

**APPENDIX B**  
**SITE SAFETY AND HEALTH PLAN**



## **SITE SAFETY AND HEALTH PLAN**

### **UGI COLUMBIA GAS PLANT SUPERFUND SITE COLUMBIA, LANCASTER COUNTY, PENNSYLVANIA**

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## 1.0 PURPOSE

This Site Safety and Health Plan (SSHP) is written to conform to the Occupational Safety and Health Administration (OSHA) Standards and Regulations, Chapter 29 Code of Federal Regulations (CFR) Parts 1910 and 1926. These provide the basis for the safety and health program. Additional specifications contained within this document are provided to conform to the requirements of the United States Environmental Protection Agency (USEPA), National Institute for Occupational Safety and Health (NIOSH), and American Conference of Government Industrial Hygienists (ACGIH). The Contractor completing required activities at the Site may adopt this plan or submit specific modifications to the plan, to allow an expedited review and approval by USEPA.



## 2.0 GENERAL

This SSHP applies to the remediation activities at the UGI Columbia Gas Plant Superfund Site (referred hereafter as the Site) in Columbia, Pennsylvania as described in Section 3 below and is designed to:

1. Prevent injuries to the Contractor employees or other persons at or visiting the Site.
2. Maintain Site personnel exposures to health hazards well below the occupational limits established by OSHA or the ACGIH.
3. Keep the exposures of area residents to contaminants well below the established site specific action levels.
4. Prevent violations of OSHA, USEPA, Pennsylvania, or other applicable regulations.
5. All Site visitors and contractors/subcontractors who may potentially be exposed to contaminants of concern working at the Site are responsible for compliance with this SSHP and any other requirements set forth by OSHA and other Federal and State regulations. If the Contractor or subcontractors wish to prepare his/her own SSHP, it must meet the minimum requirements set forth in this plan and by OSHA, USEPA, Pennsylvania, or other applicable regulations.

It may be noted that following grading and covering of contaminated materials with gravel or other media to prevent exposure, the Contractor or subcontractors working on the Site (i.e., paving contractor, etc.) will not require the 40 hour training and medical monitoring described in Section 6.0 of this plan, if the potential for exposure to contaminated materials no longer exists.



### 3.0 SITE DESCRIPTION & CONTAMINATION CHARACTERIZATION

The Site is located on a small parcel of land (approximately 2 acres) in an industrial area of the Borough of Columbia, Lancaster County, Pennsylvania, near the Susquehanna River as shown on Figure 1 and 2.

#### FORMER GAS PLANT ACTIVITIES

The Columbia Gas Company began production of gas at the Site in 1851. 'Sanborn Fire Insurance maps dating from 1886 to 1904 depict two gas holders, an oil tank, and a gas works building containing a water gas generator occupying the Site.

In 1949, the Site was sold to the Lancaster County Gas Company, which later merged into UGI. Operations at the Columbia Gas Plant ceased in the 1950s, and the Site was decommissioned sometime thereafter (the actual date is not known). Aboveground structures were demolished and removed, and the holder foundations and tar separator were backfilled.

#### RECENT SITE ACTIVITIES AND SITE STATUS

Thomas Crouse purchased the former gas plant property in 1976 from UGI Corporation. In October 1979, he sold the eastern part of the property to George Roach who began operation of a boat retail and repair shop. The eastern part of the property purchased by Mr. Roach was the location of the original plant and gas holders. At this time, PPL owns both portions of the original plant property, as shown on Figure 2.



## SITE REMEDY

The major components of Site remedy include:

- Restrictions placed on the deed or title to the property that prohibit residential use and restrict excavation in areas of contamination on the Site and in the Site vicinity.
- Removal of equipment and debris from the Site as a result of past Site operations, investigations, and remediation.
- Demolition of existing above-ground Site structures.
- Placement of 8" of cement type concrete over the holder caps.
- Excavation and disposal of contaminated Site soil and placement of clean fill, as necessary, to achieve desired grades and to isolate remaining contamination from surface contact or intrusion.
- Placement of an asphalt cap over areas where contamination will remain.
- Fencing of the Site.

In addition, the foundation and floor slab for a steel frame maintenance building may be placed at the Site. The borough is planning on constructing the building at some point in the future.



## CONSTITUENTS OF CONCERN

As a result of industrial activities associated with the manufacture of gas products conducted between 1851 and the 1950s, the Site and portions of surrounding land parcels became impacted with inorganic and organic compounds. The results of the Remedial Investigation (RI) conducted at the Site and Site vicinity found that the surface and subsurface soils contain semi-volatile organic compounds (SVOCs) and relatively low concentrations of volatile organic compounds (VOCs). The SVOCs detected tended to be comprised primarily of the heavier, less soluble species. Materials within two on-Site holder tanks were also found to contain residual wastes from gas manufacturing operations. The RI also indicated the presence of Dense Non-Aqueous Phase Liquid (DNAPL) contained within the fractured bedrock beneath the Site and surrounding land parcels in the Site vicinity.

The Baseline Human Health Risk Assessment (BHHRA) performed for the Site identified the following constituents of concern (COCs) for the on-site remedial activities: Acenaphthylene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, benzo(a)pyrene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Aluminum, Arsenic, Beryllium, Cadmium, Iron, Lead, Thallium, and Magnesium.

A list of potential COCs at the Site, identified in the BHHRA, along with Occupational Safety and Health (OSHA) Permeable Exposure Limits (PELs) and symptoms/effects of acute exposure are presented in Table 1. Table 2 provides the maximum concentration of the COCs in Site soils. Additional information on the potential COCs is presented in Appendix A.



#### 4.0 HAZARD ANALYSIS

The Site activities will consist of mobilization, decontamination of tools and equipment, excavation of Site soils, fill placement, pavement/concrete construction, site restoration, and demobilization. Based on these activities, Contractor employees and visitors have the potential to be exposed to the following hazards:

- Incidental ingestion of impacted soils,
- Direct contact to impacted soils;
- Inhalation of fugitive dust;
- Heat stress;
- Cold stress;
- Noise;
- Biological hazards;
- Equipment traffic; and,
- Other vehicular traffic.

The Contractor is to review potential hazards during Site activities and where there are changes due to the work, associated controls, and/or equipment used, the analyses are to be modified by the Contractor to represent the actual Site conditions.



## 5.0 PERSONNEL RESPONSIBLE FOR SAFETY & HEALTH

The Contractor shall designate the following personnel to be responsible for implementing the safety and health program at the Site.

### 1. Safety and Health Manager (SHM)

Duties of the position are:

- a) To develop, implement, oversee, and enforce the SSHP;
- b) To conduct the initial Site Orientation;
- c) To provide continuing health and safety support, as needed;
- d) To review results of air monitoring and accident reports;
- e) To be present on Site during the first three days of remedial activities;
- f) Be available for emergencies;
  - To provide continued support for upgrading/downgrading of the level of personal protection;
  - To have the authority to stop operations if unacceptable health or safety conditions exist;
- g) To coordinate any modifications to the SSHP with the Site Health and Safety Officer, Contractor Project Manager, Site Respondents and the Owner;
- h) To conduct accident investigations and prepare accident reports;
- i) To sign and date SSHP prior to submittal to USEPA for approval; and
- j) To visit the Site as necessary to audit the effectiveness of SSHP.

### 2. Contractor Project Manager

Duties of the position are:

- a) To allocate resources to safely perform all operations;



- b) Overall responsibility for work operations; and,
- c) To assist the SHM in the identification of existing and predictable hazards and to take prompt corrective measures to eliminate these hazards.

3. Site Safety and Health Officer (SSHO)

Duties of the position are:

- a) To assist in the implementation and enforcement of the SSHP;
- b) To conduct occupational air monitoring, training, and Site safety inspections and accident investigations;
- c) To remain on Site during all project operations;
- d) To have the authority to stop operations if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions;
- e) To consult with and coordinate any modifications to the SSHP with the Safety and Health Manager, and Contractor Project Manager;
- f) To conduct accident investigations and prepare accident reports, as necessary;
- g) To review results of daily quality control inspections and document safety and health findings into the Daily Inspection Log;
- h) To coordinate and to oversee the implementation of the corrective action;
- i) To provide OSHA required Site Specific Orientation for all employees new to the Site;
- j) To collect and maintain proof of current OSHA training and medical surveillance for all Site work force.
- k) To participate in all management meetings in preparation for new Site activities;
- l) To report on safety/participate in scheduled management regarding progress; and



- m) To prepare for, conduct and/or host and record pertinent daily tool box safety meetings.

4. Contractor Site Superintendent

Duties of the position are:

- a) To coordinate all construction and sub-contractor activities; and,
- b) To assure compliance with SSHP for all construction activities.

The Contractor's Project Manager and Site Superintendent will be directly responsible for enforcing the SSHP for Contractor and Subcontractor personnel and will report directly to the SSHO and SHM regarding any unsafe Site activities as they occur.

All modifications to the SSHP will be approved and signed by the SHM.



## 6.0 OCCUPATIONAL HEALTH PHYSICIAN & MEDICAL SURVEILLANCE PROGRAM

For personnel who may potentially be exposed to contaminated material, the Contractor will utilize the services of physicians who are board certified in occupational medicine to supervise the medical surveillance program and conduct employee medical examinations.

1. The medical examination will consist of:
  - a) Medical and Occupational History Questionnaire;
  - b) General Physical, including evaluation of all major organ systems;
  - c) Pulmonary Function Examination;
  - d) Electrocardiogram;
  - e) Chest X-Ray (optional);
  - f) Otoscopic Examination;
  - g) Audiometric Examination;
  - h) Visual Acuity Examination;
  - i) Blood Tests, Blood Count, Blood Profile;
  - j) Blood Lead and ZPP; and
  - k) Drug Screen.
  
2. A baseline examination will be given prior to the employee starting any work activities. A medical examination will be repeated under one or more of the following conditions:
  - a) More than a year has passed since the employee's last examination;
  - b) The employee experiences an acute exposure to a toxic or hazardous material, or an injury.
  - c) The examining physician, the SHM, or SSHO recommends one; or
  - d) At the request of an employee with demonstrated symptoms of an occupational exposure to toxic or hazardous materials.



For personnel who may potentially be exposed to contaminated media, the Contractor will obtain a certification from the occupational physician that the employee is medically fit to wear respiratory protection and has no medical condition that would place him at an increased risk. No employee will be permitted to work in the Exclusion Zone (EZ) until his certificate has been submitted to the SSHO.

All medical records will be kept for at least 30 years and will be made available to the Site Respondents and Owner or regulatory agencies, as required.



## 7.0 SAFETY TRAINING

The SSHO or designee will provide and require that all personnel who may potentially be exposed to contaminated material at the Site complete training or refresher sessions. Training and refresher sessions will assure that all personnel are capable of and familiar with the use of safety, health, respiratory, and protective equipment and with the safety and security procedures required for this Site. The training session will include the OSHA mandated 40 hour training course for new personnel with potential exposure, as well as refresher courses for those persons who have had this training. Supervisors will have completed an additional 8 hours of supervisor training per 29 CFR 1910.120 (e).

Documentation will be kept on file, which certifies that each employee or subcontractor employee who may potentially be exposed to contaminated material at the Site has satisfied the requirements of the OSHA training regulation 1910.120(e).

There will be at least one person present on Site who will be trained and certified in Standard First Aid and Adult Cardiopulmonary Resuscitation (CPR).

1. The SSHO will provide and conduct a training program on Site for Site personnel prior to commencing work within the EZ. This training program will address as a minimum the following topics:
  - a) Potential hazards;
  - b) Biology, chemistry and physics of hazardous materials;
  - c) Rights and responsibilities of workers under OSHA and Contractor's Hazard Communication Program;
  - d) Standard safety operating procedures;
  - e) Types of monitoring equipment to be used;
  - f) SSHP;



- g) Internal and external communications;
  - h) Medical surveillance program;
  - i) Personal protective clothing and equipment;
  - j) Respiratory equipment including training and qualitative fit testing for full-face piece respirators;
  - k) Air monitoring program;
  - l) Decontamination procedures;
  - m) Evacuation, first aid, and emergency procedures dealing with fire and medical situations;
  - n) Work zones established at the Site;
  - o) Safe work practices associated with employee's work assignment, including dust control measures, hazardous materials recognition, and use of the buddy system;
  - p) Basic operational safety, emphasizing hazards expected on Site;
  - q) Prohibitions inside the EZ and Contamination Reduction Zone (CRZ), including:
    - 1. Glasses and/or facial hair, such as beards or long sideburns, which interfere with respirator fit;
    - 2. Eating, drinking, smoking, and/or chewing in the EZ or CRZ;
    - 3. Wearing of personal articles, (e.g. watches, rings, etc.); and entertainment headsets such as personal CD, tape or radio devices.
    - 4. Working when ill.
2. All personnel assigned to the Site will receive the Site-specific safety and health training. Upon completion of this training, a training acknowledgment log will be completed. The training acknowledgment logs will include provisions for the following information:
- a) Employee or visitor's name.



- a. Verification of topics covered, including:
  - i. Work Rules and Safety Requirements
  - ii. Personal Protection Equipment
  - iii. Potentially Hazardous Chemicals
  - iv. Emergency Equipment and Plan
  - v. Reporting Injuries and Illnesses
  - vi. Emergency Procedures
  - vii. Job Assignment
  - viii. Personal Hygiene
  - ix. Medical Tests
  - x. Materials used
  - xi. Equipment demonstration
  - xii. Hands-on equipment practice for each employee
  - xiii. Prohibitions covered
  - xiv. Buddy-System explanation; and
  - xv. Standard operating procedures.
  
- c) Date and signature by trainee and trainer.

There may be additional safety training sessions conducted by the SSHO throughout the duration of the project. The purpose of these training sessions is to reinforce the proper procedures, to correct any deficiencies noted in the safety and health program, and to prepare the workers for any change in the safety and health plan due to changes in the operations or unanticipated problems.

All Site personnel will participate in daily safety tailgate meetings that address the health and safety concerns presented by the project's definable features of work. Training attendance and topics will be documented on a daily sign-in log.



3. All first time visitors will be required to undergo an orientation conducted by the SSHO or his designee. The training will consist of:
  - a) Hazards present at the Site;
  - b) Effects of these hazards;
  - c) Progress of work and the relationship of the present work in regard to the type of hazards that may be encountered;
  - d) Emergency signals and procedures;
  - e) Type and limitations of personal protective equipment in use;
  - f) Proper use of protective equipment;
  - g) General safety rules and policies in effect at the Site; and
  - h) Completion of a training acknowledgment log.

If a visitor does not, for any reason, have the required OSHA training and medical examination they will not be permitted in the EZ.



## 8.0 ACCIDENT PREVENTION PROGRAM

The Contractor is to develop a comprehensive Accident Prevention Program, which follows the requirements, listed in 29 CFR 1910 and 1926. A copy of the Accident Prevention Program is to be appended to this plan. This plan will include the following features:

1. Statement of company policy;
2. Delegation of responsibility;
3. A self-inspection guide;
4. Safety meetings;
5. Outline of topics suitable for safety meetings;
6. Fire prevention program;
7. Posting requirements;
8. Assured equipment grounding conductor program;
9. Policy for violation of safety rules;
10. Accident investigation;
11. General safety rules for employees;
12. Lock out/tag out procedure;
13. Confined space entry;
14. Training requirements; and
15. Safety inspection policy and procedures.

The Contractor's Project Manager is responsible for the administration of the Accident Prevention Program. The SHM is responsible for the implementation and overview of the program while the SSHO will manage the program on a daily basis. The SSHO will determine whether any of the safety rules are being violated, advise the employee(s) on the proper procedure(s), initiate any disciplinary action(s) which may be required, conduct the daily safety inspections, investigate all accidents, and make recommendations that will correct all unsafe conditions.



All subcontractors will also be required to follow the Accident Prevention Program. Subcontractor personnel will be trained in the content and procedures associated with the program. The SSHO will be responsible for determining subcontractor compliance with this program.

There will be daily safety meetings conducted by the SSHO. The topics will be developed in conjunction with the SHM. All on Site personnel will be required to attend the safety meetings. A log will be kept of the attendees and subjects covered.

## 1. Typical Topics

- a) Safely Operating and working around heavy equipment such as excavators, dozers, and vibratory rollers;
- b) Work Zones and PPE Requirements;
- c) Heat Stress;
- d) Cold Stress;
- e) Personnel/Equipment Decontamination and prevention of cross contamination;
- f) Emergency Response Procedures;
- g) Slips, Trips and Falls;
- h) Safety with Electrical Hazards;

## 2. Additional Topics

- a) Cutting and Welding: All cutting and welding (“hot work”) operations will require a burning permit signed by the SSHO. The burning permit will require the following information:
  - i) Percent oxygen level;
  - ii) Percent of lower flammable limit;
  - iii) Vapor concentration;



- iv) Availability of fire extinguisher;
- v) Location of nearest combustibles;
- vi) Welding/burning operations in compliance with OSHA regulation 1910.252; and,
- vii) Designated fire watch.

The testing of the atmosphere will be the SSHO or designee's responsibility. At each hot work location an individual will be designated as fire watch. This person's sole responsibility shall be to monitor the hot work and have immediate access to a fire extinguisher located at each hot work Site.

- b) Fire Prevention: Basic fire prevention measures will be followed. Fire extinguishers will be inspected and tagged monthly.
- c) Housekeeping: The Site will be kept in a neat and orderly condition. Non-contaminated refuse will be disposed of on a regular basis. The disposal of contaminated material is discussed in the Personnel and Equipment Decontamination section of this document. Sanitation will be provided in accordance with the personal decontamination procedures outlined in Personal and Equipment Decontamination section of this document.
- d) Heavy Equipment Inspection: All equipment will be inspected by the operator prior to use. Motorized equipment will be checked to see that brake and steering mechanisms are in working order and that all alarm systems and safety guards are operational.
- e) First Aid/CPR Training: There will be one person on Site at all times trained and certified in first aid and CPR. There will also be an industrial first aid kit located in the Site office. All injuries and/or illnesses will be reported to the SSHO and in instances when he is unavailable to one of the Certified First



Aid employees who will then decide on the proper course of treatment i.e., routine first aid or emergency medical treatment. The emergency medical treatment facility and the route to be followed to get there are discussed in Emergency Response and Contingencies section of this document.

- f) Accident Reports: All accidents, occupational illnesses, and exposure events will be reported to the SSHO who will then investigate the accident and make recommendations to prevent its reoccurrence.
- g) Inspections: The SSHO will make safety inspections of the Site. All safety hazards will be immediately corrected.



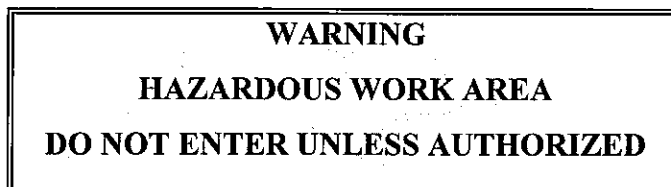
## 9.0 STANDARD SAFETY OPERATING PROCEDURES

1. The following general safety rules will be in effect for all Site personnel:
  - a) Eating, drinking, smoking, chewing gum or tobacco, applying and wearing make up, and other practices that increase the probability of hand-to-mouth transfer and ingestion of hazardous material is prohibited in any area designated contaminated.
  - b) Hands and face shall be thoroughly washed upon leaving the work area and before eating, drinking, urinating, or other activities.
  - c) Whenever decontamination procedures for protective clothing are in effect, the entire body shall be thoroughly washed as soon as possible after the protective clothing is removed.
  - d) Medicine and alcohol can increase the effects of exposure to toxic chemicals. Therefore:
    1. Personnel using prescription drugs shall inform the doctor who prescribed them of their potential contact with toxic materials.
    2. Personnel who take over-the-counter drugs within a day before work on a Site must inform the SSHO of the warnings listed on the drug's container (the part of the label that says, for example, "Do not take this medication if you are operating a motor vehicle").
    3. Alcoholic beverage intake shall be prohibited during project operations. Personnel under the influence of alcohol or recreational or illegal drugs will not be allowed on Site.



## 10.0 SITE CONTROL

1. Signage: The SSHO or designee, will provide, install, and maintain signs and other warning devices to inform Site personnel and the public of the hazards present at the Site. The signs will have letters at least 4 inches in height and will state:



In addition, areas of special hazards, such as open excavations, will be posted with a hazard warning banner or sign.

2. Zones: The Contractor will clearly layout and identify all work areas in the field and will limit equipment, operations, and personnel in the area as defined below:
  - a) Exclusion Zone (Hazardous or Contaminated Zone)
    1. This includes all areas, which are found to be impacted with material above the environmental levels.
    2. The EZ will be clearly delineated in the field prior to commencing Site work by orange safety fencing and warning signs spaced around the perimeter of the zone warning of a hazardous work area.
    3. Access from the Support Zone (SZ) into the EZ will be controlled by surrounding the CRZ with stakes, flagging, and warning signs.
    4. Access to the EZ will be restricted to personnel who are wearing the proper PPE, have received the required medical examination, and have undergone the safety and health training required by the SSHP.



Eating, drinking, smoking, or chewing is prohibited in this area.

b) Contamination Reduction Zone

1. This zone will occur at the interface of the EZ and the SZ and will provide for the transfer of construction materials and equipment, the decontamination of transport vehicles handling contaminated soil prior to entering the SZ, the decontamination of personnel and clothing prior to entering the SZ and for the physical segregation of the SZ from the EZ. The SSHO or his designee must certify all materials, equipment, tools, and vehicles removed from the CRZ for uncontrolled release as uncontaminated.
2. Access to the CRZ will be restricted to personnel who are wearing the proper PPE, have undergone the required medical examination, and have participated in the training program outlined in the SSHP. Eating, drinking, smoking, or chewing is prohibited in this area. A Site map of the Project can be found in Figure 1.

c) Support Zone

This area is the remainder of Site and is defined as being an area outside the CRZ and EZ. The SZ will be clearly delineated and procedures will be implemented to prevent active or passive contamination from the work Site. The function of the SZ includes:

1. An entry area for personnel, material, and equipment to the CRZ;
2. An exit area for decontaminated personnel, materials, and equipment from the CRZ; and,
3. A storage area for clean, safety and work equipment.

The SZ will be clearly delineated in the field.



3. Emergency Telephone Numbers: The following emergency telephone numbers will be posted at all on-Site telephones and provided to all Site personnel conducting remediation activities:

EMERGENCY PHONE NUMBERS		
	CONTACT	TELEPHONE NUMBER
1.	Lancaster General	911 or 717-544-3311
2.	Columbia Borough Police Department	911 or 717-684-7735
3.	Columbia Fire Department	911 or 717-684-5100
4.	Columbia Water Company	717-684-2712
5.	<u>Site Respondents</u> : Clean Sites Environmental Services Contact: Scott Miller	703-519-2142
6.	<u>USEPA Project Manager</u> : David Turner	215-814-3216
7.	USEPA Region III	215-814-5000 or 1-800-438-2474
8.	USEPA Spill Control	800-424-8002
9.	PADEP Emergency Response	717-705-4741 or 1-877-333-1904 (after hours)
10.	National Response Center	800-424-8802
11.	Emergency Treatment Facility a. Name: Lancaster General b. Address: 555 North Duke Street Lancaster, PA 17602	717-544-3311
12.	Engineer - Advanced GeoServices Corp. Contact: Christopher T. Reitman	610-840-9123 - Work 610-701-0670 - Home 610-389-2469 - Cell

Directions to the Emergency Treatment Facility (Lancaster General) are provided as Figure 2.



## 11.0 EMERGENCY EQUIPMENT & FIRST AID REQUIREMENTS

1. The Contractor will provide at a minimum the following emergency and first aid/emergency equipment as required:
  - a) Industrial type first aid kit, which includes a burn kit;
  - b) 3A: 40-B: C (5 LB. Capacity) and 20A: 120-B: C (20 Lb Capacity Wall Mount) type fire extinguishers;
  - c) Portable emergency eye wash units, which provide 15 minutes of fresh water to the eyes;
  - d) Spill kit consisting of shovels, drums, and absorbent material; and,
  - e) Full face piece, negative pressure respirators, disposable outerwear (Tyvek), and necessary PPE for six visitors daily.

One emergency eye wash unit and one 2A: 10B: C fire extinguisher will be placed in each CRZ. First Aid units will be located at a manned location. In isolated work areas they will be located in close proximity to the work. The first aid stations will be suitably marked.

2. Fire extinguishers will also be placed at:
  - a) The Office Trailers; (20 Lb Capacity Wall Mount);
  - b) The Contractor's Construction Equipment Trailer (20 Lb Capacity Wall Mount);
  - c) The Contractor's Flammable materials storage area; (20 Lb Capacity Wall Mount); and in
  - e) All Site vehicles and heavy equipment; 3A: 40-B: C (5 LB. Capacity).



## 12.0 EMERGENCY RESPONSE & CONTINGENCY PROCEDURES

1. Accidents, Incidents, and Unusual Events: All accidents, incidents, and unusual events will be handled in a manner to minimize health risks to Site workers. In the event that an accident, incident, or other unusual event occurs, the following procedure will be followed:
  - a) First aid or other appropriate initial action will be administered by trained personnel closest to the accident or event. This assistance will not place those rendering assistance in a situation of unacceptable risk;
  - b) All accidents, incidents, and unusual events will be reported to the SSHO. The SSHO is responsible for conducting the emergency response in an efficient, rapid, and safe manner. The SSHO will decide if off-Site assistance and/or medical treatment are required, and arrange for that assistance. In the event that an evacuation must take place an air horn will be sounded. Directions will be given to evacuate the area;
  - c) In the event of a ruptured gas service/main the SSHO will notify the local authorities via the 911 emergency call system, followed by notification of the utility company itself;
  - d) All workers on Site will conduct themselves in a mature, calm manner in the event of an accident or unusual event. All personnel will conduct themselves so as to minimize risks to themselves and to other workers; and
  - e) Immediately following the assessment of the emergency situation, the SSHO or other Site responsible personnel will contact the Site Respondents and Owner.



The types of emergencies that could occur on the project Site include fire, utility line breaks, and medical emergencies. The following is a discussion of the implications of each of these together with the measures that will be taken to prevent the spread of contamination or exposure of individuals to excessive contamination should they occur.

2. Fire/Utility Related Emergencies: Should a fire, potentially hazardous situation, or explosion occur in the EZ the hazard normally associated with such an occurrence is enhanced by the possibility of the release of airborne contamination. This could occur as a result of the air currents generated or as a result of large amounts of water used to suppress the fire. The Site Fire Alarm Plan is as follows:

- a) Outside assistance will be immediately requested, if deemed necessary, by the SSHO.
- b) Personnel not intrinsically involved in on Site emergency response procedures will evacuate to an area upwind of the fire. If the fire can be treated with a fire extinguisher, personnel closest to the fire will obtain a fire extinguisher and attempt to extinguish the fire. This will be attempted only if there is minimal risk to the personnel involved. Contractor personnel must receive training in the use of fire extinguishers, but they do not need to receive fire brigade training as outlined by OSHA.

The following steps are taken in the event of fire to reduce the possibility of the spread of contamination and to assure that individuals are not exposed above acceptable limits:

- a) Any person discovering a fire is to notify 911 first, then notify the SSHO immediately after.



- b) Should a fire occur, every effort should be made by On-site personnel, directed by the SSHO, to bring the fire under control, however, in those cases where a fire emergency is beyond the capability of on-site personnel to control, personnel will wait for outside assistance.

- 3. Medical Emergencies: Medical emergencies can be further complicated by the presence of contaminated material. As a matter of policy, should a medical emergency arise in the EZ, prime attention is given to the medical aspects of the situation even though the use of life saving techniques may result in the spread of contamination.

When the medical situation allows, precautions to prevent the spread of contamination may include:

- a) Removing the injured individual's contaminated clothing and protective equipment within the EZ;
- b) Wrapping the injured individual in sheets to contain contamination;
- c) The use of plastic sheeting to prevent ambulance interiors and hospital facilities from becoming contaminated; and,
- d) The use of protective clothing and contamination control techniques by rescue and medical facility.

Note: Medical actions will always take priority. If contaminated persons are sent to the medical facility, the SSHO or his/her designee shall accompany them.

- 4. Unusual Objects/Situations/Unidentified Utility Services: Unusual/Unidentified objects such as buried sewer lines, drums, barrels, gas cylinders, gas services, or power lines may be encountered during excavation operations. If such an event occurs, the SSHO will halt operations and decide on the next course of action after



consultation with the Project Manager, Site Respondents and Owner. The SSHO is also responsible for suspending Site operations in the event of inclement weather.

5. Spills: In the event of a spill of affected materials outside the EZ, the area will be isolated from normal traffic by the SSHO using high visibility taping. Depending on the nature of the spilled material and its volume, visual inspection will be used to determine the volume of soil to be removed. If visual inspection is insufficient to determine the affected area, soil samples will be collected around the excavated area to assure that the spill has been adequately contained and affected material removed. Spilled materials and affected superficial soils will be drummed and disposed as appropriate, according to USEPA regulations.

The names and phone numbers of all personnel and agencies that could be involved in emergency response are listed in the Site Control Section 10.0 of this plan. This list will be posted in a conspicuous location at the Site, such as the dashboard of the field vehicle, office, and decontamination trailers. After emergency personnel have been contacted, the SHM will contact the Site Respondents and Owner. The Site SHM prior to the start of field activities will verify the capabilities of the local emergency services and hospitals.

The SSHO will provide a report to the Site Respondents and Owner within 24 hours.

6. Site Evacuation: A Site emergency, such as a ruptured gas utility line, may require the evacuation of personnel from the affected area. If such a situation arises, the SSHO will give the order to evacuate. It is the responsibility of all individuals to evacuate in a calm, orderly fashion. All personnel will be familiar with evacuation procedures and means of exit from their respective work areas. The locations of all evacuation points, including gates, will be thoroughly discussed at the Site-specific health and safety briefing prior to beginning work.



The log of on Site personnel will be used to confirm that all personnel are accounted for. Control of personnel at the designated rendezvous point is the responsibility of SSHO or his/her designee. Re-entrance to the Site will only be decided upon by the SSHO or his/her designee.



### 13.0 LEVELS OF PROTECTION/PERSONAL PROTECTIVE EQUIPMENT

The Contractor will provide for its personnel and visitors all necessary protective clothing and equipment and maintain it in accordance with the manufacturer's specifications. As applicable, all equipment will be NIOSH approved.

All personnel who are required to wear a respirator will have to pass a fit test given in accordance with OSHA regulations. Fit tests will be given on an annual basis unless a significant loss/gain of body weight or a different model or size respirator is issued. Respirators will not be interchanged between workers without cleaning and sanitizing. Cartridges will be changed prior to the end of service life.

Prescription glasses worn on Site will be safety glasses. Prescription lens inserts will be provided for all employees who wear a full face air purifying or supplied air respirator.

All personnel protective equipment (PPE) worn on Site will be decontaminated or properly disposed of at the end of the workday.

1. The following are the various levels of protection that will be in effect for this project. Optional PPE provided will need to be approved by the SSHO or his/her designee prior to use on Site.
  - a) Level D
    1. Work Clothing consisting of long sleeve shirts and pants, as dictated by the weather
    2. Safety (steel toe/shank) shoes or boots
    3. Hard hat
    4. Safety glasses with side shields, goggles, or face shield
    5. Hearing Protection (for noisy areas)



6. Optional: Nitrile surgical gloves with cotton liners, disposable boot covers
- b) Level D Modified
1. Same as for Level D, plus:
  2. Disposable, hooded, one-piece, full-body coveralls constructed of polypropylene fabric. Saranex coveralls will be required in areas where there is an increased potential for workers to come in contact with impacted material.
  3. Over boots of 60 mil (minimum) rubberized PVC or neoprene. Disposable type over boots allowed for equipment operators.
  4. Cotton knit gloves and nitrile gloves
- c) Level C
1. Level D modified PPE and:
  2. Full-face piece, air-purifying respirator (NIOSH approved) equipped with cartridges approved by NIOSH for particulates and organic vapors.
- d) Level B
1. Level D modified PPE and:
  2. On demand Self Contained Breathing Apparatuses (SCBA) or Supplied Air Line Respirators with a 5 minute escape bottle

The initial minimum level of protection for Site activity is Level D Modified. The Contractor will conform to the initial levels of protection unless an upgrade or downgrade is warranted by air monitoring data (discussed further in Section 16.0) and an evaluation of work practices/controls.



1. Personal protective equipment upgrades will only occur when the SSHO makes the change based on Site activity, air monitoring of contaminant levels, and work place practices as specified in this plan.
2. The following provisions apply to respiratory protection:
  - a) Employees who are required to wear respirators must pass a pulmonary function test;
  - b) Each time a respirator is donned the employee must perform a positive pressure/negative pressure fit test;
  - c) No facial hair which interferes with a satisfactory fit is permitted. A "two day" growth of beard is considered to interfere with the fit; and,
  - d) Cartridges and filters shall be changed daily or more frequently if breakthrough or increased resistance occurs.



## 14.0 EQUIPMENT & PERSONNEL DECONTAMINATION

1. Personnel Decontamination: The Contractor will provide:
  - a) Contained storage and disposal for used disposable outerwear;
  - b) Hand/face washing facilities;
  - c) A facility for changing into and out of and storing work clothing separate from street clothing; and,
  - d) A lunch and/or break room.

Personnel decontamination consists of the following steps:

- a) Disposable PPE will be removed and discarded into properly labeled "contaminated material" impermeable receptacles.
  - b) At the end of the work day non-disposable PPE such as respirators will be washed in a low sudsing detergent, rinsed with warm water, and wiped dry with a disposable cloth; Boot wash/brushing station will be supplied if necessary.
  - c) Decontaminated PPE will be stored in a secure area of the SZ; and,
  - d) All personnel will be required to wash their hands and face prior to eating and/or smoking.
2. Equipment decontamination: All equipment will be decontaminated by wash down in the CRZ prior to maintenance work. Maintenance work such as greasing heavy equipment need not require decontamination unless the job requires body contact with soil.

Equipment decontamination will consist of the following steps:

- a) All equipment in the EZ will be assumed to be contaminated and will be surveyed for contamination before it leaves the work zone;



- b) A gross decontamination using water sprays and scraping will be done on heavy equipment prior to it being brought to the decontamination pad;
- c) At the decontamination pad, all visible contamination will be removed with scrub brushes and high-pressure water spray



## 15.0 EMISSION & DUST CONTROL

The following procedures will be employed to minimize the generation of dust at the Site:

- a) Dusty operations, like excavation of dry soil, will be suspended when wind speed is excessive, as determined by exceeding dust monitoring action levels;
- b) Heavy equipment will be cleaned by wet decontamination in areas designed to collect the run-off. Mud from the equipment will not be allowed to dry on or in the decontamination pad;
- c) Trucks in which contaminated soil/debris are carried will be covered and sealed to control dust releases with a double, positive locking mechanism on the tailgates; and
- d) If the soil is dry, The Contractor will apply water to reduce the creation and dispersion of dust. The Contractor will avoid methods that generate slippery conditions or sticky mud.

The SSHO will confirm that dust suppression practices are effective and being utilized.



## 16.0 AIR MONITORING

### 16.1 INTRODUCTION

For Remedial Action field activities, an air monitoring program will be performed for the following reasons:

- To determine the presence of hazardous atmospheres and ensure that workers are wearing appropriate PPE. (PPE requirements are discussed in Section 13.0). As discussed in Section 13.0, workers during the Remedial Action field activities will be wearing Level D PPE at the initiation of work.
- To enable the comparison of the results to established occupational standards, and help determine whether the Site-Specific, real time action level is protective of worker health.
- To document the potential migration of dust and demonstrate whether adequate dust suppression methods are being employed.

This section identifies the procedures, instruments, and analytical methods to be used during the air monitoring program. Table 3 summarizes the air monitoring equipment which may be used on this project and their function.

The SSHO shall be responsible for all aspects of the air monitoring program including sample collection and informing the SHM of results. On-site calibrations of instruments will be performed as necessary and appropriate by the SSHO in accordance with the instructions of the equipment manufacturer.



As discussed in Section 3.0, a list of potential COCs along with Occupational Safety and Health (OSHA) Permissible Exposure Limits (PELs) and symptoms/effects of acute exposure is presented in Table 1. In addition, Table 2 provides the maximum concentration of the COCs in Site soils.

The following sections discuss the air monitoring program to be conducted during designated water line relocation field activities.

## 16.2 REAL-TIME PARTICULATE MONITORING

### 16.2.1 Inorganic Compounds

The air monitoring program will consist of real-time particulate air monitoring to evaluate potential airborne inorganic compounds during designated intrusive field activities. Additional air monitoring may be conducted as directed by the SSHO for other Remedial Action activities. The Remedial Action field activities with respect to inorganic compounds include, but are not limited to:

- Site soil Excavation
- Site soil Placement

Periodic, real-time particulate (dust) monitoring will be conducted utilizing an aerosol monitor (AM) which provides a reading of total dust in milligrams per cubic meter (mg/M<sup>3</sup>). The SSHO will take periodic readings at the initiation of each designated intrusive task and every hour thereafter, or whenever visible dust is detected during the Remedial Action field activities identified above to document dust emissions. These measurements will dictate whether an upgrade in PPE is required as discussed below.

The allowable dust levels on-site can be estimated for the constituents of concern using the following equation:

$$\text{Total Allowable Particulate (mg / M}^3\text{)} = \frac{\text{particulate concentration action level}}{\text{particulate of concern concentration}}$$



This equation can be solved for the allowable total particulate as described below.

Lead has a TLV of 0.05 milligrams per cubic meter (mg/M<sup>3</sup>). A safety factor of two provides an action level for lead of 0.025 mg/M<sup>3</sup>. This is considered the total allowable particulate of concern concentration. The amount of airborne dust (total particulate) required to reach 0.025 mg/M<sup>3</sup> of lead is based on the highest soil lead concentration observed at the Site of 730 mg/kg (see Table 2). Based on these calculations, the lead concentration of 730 mg/kg (0.073 percent) was selected to estimate the amount of airborne dust required to reach 0.025 mg/m<sup>3</sup> of lead as follows:

$$\text{Total Allowable Particulate} = \frac{0.025 \text{ Mg/M}^3}{0.00073} = 34.2 \text{ mg/M}^3 \text{ total particulate}$$

Similar estimated dust concentrations for other Site inorganic COCs would be protective. The above calculation allows an accurate interpretation of the real time dust monitor data, relative to the constituent concentrations of concern at the Site. A particulate action level of 1.5 mg/M<sup>3</sup> will be used for the dust monitor to upgrade from Level D to Level C PPE (see Section 13.0). Table 4 provides air monitoring methods, action levels and protective measures for PPE.

#### 16.2.2 Organic Compounds

Select Remedial Action field activities associated with the project may create conditions, such as the release of organic vapors into the breathing space. The most significant compound found in Tables 1 and 2 that may be associated with the project based on toxicity, reported results, and likelihood of exposure due to the scheduled Remedial Action field activities is Benzene in soils.

The Air Monitoring Program will consist of real-time organic air monitoring during intrusive field activities. The intrusive Remedial Action activities with respect to organic vapors include, but are not limited to:

- Site soil Excavation



- Site soil Placement

The greatest potential of exposure to airborne organic vapors is during Site soil excavation and soil placement. Monitoring of airborne vapors using an organic vapor meter (OVM) with a flame ionization detector (FID) will be performed to evaluate Benzene and other organics during the above intrusive operations. Air monitoring within the breathing zone will be conducted at the initiation of each intrusive operation presented above, then on an as-needed basis for each intrusive Site activity, as determined by the SSHO. If the OVA has sustained reading (greater than 5 minutes) of 1 ppm, a Drager CMS Analyzer with a Benzene chip will be used to determine the benzene level. If Benzene is present at a sustained level above 1 ppm, PPE will be upgraded to Level C.

Explosivity will be monitored during water line relocation field activities and any time organic vapors exceed 250 ppm within the breathing space. Measurements obtained from the OVM and Combustible Gas Indicator/Oxygen meter will be used as criteria for institution of additional precautions, Site evacuation, and PPE selection.

Personal protective levels will be increased in the event organic vapors and/or explosivity are measured above the specified action levels presented in Table 4



## 17.0 CONSTRUCTION & EXCAVATION

1. The following steps will be taken prior to and during all excavation activities:
  - a) All utility lines that may interfere with the work will be located and disconnected before digging near them. As required by law, the Pennsylvania One-Call System will be called by the Contractor.
  - b) Trenches greater than 5 feet in depth will be shored or sloped in accordance with OSHA regulation 1926.650. A minimum slope ratio of 1.5:1 will be maintained at all times. At this time no trenches deeper than 5 feet are anticipated at the Site.
  - c) Where employees are required to enter into trenches greater than 4 feet in depth suitable means of access and egress such as a ladder, ramp, stairway or other safe means will be provided. Trenches greater than 4 feet in depth will also be considered a confined space, and entry will take place under the procedures outlined in the Confined Space Entry Program.
  - d) The Contractor will implement shoring, sloping, and/or benching methods for excavations over 5 feet in depth or at any location where the structural integrity of the excavation wall is in question.
  - e) A visible barrier or orange safety fence will be erected at the edge of any open excavation.
  - f) Neither heavy equipment nor excavated material will be placed within 2 feet of an open excavation.



- g) A competent person shall inspect all shoring, sloping and/or benching each day before workers enter excavations.
  - h) Workers shall be prohibited from standing underneath loads handled by lifting or digging equipment.
  - i) On Site personnel will perform rescue activities. In the event that on Site personnel cannot perform rescue an outside team (i.e., fire department, emergency medical services (EMS), etc.) will be called. If an outside team is requested they will be informed of the type of rescue.
  - j) Sandbags, silt fence, and polyethylene sheeting will be used to prevent and control water that could enter the excavation.
2. The following general rules will be adhered to during construction activity:
- a) All mobile equipment will be provided with working back-up alarms, brakes, and shut-off switches;
  - b) Operators shall not leave their equipment while it is running;
  - c) A daily inspection will be made by the SSHO to determine compliance with the SSHP;
  - d) Illumination in the working zone will be a minimum of 10-foot candles. Supplementary temporary lighting will be provided, if necessary;
  - e) Electrical installations will be in compliance with the National Electric Code and local code requirements;



- f) All electrical equipment will be grounded and further protected by the use of ground fault circuit interrupters;
- g) An adequate number of toilet facilities will be provided. There will be at least one toilet for every twenty employees. With separate facilities for male and female employees;
- h) A source of potable water will be provided;
- i) An on Site wash facility will be provided;
- j) Food will only be consumed in prescribed clean locations;
- k) During on Site maintenance to be performed on equipment capable of storing and releasing energy, the lockout/tagout program will be implemented;
- l) Spills will be promptly cleaned to the bare ground or pavement with dedicated equipment and hand brooms;
- m) Liquids and residues will be removed using explosion proof or air driven pumps.



## 18.0 HEAT STRESS MONITORING/MANAGEMENT

Heat stress is one of the most common hazards encountered at a Site, and there are a number of factors that have an effect in determining the amount of heat stress experienced by an individual worker. These factors include environmental conditions, type of clothing worn, workload, and individual characteristics.

When individuals are subject to heat stress and are wearing personal protective equipment (PPE) which may restrict heat loss from the body (i.e., Tyvek/respirator) heat stress management/monitoring shall be performed. The SSHO shall assure the following:

- All employees drink plenty of fluids;
- Frequent breaks are scheduled so overheating does not occur; and
- Revise work schedules, when necessary, to take advantage of the cooler parts of the day (i.e., 5:00 a.m. to 1:00 p.m., and 6:00 p.m. to nightfall; and perform heat stress monitoring.

The intent of heat stress monitoring is to maintain a body core temperature below 100.4 degrees F. This is accomplished by measuring temperature with an infrared thermometer and/or measuring pulse rate at the beginning and at the end of each break in work. A target maximum temperature is set at 99.6 degrees; the target pulse rate is 120.

Work/rest regiments shall be adjusted so that the target values are not exceeded when entering a rest period. The rest period should be of sufficient duration to allow elevated measurements to return to below the target values before returning to work. Worker exposure to heat stress will be monitored using a battery operated thermometer which can be inserted into the ear to check the person's core temperature.



## 19.0 COLD STRESS MONITORING/MANAGEMENT

Body protection shall be provided to all Site personnel that have prolonged exposure to cold air. The right kind of protective clothing shall be provided to Site personnel to prevent cold stress. The following dry clothing shall be provided by the Contractor as deemed necessary by the SSHO:

- Appropriate underclothing (wool or other);
- Outer coats that repel wind and moisture;
- Face, head, and ear coverings;
- Extra pair of socks;
- Insulated safety boots; and
- Glove liners (wool) or wind-and-water-repellant gloves.

The SSHO will use the equivalent chill temperature when determining the combined cooling effect of wind and low temperatures on exposed skin or when determining clothing insulation requirements.

Site personnel working continuously in the cold are required to warm themselves on a regular basis in the on-site hygiene facility. Warm, sweet drinks will also be provided to Site personnel to prevent dehydration. The SSHO shall follow the work practices and recommendations for cold stress threshold limit values as stated by the 1991-1992 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices by the American Conference of Governmental Industrial Hygienists or equivalent cold stress prevention methods.



## 20.0 HEARING CONSERVATION

When noisy operations make normal conversation difficult, Site personnel shall use personal protection (ear plugs and/or muffs).



## 21.0 BIOLOGICAL HAZARDS

The procedures presented in this section shall only be administered by persons certified in first aid tactics and trained in the OSHA Bloodborne Pathogens Standard.

### POISONOUS SNAKEBITES

Reactions from snakebites are aggravated by acute fear and anxiety. Other factors that affect the severity of local and general reaction from poisonous snakebite include: the amount of venom injected and the speed of absorption of venom into the victim's circulation; the size of the victim; protection from clothing, including shoes and gloves; quick antivenom therapy; and location of the bite.

#### First Aid Procedure

The objective of first aid is to reduce the circulation of blood through the bite area, to delay absorption of venom, to prevent aggravation of the local wound, and to sustain respiration.

The most important step is to take the snakebite victim to the hospital quickly. Meanwhile, the following first aid steps should be taken:

- Keep the victim from moving around.
- Keep the victim as calm as possible and preferably in a lying position (horizontal).
- Immobilize the bitten extremity and keep it at or below heart level. If the victim can reach a hospital within 4 to 5 hours and if no symptoms develop, no further first aid measures need be applied at the Site.
- If mild-to-moderate symptoms develop, apply a constricting band 2 to 4 inches above



the bite, but not around a joint (the elbow, knee, wrist, or ankle) and not around the head, neck, or trunk. The band should be 3/4 to 1-1/2 inches wide, not thin like a rubber band. Watch out for swelling. Loosen the band if it becomes too tight, but do not remove it. Periodically check the pulse in the extremity beyond the bite to insure that the blood flow has not stopped.

- If severe symptoms develop, make an incision and apply suction immediately. Apply a constricting band, if this has not already been done, and make a cut in the skin through the fang mark(s). Use a sharp, sterilized knife. Cuts should be 1/2 inch long, extending over the suspected venom deposit point. (Because a snake strikes downward, the deposit point is usually lower than the fang mark). Cuts should be made along the long axis of the limb. Do not make cross-cut incisions. Do not make cuts on the head or trunk. Apply suction with a suction cup for 30 minutes. If suction cup is not available, use the mouth. There is a little risk to the rescuer who uses his/hers mouth, but it is recommended that the venom not be swallowed and that the mouth be rinsed out.

If the hospital cannot be reached in 4 or 5 hours, take the following measures:

- Keep trying to obtain professional care, either by transporting the victim to a place where medical care is available or by using an emergency communications system to obtain medical advice.
- If no symptoms develop, keep trying to reach the hospital and give the general first aid described above.
- If any symptoms at all develop, apply a constricting band, make incisions, and apply suction immediately, as described above.

Several other factors must be considered in cases of snakebite:



- Shock - Keep the victim lying down and comfortable, and maintain his or her body temperature.
- Breathing and heartbeat - If breathing stops, give mouth-to-mouth resuscitation. If breathing stops and there is no pulse, perform cardiopulmonary resuscitation (CPR) if you have been trained to do so.
- Identifying the snake - If you can kill the snake without risk or delay, bring it to the hospital for identification.
- Cleaning the bitten area - You may wash the bitten area with soap and water and blot it dry with sterile gauze. You may apply dressings and bandages, but only for a short period of time.
- Medicine to relieve the pain - Do not give the victim alcohol, sedatives, aspirin, or any medicine containing aspirin. Some painkillers, however, may be given as directed by a physician. Consult a doctor or other medical personnel for specific medications that may be used.

## SPIDERS BITES

Spiders in the United States are generally harmless, with two notable exceptions: the Black Widow spider (*Latrodectus Mactans*) and the Brown Recluse or violin spider (*Lox Osceles Reclusa*).

The symptoms of such a spider bite are: slight reaction, severe pain produced by nerve toxin, profuse sweating, nausea, painful cramps in abdominal muscles, and difficulty in breathing and speaking. Victims recover in almost all cases, but an occasional death is reported. The bite of a Black Widow spider is the more painful and often the more deadly of the two.



Field personnel should exercise caution when lifting covers off manholes or sumps or rummaging through wood, rock, or brush piles, etc. since both the Black Widow and Brown Recluse spiders are typically found in these areas.

## TICKBORNE DISEASES

### Lyme Disease

Lyme disease is an illness caused by a bacterium which may be transmitted by the bite of a tick (*Ixodes Dammini*), commonly referred to as the "Deer Tick." The tick is about the size of a sesame seed, as distinguished from the Dog Tick, which is significantly larger. The Deer Tick is principally found along the Atlantic Coast, living in grassy and wooded areas, and feeds on mammals such as mice, shrews, birds, raccoons, possums, deer, and humans. Not all ticks are infected with the bacterium, however. When an infected tick bites, the bacterium is passed into the bloodstream of the host, where it multiplies. The various stages and symptoms of the disease are well recognized and, if detected early, can be treated with antibiotics.

Removal of ticks is best accomplished using small tweezers. Do not squeeze the tick's body. Grasp it where the mouth parts enter the skin and tug gently, but not firmly, until it releases its hold on the skin. Save the tick in a jar with the date, body location of the bite, and the place where it may have been acquired. Wipe the bite thoroughly with an antiseptic and seek medical attention as soon as possible.

The illness typically occurs in the summer and is characterized by a slowly expanding red rash, which develops a few days to a few weeks after the bite of an infected tick. This may be accompanied by flu-like symptoms along with headache, stiff neck, fever, muscle aches, and/or general malaise. At this stage, treatment by a physician is usually effective; but if left alone, these early symptoms may disappear and more serious problems may follow. The most common late symptom of the untreated disease is arthritis. Other problems which may occur include meningitis and neurological and cardiac abnormalities. It is important to note that some people do not get the



characteristic rash but progress directly to the later manifestations. Treatment of later symptoms is more difficult than early symptoms and is not always successful.

When in an area suspected of harboring ticks (grassy, bushy, or woodland area) the following precautions can minimize the chances of being bitten by a tick:

- Wear long pants and long-sleeved shirts that fit tightly at the ankles and wrists.
- Wear light colored clothing so ticks can be easily spotted.
- Wearing tick repellents may be useful.
- Inspect clothing frequently while in tick habitat.
- Inspect your head and body thoroughly when you return from the field.
- Remove any attached ticks by tugging with tweezers where the tick's mouth parts enter the skin. Do not squeeze or crush it.

### Rocky Mountain Spotted Fever

In the eastern and southern United States this tickborne disease is transmitted by the infected Dog Tick (*Dermacentor Variabilis*). It is important to note that the Dog Tick is significantly larger than the Deer Tick. Nearly all cases of infection occur in the spring and summer, generally several days after exposure to infected ticks. The onset of illness is abrupt and often accompanied by high fever, headache, chills, and severe weakness. After the fourth day of fever, victims develop a spotted pink rash that usually starts on the hands and feet and gradually extends to most of the body. As with Lyme disease, early detection and treatment significantly reduces the severity of illness. The disease responds to antibiotic therapy with tetracycline or chloramphenicol.



## POISONOUS PLANT

The majority of skin reactions following contact with offending plants is allergic in nature and is characterized by general symptoms of headache and fever, itching, redness, and a rash.

Some of the most common and most severe allergic reactions result from contact with plants of the Poison Ivy group including Poison Oak and Poison Sumac. The most distinctive features of Poison Ivy and Poison Oak are their leaves, which are composed of three leaflets each. Both plants also have greenish-white flowers and berries that grow in clusters. Such plants produce a severe rash characterized by redness, blisters, swelling and intense burning and itching. The victim can also develop a high fever and become very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

### First Aid Procedure

1. Remove contaminated clothing.
2. Wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
3. Apply calamine or other soothing skin lotion if the rash is mild.
4. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.



## 22.0 FALL PROTECTION

During the course of the project workers may be exposed to situations where there is the potential for a fall from greater than 6 feet. The acceptable means of providing access to elevated work are ladders, scaffolding, and mobile manlift baskets. The Contractor will develop a program to prevent injuries due to falls from elevated work surfaces and to comply with OSHA fall protection standards in 29 CFR 1926, Subpart M.

Site supervisors have the responsibility to ensure that fall protection is provided at the Site. The SSHO is responsible for providing fall protection training for all Site personnel and monitoring compliance with this program.



## 23.0 CONFINED SPACE ENTRY

A Confined Space Entry Program will be required when employees enter into tanks, sewers, and trenches greater than 4 feet in depth, or any place with limited ventilation which is not designed for human habitation. Prior to entry into a confined space, the SSHO or designee will review with the affected personnel all potential hazards, proper work procedures, required safety equipment, and emergency procedures.

As part of the Confined Space Entry Program, the following actions will be completed prior to entry:

1. Pre-planning of all operations with those both directly and indirectly involved, including rescue teams;
2. Notification of the SHM and other proper authorities of the planned entry and actions to be taken;
3. Working out all emergency signals with all involved in the confined space entry;
4. Have a complete list of emergency telephone numbers for police, fire, hospital, and emergency rescue units as well as directions and map of routes to nearest hospital and emergency treatment facility;
5. Having all safety equipment readily available;
6. Having all mechanical equipment thoroughly checked and in proper working order prior to initiating any confined space activities;
7. Checking all retrieval lines and safety harnesses for unusual signs of wear and making sure the SCBA is fully charged, as appropriate;



8. Calibration and rezeroing of portable gas detectors daily or more often, per manufacturer's instructions;
9. Blanking off, bleeding, blocking, securing, and isolating the confined space to a zero-mechanical state;
10. Lockout and tagout all electrical and mechanical equipment including verification that it is properly locked out by attempting to start equipment; and
11. Considering all confined spaces dangerous before entry until proven safe.

All confined spaces will have their atmosphere tested prior to entry. The following air tests will be taken:

- a) Oxygen level;
- b) Presence of organic vapors;
- c) Potentially explosive atmospheres;
- d) Detection of Carbon Monoxide (CO) and Hydrogen Sulfide (H<sub>2</sub>S); and
- e) Real time particulates.

If necessary, the Contractor will ventilate the confined space prior to employees entering and during all phases of work. A positive draft will be maintained into the confined space. The SSHO or designee will also continuously monitor the atmosphere of the confined space using portable combustible gas, oxygen deficiency, and toxic gas detectors during all activities, which require employees to enter the confined space.

If any of the following conditions are met, entry into the confined space will be prohibited.



- An oxygen deficient atmosphere has a percent oxygen concentration below 19.5%.
- An oxygen-enriched atmosphere is above 22%.
- Excessive organic vapor concentrations occur when the level is above 100 parts per million (ppm).
- A flammable atmosphere has a reading above 10% of the Lower Explosive Limit (LEL).
- Excessive hydrogen sulfide concentrations occur when the measured level is above 5 ppm.
- Excessive CO concentrations occur when the measured level is above 35 ppm.
- Excessive particulate with particulate concentrations above 100ug/m<sup>3</sup>.

This testing will occur at all depths (top to bottom) of the confined space.

Finally, the SSHO or designee will verify that the confined space is isolated from all unwanted forms of energy and material. This can be done by verifying that lockout/tagout systems have not been tampered with.

During confined space entry the SSHO or designee will:

1. If necessary, visually inspect ladder rungs for corrosion;
2. Monitor the atmosphere using a combustible gas, oxygen deficiency, and hydrogen sulfide detector when work is being performed;



3. Use a safety harness at all times with a minimum of 2-inch nylon rope retrieval line attached;
4. The trailing end of the retrieval line should be tied to the portable hoist assembly-lifting device or to an anchor point outside the confined space;
5. Equip standby personnel with self-contained breathing apparatus;
6. When using SCBA the buddy system shall be used. Two persons (entrants) wearing SCBA shall be in the confined space;
7. Outside attendant/observer shall keep an accurate count of all entrants and maintain effective and continuous contact with entrants;
8. At least one crew member (attendant) shall keep a constant watch and a continuous hold on the retrieval line of the workers in the confined space, whenever a portable hoist is not being used. The end of the line must be secured to an anchor point outside the entry portal;
9. The attendant shall recognize potential signs of trouble from those within the confined space. The attendant shall have sufficient training to recognize the potential hazardous activities both inside and outside the confined space;
10. Tools shall be lowered by a line and never thrown into the confined space;
11. Use a plastic pail to lower tools within or raise tools from a confined space instead of a metal pail;
12. All Contractor crewmembers shall wear proper work shoes, hard hats, and reflective traffic vests;



13. When the confined space is re-entered, the atmosphere must be retested if testing has stopped;
14. The attendant should not attempt a rescue unless another observer or backup person arrives, and only if trained to affect a rescue and has proper rescue equipment. If not trained, The Contractor will call for professional emergency rescue crews;
15. In the event of a rescue or extrication of a person from the lower level of the confined space, an additional rescue person is needed on the platform level to assist in guiding the injured worker out of the confined space; and
16. Comply with OSHA regulation 1910.146 in regards to permitted and non- permitted confined space entry.



## 24.0 RECORD KEEPING

1. The SSHO or designee will maintain all records documenting the implementation of the SSHP. The records will include:
  - a) Training logs;
  - b) Daily logs;
  - c) Weekly reports;
  - d) Real time air monitoring;
  - f) Documentation of safety meetings;
  - h) Decontamination logs;
  - i) Monitoring equipment calibration sheets;
  - j) Permit for open flame or welding;
  - k) Confined space entry permit;
  - l) Accident report;
  - m) Employee/visitor register; and
  - n) Medical certifications.
  
2. If an accident, an explosion or fire, or a release of toxic materials occurs during the course of the project, the Site Respondents and Owner will be telephoned immediately and receive a written notification within 24 hours. The report shall include the following items:
  - a) Name, organization, and telephone number of the Contractor;
  - b) Name and title of the person(s) reporting;
  - c) Date and time of the accident/incident;
  - d) Location of the accident/incident, i.e., Site location, facility name;
  - e) Brief summary of the accident/incident giving pertinent details including type of operation ongoing at the time of the accident/incident;
  - f) Cause of the accident/incident, if known;



- g) Casualties (fatalities, disabling injuries);
- h) Details of any existing chemical hazard or contamination;
- i) Estimated property damage, if applicable;
- j) Nature of damage, effect on contract schedule;
- k) Action(s) taken by the Contractor to provide for safety and security; and,
- l) Other damage or injuries sustained, public or private.

3. Daily safety inspection logs shall be kept for review and include the following items:

- a) Date;
- b) Areas inspected;
- c) Employees in the particular areas;
- d) Equipment being utilized by the employees named;
- e) Protective clothing and equipment being worn by the employees;
- f) Air monitoring results; and,
- g) Signature of SSHO.

4. Daily Reports will include:

- a) Summary sheet covering the range of work being done;
- b) Any incidents of:
  - 1. Non-use of protective devices in an area where required
  - 2. Non-use of protective clothing
  - 3. Disregard of buddy system
  - 4. Violation of eating, smoking, and chewing in prohibited areas
  - 5. Misuse of any of the above
  - 6. Job related injuries and illness;
- c) SSHO signature and date;



d) Copies of daily logs.

5. Employee's and Visitor's Logs shall include:

- a) Date;
- b) Name;
- c) Address;
- d) Representing Agency or Company;
- e) Time entering Site; and,
- f) Time exiting Site.



## 25.0 PROJECT SAFETY & HEALTH SUMMARY

1. The Contractor will submit, to the Site Respondents and Owner a Safety Summary Report within thirty days of the project completion. The report shall be signed by the project SHM and will include:
  - a) Summary of all environmental air monitoring accomplished on the project;
  - b) Procedures and techniques used to decontaminate equipment and personnel;
  - c) Results of air sampling;
  - d) Copies of hazardous waste manifest forms indicating proper disposal was accomplished;
  - e) Final physical/medical certifications;
  - f) Daily Safety Inspection Reports;
  - g) Training Logs; and,
  - h) Accident Reports.



## 26.0 SSHP REVIEW AND APPROVAL

Project Name: \_\_\_\_\_ Project No.: \_\_\_\_\_  
Company Name: \_\_\_\_\_  
Name of Project: \_\_\_\_\_  
Safety and Health Manager (print): \_\_\_\_\_  
Approval Signature: \_\_\_\_\_  
Project Safety and Health Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## **TABLES**

**TABLE 1**  
**LIST OF POTENTIAL CONSTITUENTS OF CONCERN**



**UGI Columbia Gas Plant Superfund Site**  
**Columbia, PA**

POTENTIAL CONSTITUENTS OF CONCERN	OSHA PEL mg/m <sup>3</sup>	SYMPTOMS/ EFFECTS OF ACUTE EXPOSURE
Acenaphthylene	N/A	N/A
Aluminum	15 (total); 5 (resp)	Skin, eye, respiratory irritation
Arsenic	0.01	Ulceration or nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [potential occupational carcinogen]
Benzo(a)anthracene	N/A	N/A
Benzo(b)fluoranthene	N/A	N/A
Benzo(k)fluoranthene	N/A	N/A
Benzo(g,h,i)perylene	N/A	N/A
Benzo(a)pyrene	N/A	N/A
Beryllium	.005; .025 [30-minute maximum peak]	Berylliosis(chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]
Cadmium (dust/fume)	0.005	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]
Dibenzo(a,h)anthracene	N/A	N/A
Indeno(1,2,3-cd)pyrene	N/A	N/A
Iron	N/A	N/A
Lead	0.05	Lassitude (weakness, exhaustion); insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension
Magnesium	N/A	N/A
Thallium	0.1 [skin]	Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs

**TABLE 2**  
**MAXIMUM CONCENTRATIONS OF CONSTITUENTS OF CONCERN IN SOIL**



**UGI Columbia Gas Plant Superfund Site**  
**Columbia, PA**

Potential Constituent of Concern	Maximum Concentration Observed in Site Soils	Sample ID	Pennsylvania Residential Direct Contact Numerical Values	Pennsylvania Non-Residential (0-2') Direct Contact Numerical Values
Acenaphthylene	270	SUB-2	13,000	170,000
Aluminum	21400	PPLCGP-SB05B 34680	190,000	190,000
Arsenic	34.1	PPLCGP-02 04- 21-94	12	53
Benzo(a)anthracene	310	SUB-2	25	110
Benzo(b)fluoranthene	260	SUB-2	25	110
Benzo(k)fluoranthene	320	SUB-2	250	1100
Benzo(g,h,i)perylene	360	SUB-2	13,000	170,000
Benzo(a)pyrene	350	SUB-2	2.5	11
Beryllium	3.9	PPLCGP-SB05B 34680	440	5,600
Cadmium (dust/fume)	5.8	PPLCGP-SS2 28- Nov-94	47	210
Dibenzo(a,h)anthracene	2.5	PPLCGP-SED03 21- Dec-94	2.5	11
Indeno(1,2,3-cd)pyrene	220	SUB-2	25	110
Iron	39700	PPLCGP-SB07B 29- Nov-94	66,000	190,000
Lead	730	PPLCGP-SB2RA 30- Nov-94	500	1000
Magnesium	36300	PPLCGP-SS3 28- Nov-94	-	-
Thalium	3.5	PPLCGP-SB1DRB 07-Dec-94	15	200



**TABLE 3**  
**AIR MONITORING EQUIPMENT**

**UGI Columbia Gas Plant Superfund Site**  
**Columbia, PA**

<b>INSTRUMENT</b>	<b>HAZARD MONITORED</b>	<b>APPLICATION</b>	<b>DETECTION METHOD</b>	<b>GENERAL CARE AND MAINTENANCE</b>	<b>OPERATING DURATION</b>
Dust Monitor (Mini-Ram™)	Dust, aerosols, fumes, mist	Measures total or respirable particulate matter in air	Provides real time measurements of total or respirable particulate in a known volume of air	Recharge or replace battery	Battery life - 12 hrs. per charge
Organic Vapor Meter (OVA)	Organic vapors	Measures organic vapor concentration	Photo Ionization Detector (PID) or Flame Ionization Detector (FID)	Recharge battery Hydrogen gas Calibrate daily	4 to 10 hours
Drager CMS Analyzer	Benzene	Measures Benzene Concentration	Benzene Chip	Calibrate, recharge or replace battery	8 to 10 hours
Explosive Meter	Lower Explosive Limit	Lower Explosive Limit	Provides real time measurements of flammable materials in the surrounding air	Calibrate, recharge or replace battery	8 to 10 hours



**TABLE 4**  
**AIR MONITORING METHODS, ACTION LEVELS AND PROTECTIVE MEASURES**

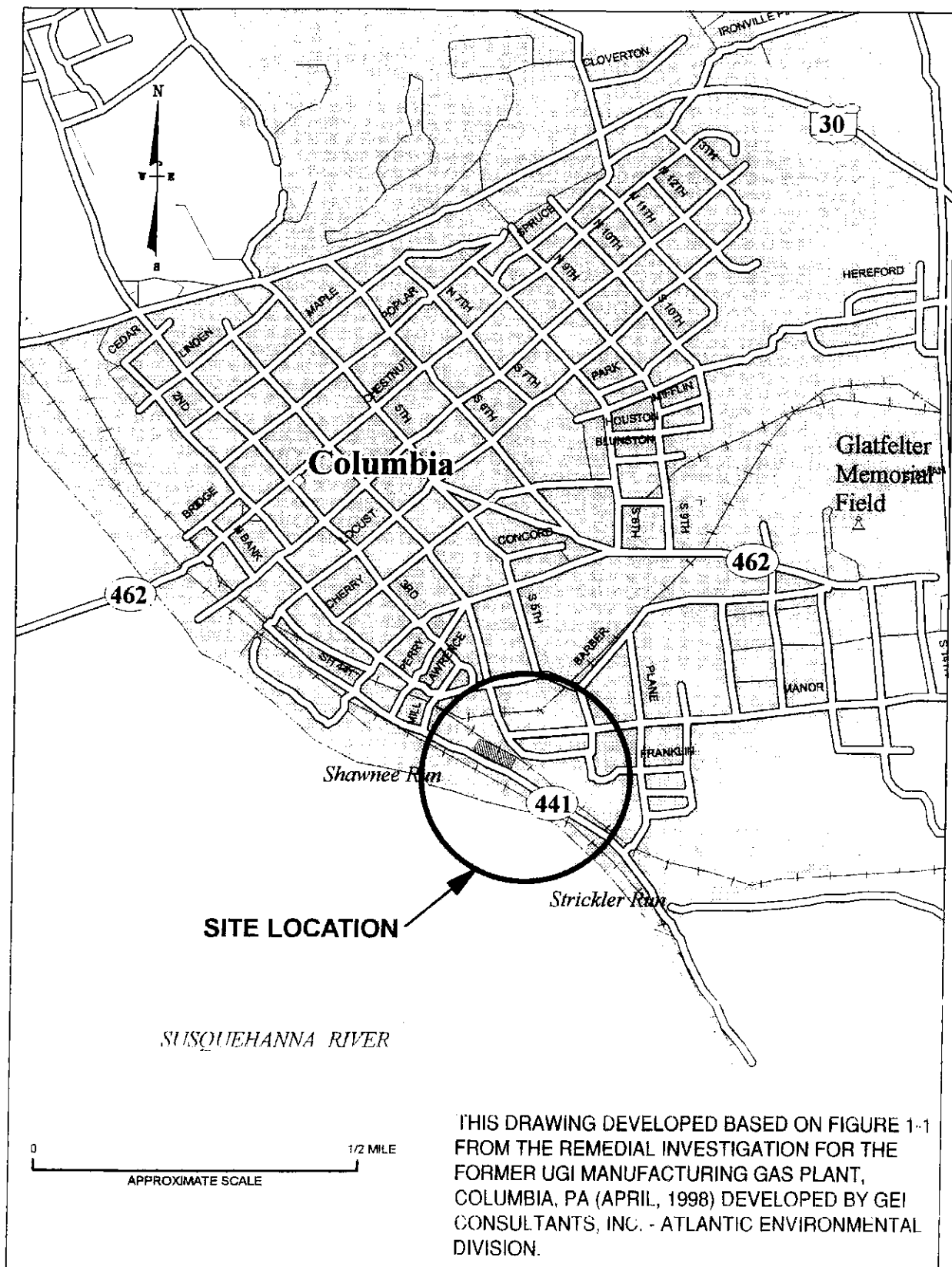
**UGI Columbia Gas Plant Superfund Site**  
**Columbia, PA**

<b>Hazard</b>	<b>Monitoring Method</b>	<b>Action Level (See Note 1)</b>	<b>Monitoring Schedule (See Note 2)</b>	<b>Protective Measures (See Section 8.0)</b>
Particulate Matter	Particulate monitor	0 - 1.5 mg/M <sup>3</sup>	At the initiation of each task/operation and periodically (every 60 minutes) during intrusive field activities and every 60 minutes near the fence line.	Level D
		1.5-5 mg/M <sup>3</sup> (respirable fraction)	Periodically (every 60 minutes) during intrusive field activities and every 60 minutes near the fence line.	Level C
		>5 mg/M <sup>3</sup> (respirable fraction)	Periodically (every 60 minutes) during intrusive field activities and every 60 minutes near the fence line.	Level B
Total Organic Vapor	Organic Vapor Monitor (OVM)	< 5 ppm	At the initiation of each task/operation and periodically (every 60 minutes) during intrusive operations.	Level D
		5 - 250 ppm	Continuously (every 30 minutes) during intrusive operations.	Level C
		> 250 ppm	Continuously (every 30 minutes) during intrusive operations.	Level B
Benzene	Drager CMS Analyzer with a Benzene Chip	>1 ppm	OVM Sustained Reading of 1ppm over 5 minutes and periodically (every 60 minutes).	Level C
		10-25 ppm	Continuously (every 30 minutes) during intrusive operations.	Level B
Combustible Gases	Combustible Gas Meter (% of LEL)	0-10%	At the initiation of each task/operation and periodically (every 60 minutes) during intrusive operations.	Continue Operations
		10-20 %	Continuously (every 30 minutes) during intrusive operations with OVA readings over 250 ppm.	Proceed with caution extrinsically safe equipment and no ignition sources in the work area
		20% and above	Continuously (every 15 minutes) during intrusive operations.	Evacuate area stop operations until <20%

**Note 1**

1. Action level based on a sustained reading greater than 5 minutes within the breathing zone.
2. Monitoring frequency may be modified (increased/decreased) based on field conditions, SSH observations and professional judgment (i.e., more monitoring on windy days - less monitoring on rainy days). All changes in monitoring frequency must be approved by the Site Safety Manager.

## **FIGURES**



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**GeoServices**

Engineering for the Environment. Planning for People.™

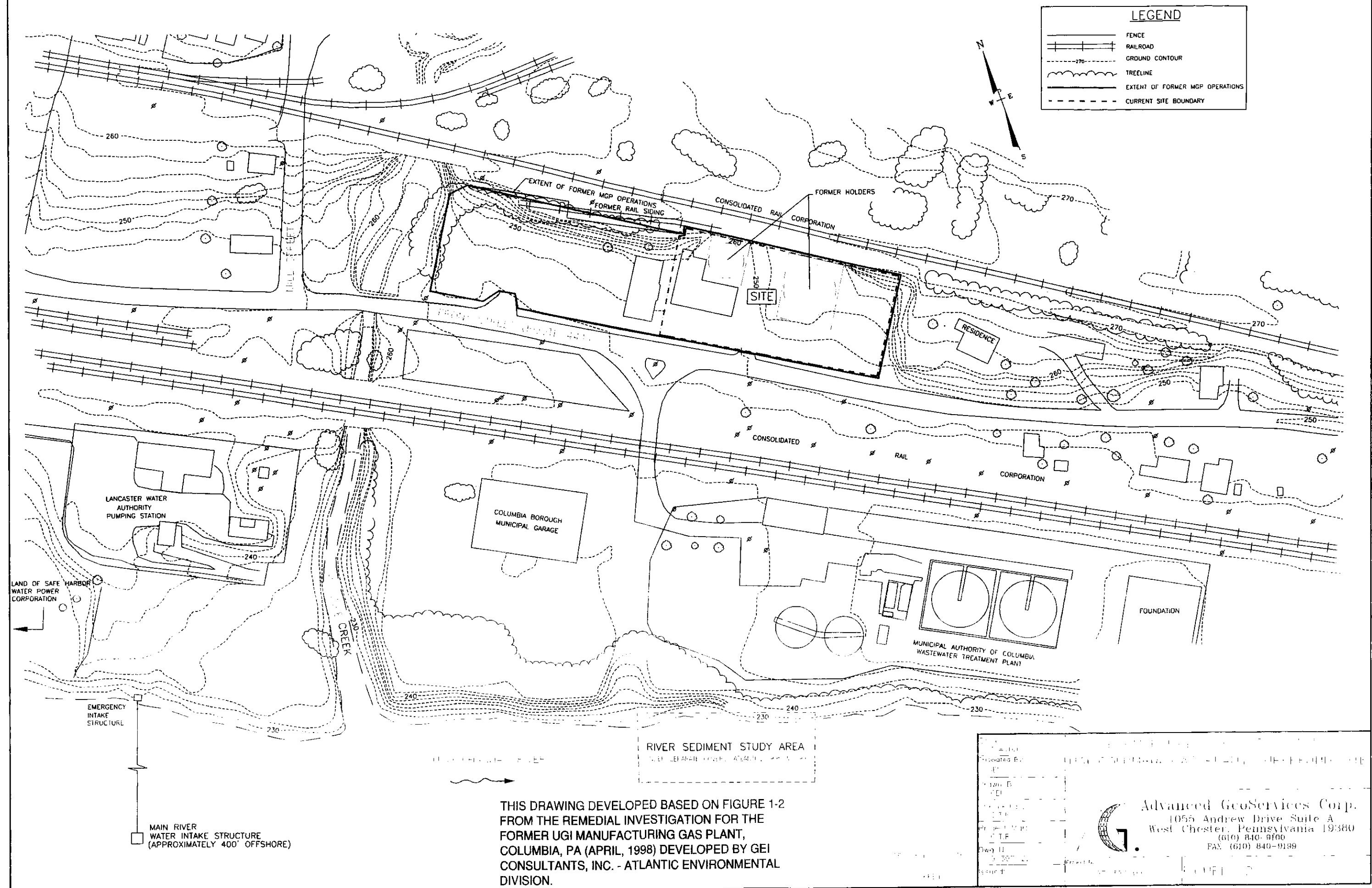
1055 ANDREW DRIVE, SUITE A, WEST CHESTER PA, 19380  
Tel 610 840.9100 fax 610 840.9199 www.advancedgeoservices.com

J:\COLUMBIA\DRAWINGS\2006-1800-07\2006-1800-07-01.dwg, Mqr

# SITE LOCATION MAP

## UGI COLUMBIA GAS PLANT SUPERFUND SITE

PROJECT ENGINEER: C.T.R.	SCALE: AS SHOWN
CHECKED BY: C.T.R.	PROJECT NUMBER: 2006-1800-07
DRAWN BY: D.E.C.	DATE: 11/20/06 FIGURE: 1



Advanced GeoServices Corp.  
 1055 Andrew Drive Suite A  
 West Chester, Pennsylvania 19380  
 (610) 840-9100  
 FAX (610) 840-9199

Project: Remedial Investigation for the former UGI Manufacturing Gas Plant, Columbia, PA  
 Date: April 1998  
 Drawn by: [Name]  
 Checked by: [Name]  
 Approved by: [Name]



# FIGURE 3

## Directions to Emergency Treatment Facility - Lancaster General Hospital

Page 1 of 1



Start **S Front St & Mill St**  
Columbia, PA 17512  
End **555 N Duke St**  
Lancaster, PA 17602  
Travel 11.8 mi (about 20 mins)

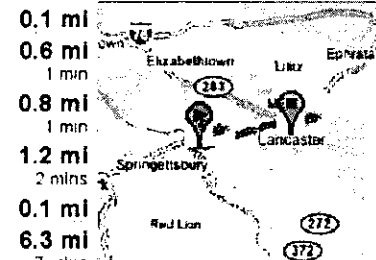
### Directions

1. Head **west** from **S Front St**
- ➔ 2. Turn **right** at **Union St**
- ➔ 3. Bear **right** at **Lancaster Ave**
4. Continue on **Columbia Ave**
- ⬅ 5. Turn **left** at **Prospect Rd**
- ➔ 6. Turn **right** into the **US-30 E** entry ramp
7. Take the **Harrisburg Pike** exit
- ➔ 8. Turn **right** at **Harrisburg Pike**
- ⬅ 9. Bear **left** at **W James St**
- ⬅ 10. Turn **left** at **N Queen St**
- ➔ 11. Turn **right** at **E Frederick St**
- ➔ 12. Turn **right** at **N Duke St**
13. Arrive at **555 N Duke St**  
Lancaster, PA 17602

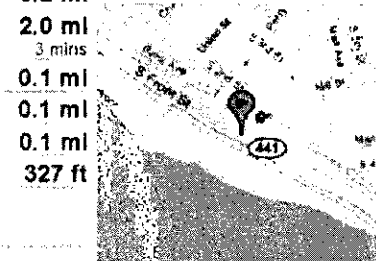
These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.

Map data © 2006 NAVTEQ™

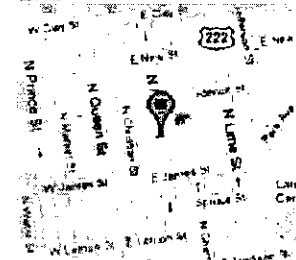
### Overview



### Start



### End



Map data © 2006 NAVTEQ™

## **APPENDICES**

**APPENDIX A**

**NIOSH POCKET GUIDE TO CHEMICAL HAZARDS**

# NIOSH Pocket Guide to Chemical Hazards

<b>Aluminum</b>		CAS 7429-90-5	
<b>Al</b>		RTECS BD0330000	
<b>Synonyms &amp; Trade Names</b> Aluminium, Aluminum metal, Aluminum powder, Elemental aluminum		<b>DOT ID &amp; Guide</b> 1309 170 (powder, coated) 1396 138 (powder, uncoated) 9260 169 (molten)	
<b>Exposure Limits</b>	NIOSH REL: TWA 10 mg/m <sup>3</sup> (total) TWA 5 mg/m <sup>3</sup> (resp)		
	OSHA PEL: TWA 15 mg/m <sup>3</sup> (total) TWA 5 mg/m <sup>3</sup> (resp)		
IDLH N.D. See: IDLH INDEX		Conversion	
<b>Physical Description</b> Silvery-white, malleable, ductile, odorless metal.			
MW: 27.0	BP: 4221°F	MLT: 1220°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.70
Fl.P: NA	UEL: NA	LEL: NA	
Combustible Solid, finely divided dust is easily ignited; may cause explosions.			
<b>Incompatibilities &amp; Reactivities</b> Strong oxidizers & acids, halogenated hydrocarbons [Note: Corrodes in contact with acids & other metals. Ignition may occur if powders are mixed with halogens, carbon disulfide, or methyl chloride.]			
<b>Measurement Methods</b> NIOSH 7013, 7300, 7301, 7303; OSHA ID121 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation		<b>First Aid (See procedures)</b> Eye: Irrigate immediately  Breathing: Fresh air	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations</b> To be added later			
<b>Exposure Routes</b> inhalation, skin and/or eye contact			
<b>Symptoms</b> Irritation eyes, skin, respiratory system			
<b>Target Organs</b> Eyes, skin, respiratory system			
See also: INTRODUCTION See ICSC CARD: 0988 See MEDICAL TESTS: 0011			

# NIOSH Pocket Guide to Chemical Hazards

<b>Arsenic (inorganic compounds, as As)</b>		CAS 7440-38-2 (metal)	
<b>As (metal)</b>		RTECS CG0525000 (metal)	
<b>Synonyms &amp; Trade Names</b> Arsenic metal: Arsenia Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except ARSINE.]		<b>DOT ID &amp; Guide</b> 1558 152 (metal) 1562 152 (dust)	
<b>Exposure Limits</b>	NIOSH REL: Ca C 0.002 mg/m <sup>3</sup> [15-minute] See Appendix A		
	OSHA PEL: [1910.1018] TWA 0.010 mg/m <sup>3</sup>		
<b>IDLH</b> Ca [5 mg/m <sup>3</sup> (as As)] See: 7440382		<b>Conversion</b>	
<b>Physical Description</b> Metal: Silver-gray or tin-white, brittle, odorless solid.			
MW: 74.9	BP: Sublimes	MLT: 1135°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.73 (metal)
Fl.P: NA	UEL: NA	LEL: NA	
Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.			
<b>Incompatibilities &amp; Reactivities</b> Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]			
<b>Measurement Methods</b> NIOSH 7300, 7301, 7303, 7900, 9102; OSHA ID105 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench		<b>First Aid (See procedures)</b> Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations</b> NIOSH <b>At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:</b> (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure			

mode in combination with an auxiliary self-contained positive-pressure breathing apparatus  
**Escape:** (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

**Exposure Routes** inhalation, skin absorption, skin and/or eye contact ingestion

**Symptoms** Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [potential occupational carcinogen]

**Target Organs** Liver, kidneys, skin, lungs, lymphatic system

**Cancer Site** [lung & lymphatic cancer]

See also: [INTRODUCTION](#) See ICSC CARD: [0013](#) See MEDICAL TESTS: [0017](#)

# NIOSH Pocket Guide to Chemical Hazards

<b>Beryllium &amp; beryllium compounds (as Be)</b>		CAS 7440-41-7 (metal)	
<b>Be (metal)</b>		RTECS <u>DS1750000</u> (metal)	
<b>Synonyms &amp; Trade Names</b> Beryllium metal: Beryllium Other synonyms vary depending upon the specific beryllium compound.		<b>DOT ID &amp; Guide</b> 1566 <u>154</u> (compounds) 1567 <u>134</u> (powder)	
<b>Exposure Limits</b>	NIOSH REL: Ca Not to exceed 0.0005 mg/m <sup>3</sup> See Appendix A		
	OSHA PEL: TWA 0.002 mg/m <sup>3</sup> C 0.005 mg/m <sup>3</sup> 0.025 mg/m <sup>3</sup> [30-minute maximum peak]		
<b>IDLH</b> Ca [4 mg/m <sup>3</sup> (as Be)] See: <b>IDLH INDEX</b>		<b>Conversion</b>	
<b>Physical Description</b> Metal: A hard, brittle, gray-white solid.			
MW: 9.0	BP: 4532°F	MLT: 2349°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.85 (metal)
Fl.P: NA	UEL: NA	LEL: NA	
Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of a powder or dust.			
<b>Incompatibilities &amp; Reactivities</b> Acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium			
<b>Measurement Methods</b> NIOSH <u>7102</u> , <u>7300</u> , <u>7301</u> , <u>7303</u> , <u>9102</u> ; OSHA <u>ID125G</u> , <u>ID206</u> See: <u>NMAM</u> or <u>OSHA Methods</u>			
<b>Personal Protection &amp; Sanitation</b> Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash		<b>First Aid</b> (See procedures) Eye: Irrigate immediately  Breathing: Fresh air	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations</b> NIOSH <b>At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:</b> (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus <b>Escape:</b> (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus			

<b>Exposure Routes</b> inhalation, skin and/or eye contact
<b>Symptoms</b> Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]
<b>Target Organs</b> Eyes, skin, respiratory system
<b>Cancer Site</b> [lung cancer]
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: <a href="#">0226</a> See MEDICAL TESTS: <a href="#">0025</a>

# NIOSH Pocket Guide to Chemical Hazards

<b>Cadmium dust (as Cd)</b>			CAS 7440-43-9 (metal)
<b>Cd (metal)</b>			RTECS EU9800000 (metal)
<b>Synonyms &amp; Trade Names</b> Cadmium metal: Cadmium Other synonyms vary depending upon the specific cadmium compound.			<b>DOT ID &amp; Guide</b> 2570 154 (compounds)
<b>Exposure Limits</b>	NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]		
	OSHA PEL*: [1910.1027] TWA 0.005 mg/m <sup>3</sup> [*Note: The PEL applies to all Cadmium compounds (as Cd).]		
<b>IDLH</b> Ca [9 mg/m <sup>3</sup> (as Cd)] See: IDLH INDEX		<b>Conversion</b>	
<b>Physical Description</b> Metal: Silver-white, blue-tinged lustrous, odorless solid.			
MW: 112.4	BP: 1409°F	MLT: 610°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.65 (metal)
FLP: NA	UEL: NA	LEL: NA	
Metal: Noncombustible Solid in bulk form, but will burn in powder form.			
<b>Incompatibilities &amp; Reactivities</b> Strong oxidizers; elemental sulfur, selenium & tellurium			
<b>Measurement Methods</b> NIOSH 7048, 7300, 7301, 7303, 9102; OSHA ID121, ID125G, ID189, ID206 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> Skin: No recommendation Eyes: No recommendation Wash skin: Daily Remove: No recommendation Change: Daily		<b>First Aid (See procedures)</b> Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations</b> NIOSH <b>At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:</b> (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus <b>Escape:</b> (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus			

<b>Exposure Routes</b> inhalation, ingestion
<b>Symptoms</b> Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]
<b>Target Organs</b> respiratory system, kidneys, prostate, blood
<b>Cancer Site</b> [prostatic & lung cancer]
See also: <a href="#">INTRODUCTION</a> See ICSC CARD: <a href="#">0020</a> See MEDICAL TESTS: <a href="#">0035</a>

# NIOSH Pocket Guide to Chemical Hazards

<b>Cadmium fume (as Cd)</b>		CAS 1306-19-0 (CdO)	
<b>CdO/Cd</b>		RTECS EV1930000 (CdO)	
<b>Synonyms &amp; Trade Names</b> CdO: Cadmium monoxide, Cadmium oxide fume Cd: Cadmium		<b>DOT ID &amp; Guide</b>	
<b>Exposure Limits</b>	NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]		
	OSHA PEL*: [1910.1027] TWA 0.005 mg/m <sup>3</sup> [*Note: The PEL applies to all Cadmium compounds (as Cd).]		
<b>IDLH</b> Ca [9 mg/m <sup>3</sup> (as Cd)] See: IDLH INDEX		<b>Conversion</b>	
<b>Physical Description</b> Odorless, yellow-brown, finely divided particulate dispersed in air. [Note: See listing for Cadmium dust for properties of Cd.]			
MW: 128.4	BP: Decomposes	MLT: 2599°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.15 (crystalline form)/6.95 (amorphous form)
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid			
<b>Incompatibilities &amp; Reactivities</b> Not applicable			
<b>Measurement Methods</b> NIOSH 7048, 7300, 7301, 7303; OSHA ID121, ID125G, ID189, ID206 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> Skin: No recommendation Eyes: No recommendation Wash skin: Daily Remove: No recommendation Change: Daily		<b>First Aid (See procedures)</b>  Breathing: Respiratory support	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations</b> NIOSH <b>At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:</b> (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus			

**Escape:** (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

**Exposure Routes** inhalation

**Symptoms** Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; emphysema, proteinuria, anosmia (loss of the sense of smell), mild anemia; [potential occupational carcinogen]

**Target Organs** respiratory system, kidneys, blood

**Cancer Site** [prostatic & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0117 See MEDICAL TESTS: 0035

apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

**Up to 50 mg/m<sup>3</sup>:** (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

**Up to 100 mg/m<sup>3</sup>:** (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

**Emergency or planned entry into unknown concentrations or IDLH conditions:** (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:** (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

**Exposure Routes** inhalation, ingestion, skin and/or eye contact

**Symptoms** Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension

**Target Organs** Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127

# NIOSH Pocket Guide to Chemical Hazards

<b>Lead</b>		CAS 7439-92-1	
<b>Pb</b>		RTECS OF7525000	
<b>Synonyms &amp; Trade Names</b> Lead metal, Plumbum		<b>DOT ID &amp; Guide</b>	
<b>Exposure Limits</b>	NIOSH REL*: TWA 0.050 mg/m <sup>3</sup> See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]		
	OSHA PEL*: [1910.1025] TWA 0.050 mg/m <sup>3</sup> See Appendix C [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]		
<b>IDLH</b> 100 mg/m <sup>3</sup> (as Pb) See: 7439921		<b>Conversion</b>	
<b>Physical Description</b> A heavy, ductile, soft, gray solid.			
MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
FLP: NA	UEL: NA	LEL: NA	
Noncombustible Solid in bulk form.			
<b>Incompatibilities &amp; Reactivities</b> Strong oxidizers, hydrogen peroxide, acids			
<b>Measurement Methods</b> NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily		<b>First Aid (See procedures)</b> Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations</b> NIOSH/OSHA <b>Up to 0.5 mg/m<sup>3</sup>:</b> (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator <b>Up to 1.25 mg/m<sup>3</sup>:</b> (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter <b>Up to 2.5 mg/m<sup>3</sup>:</b> (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing			

# NIOSH Pocket Guide to Chemical Hazards

<b>Thallium (soluble compounds, as Tl)</b>		<b>CAS</b>	
		<b>RTECS</b>	
<b>Synonyms &amp; Trade Names</b> Synonyms vary depending upon the specific soluble thallium compound.		<b>DOT ID &amp; Guide</b> 1707 <u>151</u> (compounds, n.o.s.)	
<b>Exposure Limits</b>	NIOSH REL: TWA 0.1 mg/m <sup>3</sup> [skin]		
	OSHA PEL: TWA 0.1 mg/m <sup>3</sup> [skin]		
<b>IDLH</b> 15 mg/m <sup>3</sup> (as Tl) See: <u>thallium</u>		<b>Conversion</b>	
<b>Physical Description</b> Appearance and odor vary depending upon the specific soluble thallium compound.			
Properties vary depending upon the specific soluble thallium compound.			
<b>Incompatibilities &amp; Reactivities</b> Varies			
<b>Measurement Methods</b> NIOSH <u>7300</u> , <u>7301</u> , <u>7303</u> , <u>9102</u> ; OSHA <u>ID121</u> See: <u>NMAM</u> or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily		<b>First Aid (See procedures)</b> Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations</b> NIOSH/OSHA <b>Up to 0.5 mg/m<sup>3</sup>:</b> (APF = 5) Any dust and mist respirator^ <b>Up to 1 mg/m<sup>3</sup>:</b> (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators^/(APF = 10) Any supplied-air respirator <b>Up to 2.5 mg/m<sup>3</sup>:</b> (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter^ <b>Up to 5 mg/m<sup>3</sup>:</b> (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-			

fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

**Up to 15 mg/m<sup>3</sup>:** (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

**Emergency or planned entry into unknown concentrations or IDLH conditions:** (APF = 10,000)

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:** (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

**Exposure Routes** inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms** Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs

**Target Organs** Eyes, respiratory system, central nervous system, liver, kidneys, gastrointestinal tract, body hair

See also: [INTRODUCTION](#) See [MEDICAL TESTS: 0228](#)

# NIOSH Pocket Guide to Chemical Hazards

<b>Magnesium oxide fume</b>		CAS 1309-48-4	
<b>MgO</b>		RTECS OM3850000	
<b>Synonyms &amp; Trade Names</b> Magnesia fume		<b>DOT ID &amp; Guide</b>	
<b>Exposure Limits</b>	NIOSH REL: <u>See Appendix D</u>		
	OSHA PEL†: TWA 15 mg/m <sup>3</sup>		
<b>IDLH</b> 750 mg/m <sup>3</sup> See: 1309484		<b>Conversion</b>	
<b>Physical Description</b> Finely divided white particulate dispersed in air. [Note: Exposure may occur when magnesium is burned, thermally cut, or welded upon.]			
MW: 40.3	BP: 6512°F	MLT: 5072°F	Sol(86°F): 0.009%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 3.58
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid			
<b>Incompatibilities &amp; Reactivities</b> Chlorine trifluoride, phosphorus pentachloride			
<b>Measurement Methods</b> NIOSH 7300, 7301, 7303; OSHA ID121 See: NMAM or OSHA Methods			
<b>Personal Protection &amp; Sanitation</b> Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation		<b>First Aid</b> ( <u>See procedures</u> )  Breathing: Respiratory support	
<u>Important additional information about respirator selection</u> <b>Respirator Recommendations OSHA</b> <b>Up to 150 mg/m<sup>3</sup>:</b> (APF = 10) Any dust, mist, and fume respirator/(APF = 10) Any supplied-air respirator <b>Up to 375 mg/m<sup>3</sup>:</b> (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter <b>Up to 750 mg/m<sup>3</sup>:</b> (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece <b>Emergency or planned entry into unknown concentrations or IDLH conditions:</b> (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand			