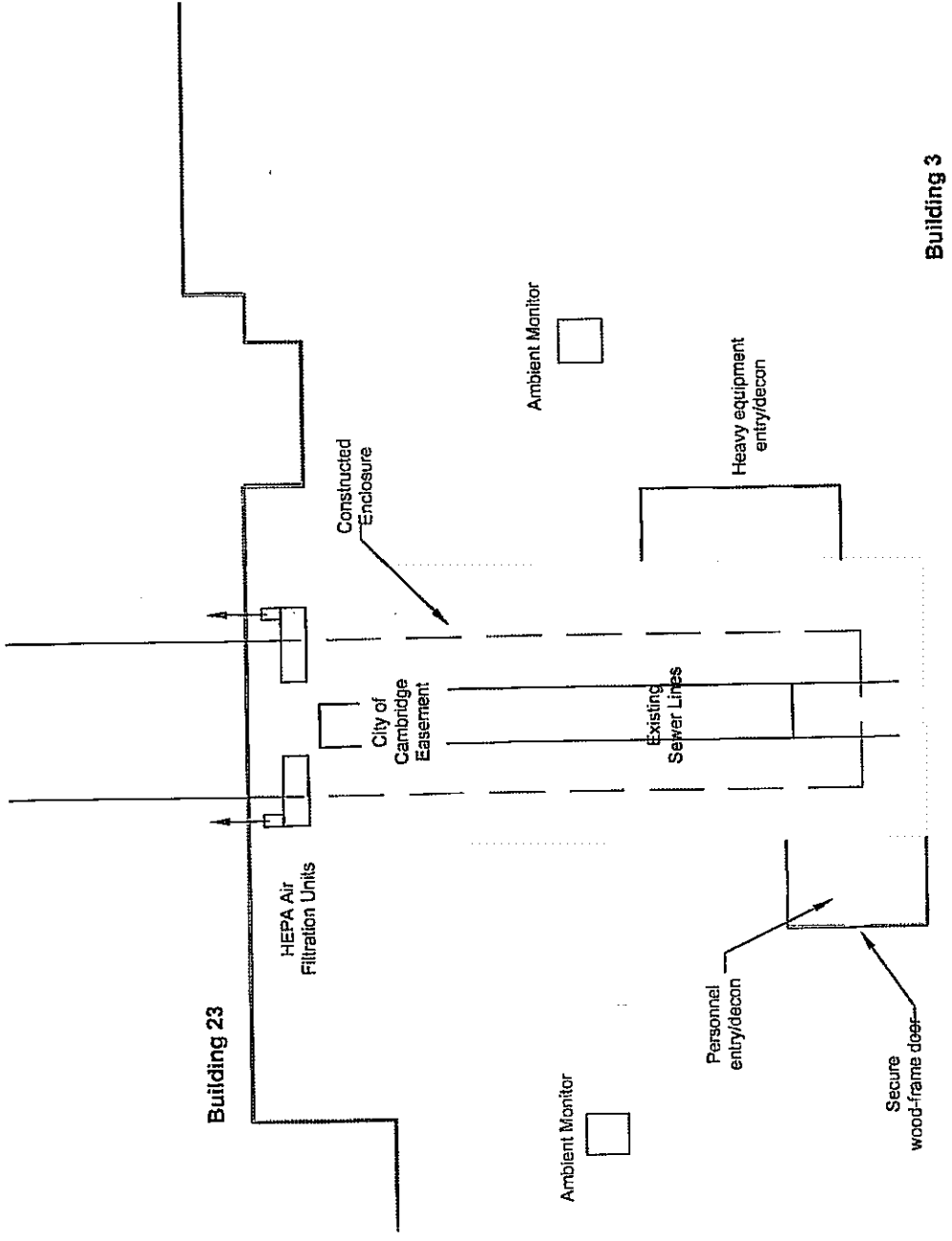
Sewer Separation

January 6, 2010

Sketch 1

NOT TO SCALE

Date: 01.07.11 Edited by: ALM



- Key**
- Building lines
 - - - City of Cambridge easement lines
 - Enclosure
 - Ambient monitor
 - Decon stations



300 Wildwood Avenue
Woburn, MA 01801
Tel: 781.933.2555
Fax 781.932.9402
email: mail@covinoinc.com

Covino Project 10.01508

Client:
Environmental Management
Professionals
94 Sawyer Lane
Marshfield, Massachusetts

Site:
Building 3
WR Grace & Co.
Cambridge, Massachusetts

Sewer Separation

January 6, 2010

Figure 2

NOT TO SCALE

Date: 01.07.11 Edited by: ALM

