Work Plan and Health and Safety Plan for Minor Excavations

Town of Tiverton
Bay Street Area
Tiverton, Rhode Island

December 16, 2005

Prepared for:

Department of Public Works
Town of Tiverton
50 Industrial Way
Tiverton, Rhode Island 02878

Prepared by:

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1. Introduction

On behalf of the Town of Tiverton, BETA Group, Inc. (BETA) has prepared this Work Plan/Health and Safety Plan (HASP), to protect health, safety, public welfare and the environment from potential hazards which may arise during utility-related excavation in the Bay Street area, bounded on the North by State Avenue, on the West by the Sakonnet River, on the South by the so-called Simpson Wall, and on the East by Church Street (extended to State Avenue and so-called Simpson Wall), of Tiverton, Rhode Island (the Project Area).

The Work Plan portion of this document (Section 2) provides Town employees with the procedures to perform utility-related excavation work in the Project Area. The HASP portion of this document (Sections 3 through 8) was developed to comply with the regulations outlined by the Occupational Safety and Health Administration (OSHA) found in 29 Code of Federal Regulations (CFR) 1910.120.

The purpose of these procedures shall include the following:

(a) measures to protect sensitive human populations from exposure to oil and/or hazardous materials;
(b) the institution of air monitoring activities, if necessary, to protect the public from exposures to gases and air-borne particulates;
(c) measures that may be necessary to contain oil and/or hazardous materials during the performance of response actions, including:

1. measures to control dust and other environmental media (e.g. wetting soils);
2. measures to decontaminate vehicles and equipment to minimize the spread of contaminated soil from the disposal site;
3. measures to secure on-site excavations and stockpiles of contaminated material; and,
4. discontinuance of excavation activities where necessary to protect public health and safety.

A master copy of this document and all necessary revisions will be maintained at the Town of Tiverton Department of Public Works and a working copy will be brought on-site during all excavation activities in the Project Area. Town personnel will be trained in the health and safety response procedures presented herein and shall become familiar with the provisions of this plan. A daily “tailgate” meeting will be conducted at the beginning of the day in order to ensure that the Town workers and any subcontractors are aware of the health and safety issues anticipated for the day.

This HASP has been written for the use of the Town of Tiverton and its employees. Properly trained and experienced subcontractors may also use it as a guidance document. However, the Town of Tiverton does not guarantee the health or safety of any person entering this site.

Due to the potential hazardous nature of the Project Area and the site activities associated therewith, it is not possible to discover, evaluate, and provide protection for all possible hazards, which may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury during this project. The health and safety guidelines in this Work Plan/HASP were prepared specifically for activities in the Project Area and should not be used on any other project without prior research by trained health and safety specialists.

2. Work Plan

This Work Plan provides direction and information regarding the performance of excavation activities in the Project Area. Given the sensitive nature of the work in this area, work practices are different than those conducted in other, less sensitive areas of Town. The HASP section of this document details the necessary procedures for ensuring worker health and safety during excavation activities. The following Work Plan identifies the types of excavations and includes activities to address contamination issues, management of impacted soils, dust control, and public interaction. All Town employees involved in excavation work in the Project Area should be trained to fully understand the Work Plan and the HASP.

2.1 Types of Excavation

Two types of excavations have been defined within the Project Area: Minor Excavations and Major Excavations. The following defines each of these types of excavations:

- **Minor Excavations:** Minor Excavations consist of excavations less than three (3) feet deep and less than approximately 25 feet in length (for excavations less than 3 feet wide) or less than approximately 75 square feet (for all other excavations). If significant impacted soil is identified during a Minor Excavation, such excavation would be upgraded to a Major Excavation.
- **Major Excavations:** All excavations greater than three (3) feet deep or excavations less than three (3) feet deep that are greater than approximately 25 feet in length (for excavations less than 3 feet wide) or greater than approximately 75 square feet (for all other excavations). Due to the larger area and longer duration of Major Excavations, this document does not cover Major Excavations.

2.2 Hazard Assessment

During all Minor Excavation activities in the Project Area, Town employees should constantly evaluate the condition of soils and the nature of encountered materials. Materials expected to be encountered within this area include coal, coal ash, urban fill (brick, cement, glass, metal), and other non-native materials. Section 4.3 details hazard assessment activities for the protection of worker health and safety. However, should Town employees encounter soils that do not trigger any of the criteria in Section 4.3 but appear to be significantly impacted with oil and/or hazardous materials, work should cease and a comprehensive assessment of the encountered soils should be performed. Assessment criteria to be used by Town employees includes, but is not limited to:

- Significant odors including petroleum, solvent, and/or any unknown odors emanating from the soils or the excavation area.
- Significant non-natural discoloration of soils (i.e., blue, green, or purple soils).
- Evidence of petroleum such as pure petroleum product, petroleum sheens, or oily residues.
- Any other indication of significantly impacted soils.

2.3 Soil Management

To the extent possible, all displaced soils should be returned to the excavation as backfill material. If soils are to be removed from the excavation, they should either be placed immediately into a dump truck for transport or placed on 6 millimeter thick polyethylene sheeting and covered with 6 millimeter thick polyethylene sheeting. At the end of each work day, all removed soils should be transported to the DPW yard and placed in a designated storage area on 6 millimeter thick polyethylene sheeting and securely covered with 6 millimeter thick polyethylene sheeting to prevent wind or stormwater erosion. Upon completion of the excavation project, stockpiled soils should be tested and proper disposal methods should be determined and implemented.

2.4 Dust Management

During excavation activities in the Project Area, Town employees will implement dust control measures consisting of periodic watering down of work areas and cleaning of the work area as necessary. Watering should be conducted prior to implementing any intrusive activities and as areas dry out during the work day. Dust control is imperative to prevent migration of particulate matter and contaminants from the work area to residential or other sensitive areas. The amount of water used shall be controlled so that sediments are not carried off in any excess water.

2.5 Public Interaction

Given the public involvement in the investigation and response actions in the Project Area, it is likely that residents and other public parties may desire to observe work activities and/or question Town employees about the nature of the activities being performed. Observers should be politely asked to remain out of the work area and to observe at a safe distance from all work activities. A police detail should be retained to handle traffic safety issues and to ensure that any observers are not put in harms way.

It is imperative that all questions from residents or other public parties be politely directed to the Director of Public Works. It is also imperative that all work activities be conducted in accordance with this Work Plan/HASP to ensure compliance with all applicable regulations and to avoid exposure to contaminants for residents of this area.

3. Health and Safety Plan

3.1 General Site Information

The Project Area consists of Town-owned roads and easements within the Bay Street area. This area is bounded on the North by State Avenue, on the West by the Sakonnet River, on the South by so-called Simpson Wall, and on the East by Church Street (extended to State Avenue and so-called Simpson Wall). Emergency contact information along with driving directions from the Project Area to the nearest medical facility is provided in Table 1. Refer to Figure 1 for a Site locus. Appendix C contains a checklist for work in the Project Area.

Table 1 – Emergency Information and Local Resources, Bay Street Project Area, Tiverton, Rhode Island

Public and Private Resources	Telephone Numbers
St. Anne's Hospital	(508) 674-5600
Tiverton Fire Department	911 or *77 (cell phone)
Medical Emergency	911 or *77 (cell phone)
Tiverton Police Department (Emergency)	911 or *77 (cell phone)
Rhode Island Department of Environmental Management	(401) 222-3070
National Response Center	800-422-8802
National Poison Control Center	(800) 682-9211
DIGSAFE Reporting Line	(888) 344-7233

Nearest Hospital: St. Anne's Hospital
901 South Main Street
Fall River, MA
(508) 674-5600 (General)

Directions: From Site: Go northeast on Bay Street towards State Avenue by turning left. Turn right onto State Avenue (0.03 miles). Turn left onto SR138, South Main Street (0.45 miles). At traffic signal, turn slightly to the right onto South Main Street (1.18 miles). Hospital entrance is 0.47 miles on the left.

4. Site / Hazard Overview

4.1 Site Description and History

Minor Excavation work in the Project Area will generally consist of excavation work to repair manholes, patch pavement, and perform minor utility repair work. Major Excavation work is not covered by this HASP and may involve hazards not addressed by this HASP. A work-specific HASP would be required for all Major Excavations.

The contamination in this area was discovered during utility-related excavation to link a condominium development and proposed industrial park into the Fall River Regional Wastewater Treatment Facility. During the excavation to place this sanitary sewer line along the RIDOT Railway (northern part of the Project Area, between State Avenue and Judson Street), soil contamination was encountered. Soil testing conducted by RIDEM and for waste characterization purposes indicates concentrations of total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAHs). The concentrations of TPH and PAHs detected to date are attributable to coal and coal ash. Surficial soil sampling indicated elevated levels of total petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and lead in the soil. The nature of this contamination suggests a source consistent with historical filling of the roadways with coal gasification byproducts. This HASP covers construction activities associated with Minor Excavations within these suspected contaminated areas. Hazards that may be encountered may include the inhalation of dust from or direct contact with unknown wastes and wastes that are toxic and/or ignitable within the soils that will be excavated. It is not expected that liquid wastes or contaminated groundwater would be encountered during Minor Excavations.

4.2 Tasks

The project includes the following field activities:

- Excavation (to depths less than 3 feet), stockpiling, grading and backfilling activities; and,
- Environmental and health and safety monitoring during site activities.

4.3 Hazard Assessment

Hazards of concern within the Project Area include general construction hazards, physical hazards, cold stress (when working in winter), chemical exposures, and noise hazards. The dangers that may be attributed to these hazards are discussed below.

- **General Construction**: The greatest potential hazard at most sites is related to the operation of heavy equipment, especially in the case of malfunction, misuse, or improper operation. Personnel not directly involved with equipment operation should stand a safe distance away from the machinery. Personnel should wear hard-hats when working near heavy equipment and any time there is a potential hazard from overhead or falling objects.

- **Physical Hazards**: The greatest potential physical hazards at the Site include construction equipment, street traffic and open excavations. Field personnel should always be aware of construction equipment location and proximity to the public streets adjacent to the work areas.

- **Cold Stress**: Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures and when the wind-chill factor is low. To guard against them: wear appropriate clothing, have warm shelter readily available, carefully schedule work and rest periods, and monitor workers' physical conditions.

- **Chemical Exposures**: Table 3 summarizes the more toxic chemicals known or suspected to be present as components of coal, ash and lead, including the associated symptoms of acute exposure to such contaminants. Since additional unsuspected hazards may exist at the Site, periodic air quality monitoring and evaluation of site conditions will be performed during all on-site activities.

Table 3
Known and Suspect Chemical Contaminants

Chemical Contaminants	Potential Hazards	OSHA PEL[1]	NIOSH REL[2]
Coal Tar Pitch Volatiles	Toxic by inhalation, ingestion, or skin absorption.	0.2 ppm	0.1 ppm
Benzene	Toxic by inhalation, ingestion or skin absorption. (Class IB Flammable liquid)	1 ppm	0.1 ppm
Ethylbenzene	Toxic by inhalation, ingestion or skin absorption. (Class IB Flammable liquid)	10 ppm (8 hrs)	10 ppm (8 hrs)
Naphthalene		10 ppm (8 hrs)	10 ppm (8 hrs)
Toluene	Toxic by inhalation, ingestion or skin absorption. (Class IB Flammable liquid)	200 ppm (8 hrs)	100 ppm 375 mg/m^3 (8 hrs)
Xylenes	Toxic by inhalation, ingestion or skin absorption. (Class IB Flammable liquid)	100 ppm 435 mg/m^3 (8 hrs)	0.1 ppm (8 hrs)

[1] Occupational Safety and Health Act Permissible Exposure Limit
[2] National Institute for Occupational Safety and Health Recommended Exposure Limit

Table 3 Continued
Known and Suspect Chemical Contaminants

Chemical Contaminants	Potential Hazards	OSHA PEL	NIOSH REL
Arsenic	Toxic by inhalation, absorption, contact, and ingestion. Ulceration of nasal septum, dermal, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin may occur.	0.002 mg/m^3	0.010 mg/m^3
Cyanide	Toxic by inhalation, absorption, contact, and ingestion. Ulceration of nasal septum, dermal, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin may occur.	0.010 mg/m^3	0.002 mg/m^3 (15 Min.)
Lead	Harmful if inhaled, ingested or Absorbed through the skin.	50 $\mu g/m^3$	30 $\mu g/m^3$

[1] Occupational Safety and Health Act Permissible Exposure Limit
[2] National Institute for Occupational Safety and Health Recommended Exposure Limit

Symptoms of Chemical Exposure: On-site workers should be aware of the specific symptoms of acute chemical exposure to the materials listed in Table 3. In general, workers should also be aware of some indications of toxic effects of chemical exposure, which are described below:

- Observable by others:
  - Changes in complexion, skin discoloration
  - Lack of coordination
  - Changes in demeanor
  - Excessive salivation, papillary response
  - Changes in speech pattern

- Non-observable by others:
  - Headaches
  - Dizziness
  - Blurred vision
  - Cramps
  - Irritation of eyes, skin, or respiratory tract

- **Volatile Organic Compounds**: Total VOCs will be monitored in the air during the excavation activities. The work will be performed in an outside environment and organic vapors will be monitored during the excavation and removal of contaminated soil encountered. Monitoring and personal protection are described in Section 5.

- **Noise**: To access the impacted soil, construction equipment (such as excavators, front-end loaders, etc.) will be used. Hearing protection and safety glasses are required to be worn during

excavation/remediation activities. Persons working in close proximity to construction equipment shall wear sufficient hearing protection. This equipment may include foam earplugs or foam earmuffs. Hand signals must be used for communication in these situations. Hand signals shall be established and practiced prior to donning protective hearing equipment.

5. On-Site Control

A Town employee will be designated to coordinate access control to the work zone. If no hazardous conditions are identified, general town workers under the supervision of a 40-hour OSHA site supervisor may work in the Exclusion Zone. When hazardous conditions are identified, no unauthorized personnel should enter the work zone without appropriate 40-hour OSHA site worker safety training. Control boundaries have been established as follows (see Figure 3):

- Exclusion Zone: A 10 foot radius around the excavation area will be treated as the Exclusion Zone. All equipment will be decontaminated in this zone prior to being transferred to the Support Zone.
- Contaminant Reduction Zone: A 5-10 foot perimeter around the Exclusion Zone will be treated as the Contaminant Reduction Zone.
- Support Zone: The remainder of the Site outside of the Contaminant Reduction Zone will be considered the Support Zone.

5.1 Monitoring Procedures

Town employees will use a Thermo Environmental 580B Photoionization Detector (PID), or equivalent, to periodically monitor air quality within the breathing zone during all invasive operations (see Appendix C for a PID Standard Operating Procedure). PID results will be used to determine what type (if any) respiratory protection will be necessary at the Site during construction activities.

On-Site Personnel

Site Safety Officer:	Bruce Fay, Foreman, Cell: (401) 265-0421 **or** Roger St. Ours, Cell: (401) 265-0428 **or** John Lincourt, Wastewater Collection Superintendent, Cell: (401) 265-8103
Regulatory Authority	N/A
State Agency Reps.	N/A
Local Agency Reps.	N/A
Contractors:	N/A

5.2 Action Levels and Personnel Protection

The initial level of personnel protection will be Level D. The following table lists the appropriate action level (based on PID readings) within each zone. Appendix C contains a PID Standard Operating Procedure.

Location	Action Level	Response
Work Area	5 ppm TVOC in the ambient air	Monitor ambient air for TVOC. If TVOC >5 ppm, upgrade to Level C or Major Excavation
Exclusion Zone Boundary	any detection of TVOC in the ambient air	Modify work practices to minimize volatilization of contaminants
Exclusion Zone Boundary	5 ppm TVOC	Stop work until controls are identified that will reduce volatilization of contaminants. Do not restart work unless authorized by the Project Manager, department director, and/or the health and safety coordinator.

Level D personnel protection will include:

- Gloves – disposable Nitrile gloves if handling soils or re-usable leather gloves for all other work
- Long sleeve shirt (optional) and long pants
- OSHA-approved safety footwear
- Safety glasses or chemical splash goggles (optional unless required for specific job function)
- Hard hat
- Hearing Protection (optional)

Level C personnel protection will include:

- Tyvek coveralls
- Air purifying respirator with dust and organic vapor cartridge (full-face Mask)
- Hard hat
- OSHA-approved safety footwear.
- Chemical-resistant outer boots
- Inner (disposable Nitrile gloves) and outer gloves (chemical resistant rubber gloves)
- Hearing Protection (optional)

Monitoring/Surveillance Equipment

PID: **Thermo Environmental Model 580B or Equivalent**
OVA/GC: NA
Colorimetric Tubes NA
O_2 Detector: **Combustible Gas Meter**
Personal Sampling Pump: NA
Personal Dust Monitor: NA
Metal Detector: NA
Explosimeter: NA
Ensys Test Kit: NA
Noise Survey Meter: NA
Draeger Pump: NA
Notes:

6. General Safety Requirements

All persons entering and/or working in the Project Area shall follow the following General Safety Procedures:

- No employee or subcontractor may be allowed in the on-site support zone without the prior knowledge and consent of the Site Safety Officer and review of these Health and Safety Procedures.
- If hazardous conditions are identified, no one will be allowed in the exclusion zone on-site who has not been OSHA health and safety trained or without the prior knowledge and consent of the Site Safety Officer.
- There will be no activities conducted on-site without sufficient backup personnel. At a minimum, two persons must be present at the Site. Telephone contact will be made before and after sampling activities to confirm employee health and safety.
- All contractor or subcontractor personnel shall bring to the attention of the Site Safety Officer or Supervisors any unsafe condition or practice associated with the site activities that they are unable to correct themselves.
- There will be no smoking, eating, chewing gum or tobacco, applying cosmetics or contact lenses, or drinking in the support or exclusion zones.
- Hands shall be thoroughly cleaned prior to smoking, eating or other activities outside the restricted area.
- Team members must avoid unnecessary contamination (i.e., walking through known or suspected "hot" zones or contaminated puddles, kneeling or sitting on the ground, leaning against potentially contaminated barrels or equipment).
- Respiratory devices may not be worn with beards, long sideburns, or under other conditions that prevent a proper seal.
- No person shall wear a respirator in the work zone unless they are fit tested by a qualified professional.
- No visitors will be allowed access without the knowledge and consent of the Site Manager and/or Safety Officer. All visitors will be required to be briefed on safety procedures and will be required to be escorted while on-site.

6.1 First Aid

General first aid procedures for exposure include, but are not limited to, the following procedures:

- If contaminant contacts the eyes, irrigate immediately with large amounts of water;
- If contaminant contacts skin, wash with soap and water promptly;
- If contaminant is inhaled, move the exposed person to fresh air at once. If the worker's breathing has stopped, perform artificial respiration ONLY if appropriately trained and currently certified by the Red Cross or equivalent. Request appropriate medical attention as soon as possible using telephone number(s) listed in Table 1 (Emergency Information and Local Resources).

On-site Town personnel will keep a First-Aid kit at the Site during sampling activities.

7. Personal Protective Equipment

Based on an evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks. Figure 3 depicts the three work zone areas.

Location	Job Function	Level of Protection				
Exclusion Zone	Excavation and repair work	A	B	**C** or	**D**	Other
Contamination Reduction Zone	Equipment Decontamination	A	B	C	**D** or	**Other**
Support Zone	Field Vehicle and Supplies	A	B	C	**D** or	**Other**

"Other" protection consists of general construction protection gear.

7.1 Decontamination Procedures

Depending on the conditions and materials encountered during excavation, the following decontamination procedures will be used:

- If no hazardous conditions or materials are identified during Minor Excavation activities, general construction cleaning protocols will be used to clean all non-disposable equipment.
- If moderate hazardous conditions or materials are encountered, all non-expendable equipment will be cleaned as follows:

- Rinse with tap water
- Wash with Alconox detergent (or soap) and water
- Rinse with tap water

- If significant hazardous materials are encountered and equipment becomes “heavily” contaminated, consideration should be given to contracting an environmental services company to decontaminate town equipment. It may be necessary to wrap decontaminated portions of equipment with polyethylene sheeting until decontamination can be conducted.

Personal protective gear will be decontaminated as follows:

- The decontamination procedure for Level D requires the disposal of disposable Nitrile gloves and boot covers (if used) in heavy duty trash bags for off-Site disposal as refuse. All non-disposal equipment used on-site that becomes contaminated will be cleaned by the protocol referenced above.

- The decontamination procedures to be utilized for Level C site conditions will consist of the following nine-step process:
  - All sampling devices, monitoring instruments and other equipment used on-site will be segregated into piles on a plastic drop cloth and decontaminated as necessary.
  - The tape around the outer boots and gloves will be removed and deposited into a polyethylene-lined container.
  - Outer boots will be removed and disposed of in polyethylene-lined containers (if disposable) or placed on a plastic drop cloth for decontamination for re-use.
  - Outer gloves will be removed and disposed of in polyethylene-lined containers.
  - Tyvek coveralls will be removed and disposed of in polyethylene-lined containers.
  - Respirator will be removed and washed with clean water and sanitized.
  - Inner gloves will be removed and disposed in a polyethylene-lined container.
  - Worker's hands and face will be washed with soap and water before leaving the Site.

Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. The standard Level D Decontamination Protocol shall be used unless conditions require an upgrade to Level C PPE and Level C Decontamination Protocols.

Emergency Medical Care

The following are qualified on-site First Aid Responders and/or EMTs: None

First Aid equipment is available on-site at the following locations:

First Aid Kit: Located in field vehicle

Emergency Eye Wash: Located in field vehicle

Emergency Shower: 5 gallons of water are located in the field vehicle

Other (Specify): _____

Site Resource(s) and Locations (see attached Site Plan).

Water Supply: 5 gallons of water are located in the field vehicle

Telephones: Portable telephone in the field vehicle .

Communication Systems: _____

Other: _____

8. Emergency Procedures

On-site personnel will use the following standard emergency procedures. These procedures may be modified as appropriate or required for each incident. The Site Safety Officer will be notified of any on-site emergencies and will be responsible for ensuring that the appropriate procedures are followed.

- **Fire/Explosion:** The fire department will be notified and all personnel moved to a safe distance from the involved area.
- **Personal Protective Equipment Failure:** If any site worker experiences a failure or malfunction of personal protective equipment that adversely affects the protection factor that person and his/her buddy will immediately leave the Exclusion Zone. Re-entry will not be permitted until the equipment has been repaired or replaced.
- **Other Equipment Failure:** If any other equipment on-site fails to operate properly, the Site Manager and Site Safety Officer will be notified and will then evaluate the effect of such failure on continuing operations. If the failure affects personnel safety or prevents completion of the investigation activities, all personnel will leave the Exclusion Zone until the situation is remedied through appropriate action(s).

Signature Page

I have read, understood, and agree to comply with the provisions set forth in this Site-specific Health and Safety Plan and as reviewed in the Health and Safety Briefing by the Site Safety Officer.

On-Site Safety Officer	Signature	Date

Approved By:

David Webster, Director of Public Works	Signature	Date

Site Personnel

Signature	Affiliation	Date

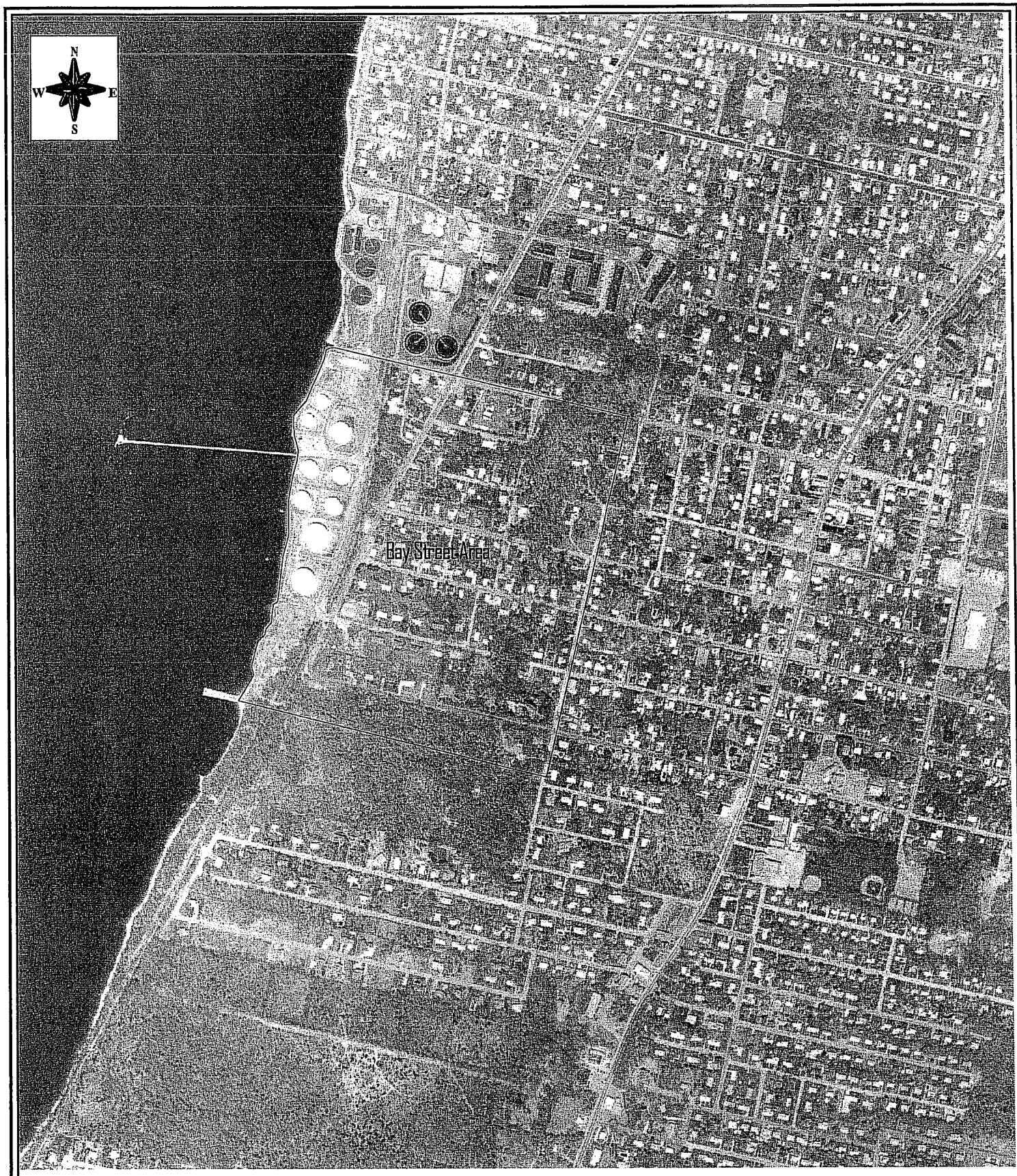


Figure 1
Site Locus

NOT TO SCALE
Source: RIGIS and USGS

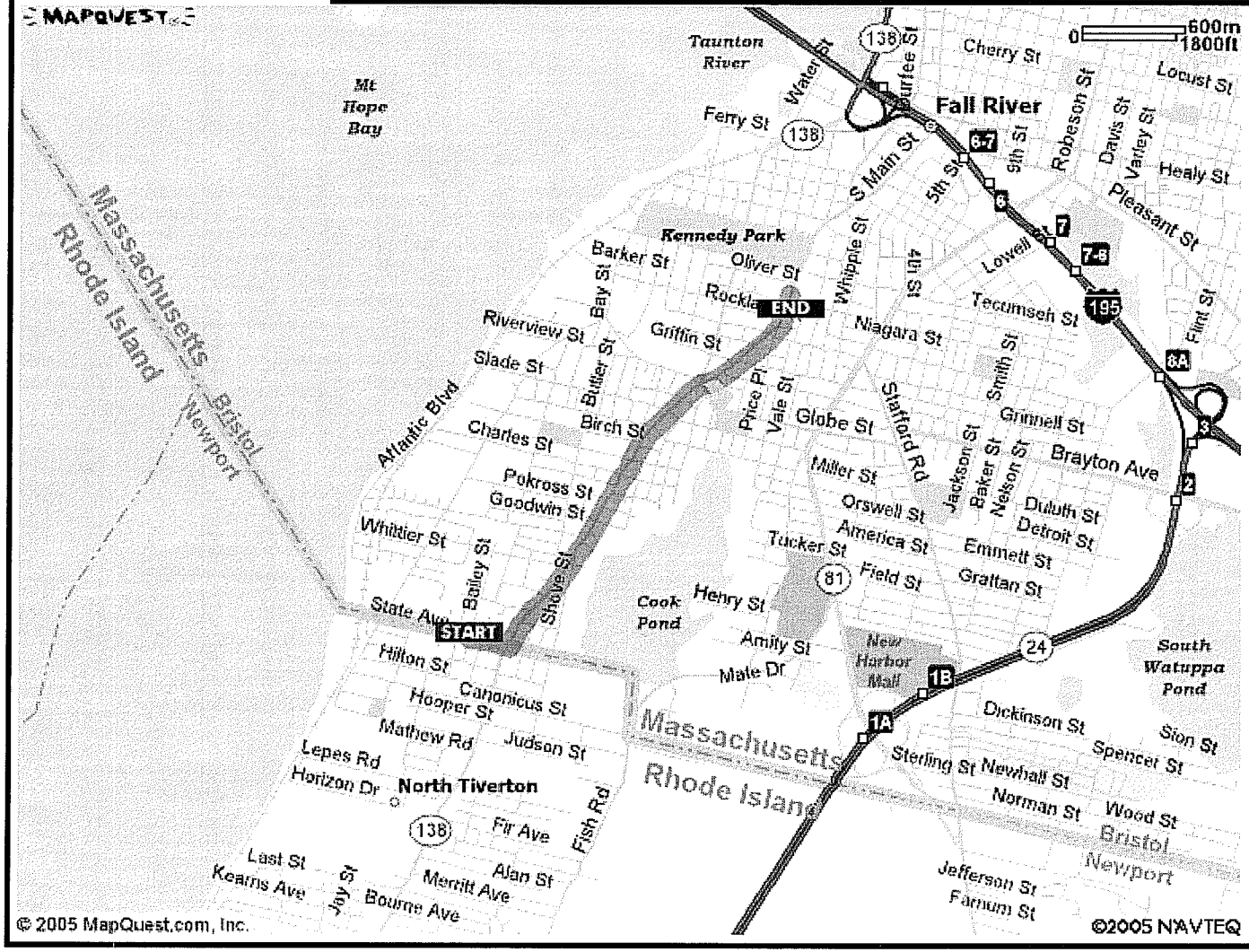
Bay Street Area
Tiverton, Rhode Island

BETA Group, Inc.
Engineers • Scientists • Planners
6 Blackstone Valley Place, Lincoln, RI 02865 401.333.2382
Norwood, MA - Rocky Hill, CT email: BETA@BETA-inc.com

Map to Hospital
Bay Street Area
Tiverton, Rhode Island

Figure
2

BETA Group, Inc.
Engineers • Scientists • Planners
6 Blackstone Valley Place, Lincoln, RI 02865 401.333.2382
Norwood, MA - Rocky Hill, CT email: BETA@BETA-inc.com



-Go northeast on Bay Street towards State Avenue by turning left.

- Turn right onto State Avenue (0.03 miles).

-Turn left onto SR138, South Main Street (0.45 miles).

-At traffic signal, turn slightly to the right onto South Main Street (1.18 miles).

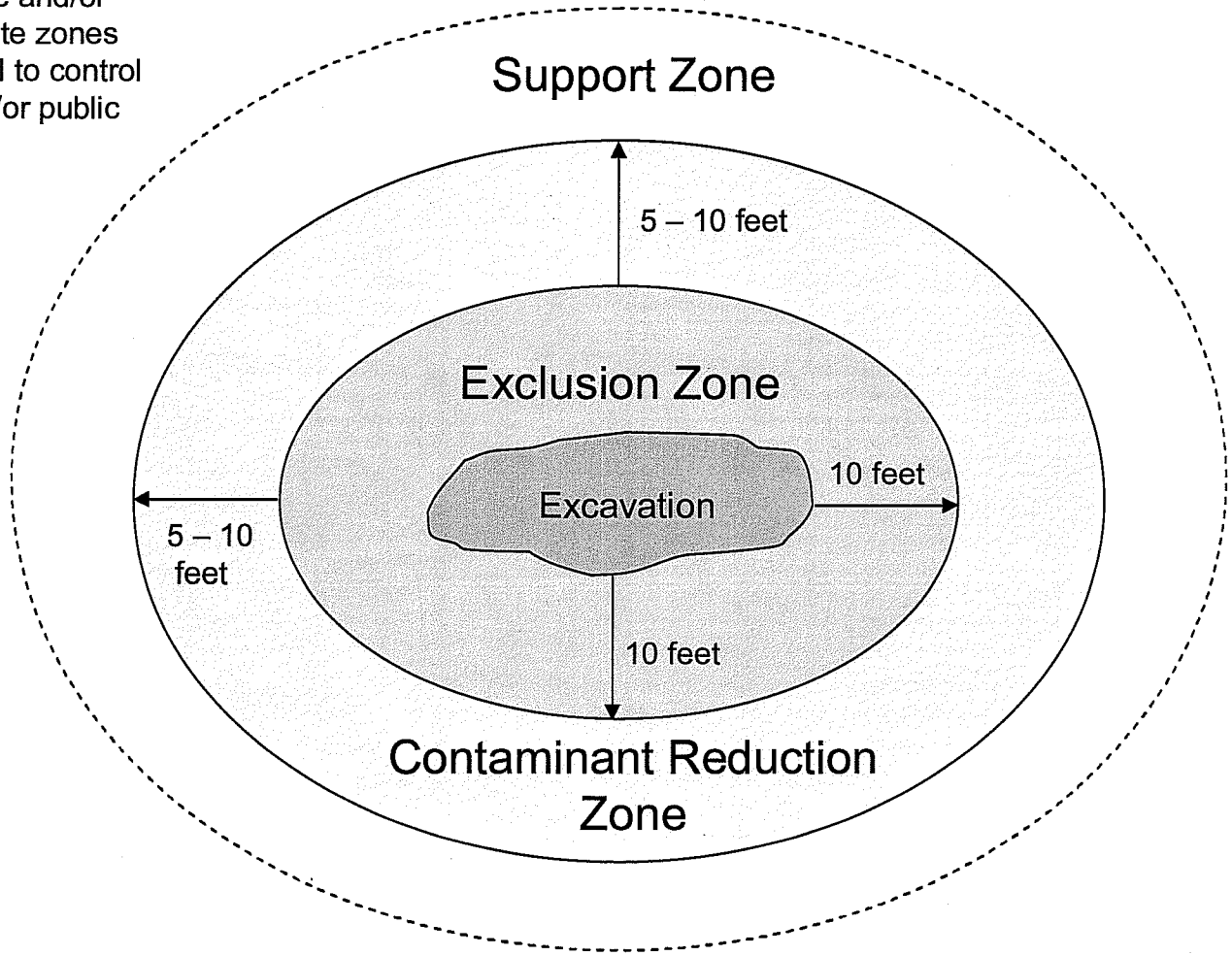
-Hospital entrance is 0.47 miles on the left.

Exclusion Zone Site Plan
Tiverton, Rhode Island

Figure
3

BETA Group, Inc.
Engineers • Scientists • Planners
6 Blackstone Valley Place, Lincoln, RI 02865 401.333.2382
Norwood, MA - Rocky Hill, CT email: BETA@BETA-inc.com

- Use caution tape and/or cones to delineate zones
- Hire police detail to control Site visitors and/or public



Appendix A
NIOSH Pocket Guide to Chemical Hazards

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

Arsenic (inorganic compounds, as As)

CAS 7440-38-2

As (metal)

RTECS CG052

Synonyms & Trade Names
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.]

DOT ID & Gu
1558 152 (metal)
1562 152 (dust)

Exposure Limits
NIOSH REL: Ca C 0.002 mg/m^3 [15-minute] See Appendix A
OSHA PEL: [1910.1018] TWA 0.010 mg/m^3

IDLH Ca [5 mg/m^3 (as As)] See: 7440382

Conversion

Physical Description
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 (met
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.

Incompatibilities & Reactivities
Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]

Measurement Methods
NIOSH 7300, 7301, 7303, 7900, 9102; OSHA ID105
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 canis N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self- breathing apparatus
Important additional information about respirator selection

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

Symptoms Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irri 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

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Benzene

CAS 71-43-2

C_6H_6

RTECS CY140

Synonyms & Trade Names
Benzol, Phenyl hydride

DOT ID & Gu
1114 130

Exposure Limits
NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A
OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F

IDLH Ca [500 ppm] See: 71432

Conversion 1 ppm = 3.19 mg/m^3

Physical Description
Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1	BP: 176°F	FRZ: 42°F	Sol: 0.07%
VP: 75 mmHg	IP: 9.24 eV		Sp.Gr: 0.88
Fl.P: 12°F	UEL: 7.8%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, many fluorides & perchlorates, nitric acid

Measurement Methods
NIOSH 1500, 1501, 3700, 3800; OSHA 12, 1005
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 organic vapor appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

Symptoms Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lass (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Cancer Site [leukemia]

See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022

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Potassium cyanide (as CN)

CAS 151-50-8

KCN

RTECS TS875

Synonyms & Trade Names
Potassium salt of hydrocyanic acid

DOT ID & Gu
1680 157 (solid)
3413 157 (solutic

Exposure Limits

NIOSH REL*: C 5 mg/m^3 (4.7 ppm) [10-minute] [*Note: The REL also applies to other CN) except Hydrogen cyanide.]

OSHA PEL*: TWA 5 mg/m^3 [*Note: The PEL also applies to other cyanides (as CN) e cyanide.]

IDLH 25 mg/m^3 (as CN) See: cyanides

Conversion

Physical Description
White, granular or crystalline solid with a faint, almond-like odor.

MW: 65.1	BP: 2957°F	MLT: 1173°F	Sol(77°F): 72%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.55
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but contact with acids releases highly flammable hydrogen cyanide.

Incompatibilities & Reactivities
Strong oxidizers (such as acids, acid salts, chlorates & nitrates) [Note: Absorbs moisture from the air forming a syrup.]

Measurement Methods
NIOSH 6010, 7904
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA

Up to 25 mg/m^3:
(APF = 10) Any supplied-air respirator
(APF = 50) Any self-contained breathing apparatus with a full facepiece

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 o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 canister provid

against the compound of concern and having an N100, R100, or P100 filter. Click here for information on selection of N, I filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

Symptoms Irritation eyes, skin, upper respiratory system; asphyxia; lassitude (weakness, exhaustion), headache, con vomiting; increased respiratory rate, slow gasping respiration; thyroid, blood changes

Target Organs Eyes, skin, respiratory system, cardiovascular system, central nervous system, thyroid, blood

See also: INTRODUCTION See ICSC CARD: 0671

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Sodium cyanide (as CN)

CAS 143-33-9

NaCN

RTECS VZ752

Synonyms & Trade Names
Sodium salt of hydrocyanic acid

DOT ID & Gu
1689 157 (solid)
3413 157 (solutic

Exposure Limits	NIOSH REL*: C 5 mg/m^3 (4.7 ppm) [10-minute] [*Note: The REL also applies to other CN) except Hydrogen cyanide.]
	OSHA PEL*: TWA 5 mg/m^3 [*Note: The PEL also applies to other cyanides (as CN) e cyanide.]

IDLH 25 mg/m^3 (as CN) See: cyanides

Conversion

Physical Description
White, granular or crystalline solid with a faint, almond-like odor.

MW: 49.0	BP: 2725°F	MLT: 1047°F	Sol(77°F): 58%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 1.60
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but contact with acids releases highly flammable hydrogen cyanide.

Incompatibilities & Reactivities
Strong oxidizers (such as acids, acid salts, chlorates & nitrates) [Note: Absorbs moisture from the air forming a syrup.]

Measurement Methods
NIOSH 6010, 7904
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 25 mg/m^3:
(APF = 10) Any supplied-air respirator
(APF = 50) Any self-contained breathing apparatus with a full facepiece
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 c pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 canister provid

against the compound of concern and having an N100, R100, or P100 filter. Click here for information on selection of N, I filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

Symptoms Irritation eyes, skin; asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; i respiratory rate; slow gasping respiration; thyroid, blood changes

Target Organs Eyes, skin, cardiovascular system, central nervous system, thyroid, blood

See also: INTRODUCTION See ICSC CARD: 1118

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Ethyl benzene

CAS 100-41-4

$CH_3CH_2C_6H_5$

RTECS DA070

Synonyms & Trade Names
Ethylbenzol, Phenylethane

DOT ID & Gu
1175 130

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 800 ppm [10%LEL] See: 100414

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 277°F	FRZ: -139°F	Sol: 0.01%
VP: 7 mmHg	IP: 8.76 eV		Sp.Gr: 0.87
Fl.P: 55°F	UEL: 6.7%	LEL: 0.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1501; OSHA 7, 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 800 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
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 o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 organic vapor

appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

Symptoms Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0268 See MEDICAL TESTS: 0098

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Lead

CAS 7439-92-1

Pb

RTECS OF752

Synonyms & Trade Names
Lead metal, Plumbum

DOT ID & Gu

Exposure Limits

NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to oth compounds (as Pb) -- see Appendix C.]

OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also ap lead compounds (as Pb) -- see Appendix C.]

IDLH 100 mg/m^3 (as Pb) See: 7439921

Conversion

Physical Description
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
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities
Strong oxidizers, hydrogen peroxide, acids

Measurement Methods
NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH/OSHA

Up to 0.5 mg/m^3:
(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facep quarter-mask respirators. Click here for information on selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3:
(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

Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters.
(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 50 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

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

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

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on sel or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

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

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

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

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Naphthalene

CAS 91-20-3

$C_{10}H_8$

RTECS QJ052

Synonyms & Trade Names
Naphthalin, Tar camphor, White tar

DOT ID & Gu
1334 133 (crude
2304 133 (molte

Exposure Limits
NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
OSHA PEL†: TWA 10 ppm (50 mg/m^3)

IDLH 250 ppm See: 91203

Conversion 1 ppm = 5.24 mg/m^3

Physical Description
Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]

MW: 128.2	BP: 424°F	MLT: 176°F	Sol: 0.003%
VP: 0.08 mmHg	IP: 8.12 eV		Sp.Gr: 1.15
Fl.P: 174°F	UEL: 5.9%	LEL: 0.9%	

Combustible Solid, but will take some effort to ignite.

Incompatibilities & Reactivities
Strong oxidizers, chromic anhydride

Measurement Methods
NIOSH 1501; OSHA 35
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Molten flush immediately/solid-liquid soap wa
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 100 ppm:
(APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for information on selection of N, R, or P
(APF = 10) Any supplied-air respirator*
Up to 250 ppm:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N10 P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 25) Any powered air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency parti
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
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 o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 organic vapor an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, se breathing apparatus
Important additional information about respirator selection

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

Symptoms Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, c

Target Organs Eyes, skin, blood, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0667 See MEDICAL TESTS: 0152

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Toluene

CAS 108-88-3

$C_6H_5CH_3$

RTECS XS525

Synonyms & Trade Names
Methyl benzene, Methyl benzol, Phenyl methane, Toluol

DOT ID & Gu
1294 130

Exposure Limits

NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)

OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)

IDLH 500 ppm See: 108883

Conversion 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 1501, 3800, 4000; OSHA 111
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 500 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
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 o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 organic vapor

appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

Symptoms Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

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m-Xylene

CAS 108-38-3

$C_6H_4(CH_3)_2$

RTECS ZE227

Synonyms & Trade Names
1,3-Dimethylbenzene; meta-Xylene; m-Xylol

DOT ID & Gu
1307 130

Exposure Limits	**NIOSH REL:** TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
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 o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 organic vapor appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

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

Symptoms irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corne: anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243

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o-Xylene

CAS 95-47-6

$C_6H_4(CH_3)_2$

RTECS ZE245

Synonyms & Trade Names
1,2-Dimethylbenzene; ortho-Xylene; o-Xylol

DOT ID & Gu
1307 130

Exposure Limits
NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
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 o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positiv 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 organic vapor appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

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

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corne: anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0084 See MEDICAL TESTS: 0243

NIOSH Publication No. 2005-151:

NIOSH Pocket Guide to Chemical Hazards

p-Xylene

CAS 106-42-3

$C_6H_4(CH_3)_2$

RTECS ZE262

Synonyms & Trade Names
1,4-Dimethylbenzene; para-Xylene; p-Xylol

DOT ID & Gu
1307 130

Exposure Limits	**NIOSH REL:** TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.41 mg/m^3

Physical Description
Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%
VP: 9 mmHg	IP: 8.44 eV		Sp.Gr: 0.86
Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
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 o pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positi 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 organic vapor appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

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

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corne anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0086 See MEDICAL TESTS: 0243

Appendix B
DPW Excavation Work Checklist

TOWN OF TIVERTON – DPW MINOR EXCAVATION WORK CHECKLIST

Date:_____ Time:_____ Weather:_____

Location: _____

Nature of Work: _____

Estimated Size of Excavation: _____

Excavation must be less than three (3) feet deep AND either less than 25 feet long (for a trench) or less than 75 square feet in area to use this form

Project Supervisor: _____
Phone: _____

Visual or Olfactory Evidence of Contamination Observed During Excavation? Yes ☐ No ☐

Explain: _____

If significant evidence of contamination is observed or any readings below do not meet the applicable OSHA Permissible Exposure Levels (PEL), stop excavation work, backfill area, and report to Dave Webster, Director of Public Works (contact information below).

TESTS TO BE TAKEN

	OSHA PEL	Yes	No	Date/Time
Combustible Gas Meter				
% Oxygen	19.5% - 21%			
% Lower Explosion Limit	<10%			
Carbon Monoxide	35 ppm			
Hydrogen Sulfide	10 ppm			
Photoionization Detector				
Volatile Organic Compounds	5 ppm_v			

GAS MONITOR: Name _____

COMBUSTIBLE GAS METER USED:
Name: _____ Model:_____ Calibration Date: _____

PHOTOIONIZATION DECTOR USED:
Name: _____ Model:_____ Calibration Date: _____

SAFETY STANDBY PERSON: Name _____
Signature _____

EMERGENCY CONTACT: David Webster, Director of Public Works
Office: (401) 625-6760, Cell: (401) 265-0492

Appendix C
PID Standard Operating Procedure

PHOTOIONIZATION DETECTOR BREATHING ZONE MONITORING PROCEDURE

In order to determine if workers are inhaling unsafe levels of volatile organic compounds (VOCs), a Photoionization Detector (PID) will be used to monitor the worker's breathing zone. A PID is capable of measuring VOCs at a minimum concentration of 0.1 part per million by volume (ppmv), as referenced to a 100 ppm isobutylene standard. The following provides a standard operating procedure for using a PID to monitor the worker's breathing zone.

- Prior to beginning of breathing zone monitoring, ensure that the PID is calibrated according to the manufacturer's specifications, using a 100 ppm isobutylene standard. If the PID is rented, the unit should arrive calibrated, ready to use. If high concentrations of VOCs are encountered during breathing zone monitoring, the PID should be re-calibrated approximately every 2 hours.
- The PID should be placed in a location as close to the excavation as possible but where it will not be disturbed or damaged. The intake for the PID should be placed approximately 2 to 3 feet LOWER than the anticipated breathing zone for Site workers. This height will provide for a safety factor to allow the PID to detect an unsafe level of VOCs prior to workers breathing such levels of VOCs.
- If the PID has an alarm function, the alarm should be set at 2.5 ppmv. This level is ½ the action level of 5 ppmv specified in the Work Plan/Health and Safety Plan. If the alarm level is triggered, continuous monitoring with the PID should be performed to determine if VOC levels exceed the 5 ppmv action level.
- If the PID does not have an alarm function, the readout of the PID should be checked approximately every 15 minutes or more frequently if odors or visual identification indicate the possibility of excavation into contaminated soils.