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FINAL HEALTH AND SAFETY PLAN FOR SITE CHARACTERIZATION OF SANITARY  
SEWER SYSTEM NAS FORT WORTH TX  
2/1/1997  
INTERNATIONAL TECHNOLOGIES



**NAVAL AIR STATION  
FORT WORTH JRB  
CARSWELL FIELD  
TEXAS**

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**ADMINISTRATIVE RECORD  
COVER SHEET**

AR File Number 390

# HQ Air Force Center for Environmental Excellence

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## Final Health and Safety Plan Addendum



Prepared for:

Site Characterization of Sanitary Sewer System  
Naval Air Station Fort Worth Joint Reserve Base  
Carswell Field, Texas

F41624-94-D8047-0039  
Project No. 768579

February 1997

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**Final****Health and Safety Plan Addendum 1  
RCRA Facility Investigation  
Sanitary Sewer System  
Naval Air Station Fort Worth  
Joint Reserve Base, Carswell Field  
Fort Worth, Texas****Prepared for:****Air Force Center for Environmental Excellence  
Brooks Air Force Base, Texas  
Contract No. F41624-94-D-8047  
Delivery Order No. 0039****Prepared by:****IT Corporation  
312 Directors Drive  
Knoxville, Tennessee 37923****Project No. 768579  
Revision 1****February 1997**

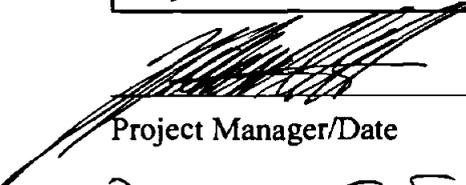
This Health and Safety Plan Addendum must be used in conjunction with the Final Site Health and Safety Plan (HASP), Remedial Investigation Base Gas Station, NAS Fort Worth, JRB, Carswell Field, Fort Worth, Texas, July 1996.

## Health and Safety Plan Addendum Approvals

### Approvals

I have read and approved this health and safety plan (HASP) addendum with respect to project hazards, regulatory requirements, and IT procedures.

Project Name: Carswell AFB	Project Number: 768579
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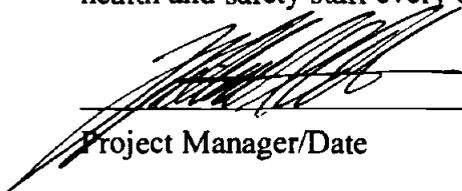
  
 Project Manager/Date

2/20/97

 2/20/97  
 Project/Location HS Staff/Date

### Acknowledgments

This HASP addendum has been provided to the site supervisor. I acknowledge my responsibility to provide the site supervisor with the equipment, materials, and qualified personnel to implement fully all safety requirements in this HASP. I will formally review this plan with the health and safety staff every 6 months until project completion.

  
 Project Manager/Date

2/24/97

I acknowledge receipt of this HASP addendum from the project manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the project manager and/or the health and safety representative.

\_\_\_\_\_  
 Site Supervisor/Date



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## **1.0 Introduction**

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### **1.1 Objective**

The objective of this health and safety plan (HASP) addendum is to provide a mechanism for the establishment of safe working conditions during the inspection and sampling inside the sanitary sewer system of the Naval Air Station Fort Worth (NAS), Joint Reserve Base (JRB), Carswell Field, Fort Worth, Texas. The safety organization and procedures have been established in the final site health and safety plan (HASP), which was part of the remedial investigation report, *Remedial Investigation Base Gas Station, NAS Fort Worth, JRB, Carswell Field, Fort Worth, Texas*, July 1996. Specific hazard control methodologies for confined space entries have been evaluated and selected in an effort to minimize the potential of accident or injury. This plan is dynamic and will change depending on activities performed. Personnel will be required to review the final HASP (July 1996) along with this addendum prior to conducting confined-space entry (CSE). Attachments I and II provide tables, material safety data sheets, and a site location map that are essential to the safe execution of this project.

### **1.2 Personnel Requirements**

Each person is responsible for completing tasks in a safe manner, and reporting any unsafe acts or conditions to their supervisor and/or the IT site supervisor. All personnel are responsible for continuous adherence to these health and safety (H&S) procedures during the performance of their work. No person may work in a manner that conflicts with the letter or the intent of these procedures. After due warnings, IT will dismiss from the site any person who violates safety procedures. IT's employees are subject to progressive discipline and may be terminated for blatant or continued violations. All on-site personnel will be trained in accordance with Title 29 Code of Federal Regulations (CFR) Part 1910.120 and this document. IT and subcontractor personnel will be responsible to strictly adhere to the final HASP (July 1996) and this addendum.

### **1.3 Additional Chemicals Used**

Hexane and methanol will be used in small amounts to decontaminate sampling equipment. These chemicals will be handled with protective gloves and will be in "squirt" bottles so quantity of use will be limited; therefore, exposure to these chemicals will not pose a health risk. Material

Safety Data Sheets (MSDS) for hexane and methanol are included in Attachment I, which is an update to the 1996 HASP MSDSs.

#### **1.4 Biological Hazards**

Personnel will be collecting sediment, soil, and groundwater samples using direct push in locations at sanitary sewer overflow sites. The sanitary sewer overflow sites have been saturated due to prevalent rainy weather throughout the months prior to sampling activities. With direct-push sampling activities, no drill cuttings will be brought to the surface or handled by personnel; however, all personnel assigned to sampling activities at these location must provide documentation of current tetanus and diphtheria vaccinations, or obtain these vaccinations through IT's medical consultant, EMR, clinics. After consultation with IT's medical director, Dr. Theriault, the sampling activities will not require Hepatitis B vaccinations, but personnel must have current tetanus and diphtheria vaccinations.

##### **1.4.1 Work Practice Controls**

- No eating, drinking, or smoking is allowed in any work area.
- Nondisposable equipment or materials that have or may have environmental media contact must be washed immediately after their use. (A 1-to-10 solution of bleach and water is recommended for proper decontamination.)
- Any clothing that comes into contact with environmental media shall be removed and disposed of.
- After use, remove gloves from top to bottom inside-out, not allowing unprotected skin to contact the exterior of the gloves.
- Open wounds or cuts will be promptly bandaged.

##### **1.4.2 Appropriate PPE**

Direct contact with environmental media shall be avoided. The use of light-weight nitrile gloves will be required in addition to PPE specified in the SSHP dated July 1996 for all direct-push activities. The gloves should be inspected prior to use to ensure there are no tears or flaws with gloves. Do not reuse gloves once removed.

### **1.4.3 Decontamination Procedures**

Use a 1-to-10 solution of bleach and water or Clorox® to wash sampling equipment and nondisposal PPE.

### **1.4.4 Incident Reporting**

All injuries involving injection or abrasion of skin with potentially contaminated materials must be immediately reported to the H&S manager (and/or the H&S Assistant) to ensure proper medical followup.

## **2.0 Confined-Space Entry**

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### **2.1 Introduction**

No confined space entry (CSE) activities are required during soil, sediment, and groundwater sampling to be conducted at Carswell AFB. This section contains the requirements and procedures for working in confined spaces. A confined space is defined as a space large enough and so configured that an employee can bodily enter and perform assigned work, has limited means for entry or exit, and is not designed for continuous employee occupancy. Contaminated storage vessel entries and other confined space work may pose additional hazards such as air contamination, flammable or explosive atmosphere, and oxygen deficiency. IT has detailed training for CSE, and only personnel properly trained shall supervise and participate in CSE procedures or serve as standby attendants.

All confined spaces are initially considered permit-required. Under certain conditions, a space may be reclassified as a nonpermit confined space provided the IT H&S professional approves the reclassification, and the space meets the criteria outlined in Section 2.2.3.

### **2.2 Confined-Space Identification and Designation**

#### **2.2.1 Identification**

The IT entry supervisor is responsible to identify all confined spaces into which IT employees or subcontractors will enter. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space. The client is responsible to identify and provide information as to contents, expected atmosphere, and rescue procedures for all confined spaces on his/her property. If a space is not considered permit-required by the client but meets the definition provided in Section 2.2.2, it shall be considered permit-required for IT-managed entry. If a space does not meet the definition provided in Section 2.2.2 but is considered permit-required by the client, this procedure shall apply.

#### **2.2.2 Classification**

A confined space is a space that is large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for human occupancy.

All sewer entries will be considered permit-required confined spaces.

A permit-required confined space is a confined space meeting the previous definition and may pose the following additional hazards:

- Contains or could contain a hazardous atmosphere
- Contains a material that has the potential for engulfing an entrant
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section
- Contains any other recognized serious safety or health hazard.

### **2.2.3 Reclassification**

Due to the potential atmospheric hazards from fuel leakage into the sewer, each sewer entry shall remain classified as a permit-required confined space. Note: No entry into sewer system is required for the current scope of work.

## **2.3 Duties of Personnel**

Each confined space being entered shall have a minimum of one dedicated attendant and one other support person (who may have other duties) within sight or call.

### **2.3.1 Duties of Entrants**

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure. See Table 3.1 in the main site HASP for toxicological information on potential contaminants in the sewer system.
- Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to alert entrants of the need to evacuate the space.
- Alert the attendant whenever:
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.

- The entrant detects a prohibited condition.
- Exit from the permit space as quickly as possible whenever:
  - An order to evacuate is given by the attendant or the entry supervisor.
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - The entrant detects a prohibited condition.
  - An evacuation alarm is activated.

### **2.3.2 Duties of Attendants**

- Knows the hazards that may be faced during entry, including information on the mode of chemical exposure, signs or symptoms, and consequences of the exposure (see Table 3-1 in the final HASP [July 1996]).
- Be aware of possible behavioral effects of hazard exposure in entrants.
- Continuously maintain an accurate count of entrants in the permit space and accurately identify who is in the permit space by tagging the lifelines with the entrant's name and recording the names of the entrants.
- Remain outside the permit space during entry operations until relieved by another attendant.
- Communicate with entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space.
- Observe activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the permit space immediately under any of the following conditions:
  - If the attendant detects a prohibited condition
  - If the attendant detects the behavioral effects of hazard exposure in an authorized entrant
  - If the attendant detects a situation outside the space that could endanger the authorized entrants

- If the attendant cannot effectively and safely perform all his duties.
- Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
- Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  - Warn the unauthorized persons that they must stay away from the permit space.
  - Advise the unauthorized persons that they must exit immediately if they have entered the permit space.
  - Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- Perform nonentry rescues.
- Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

### **2.3.3 Duties of Entry Supervisors**

- Remain immediately available on site throughout entry operations.
- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Verify, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- Sign entry permit authorizing entry.
- Terminate the entry and cancel the permit as required.
- Remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
- Determine that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

- Document on the entry permit any incidents or circumstances requiring review of the CSE program. Such incidents include:
  - Unauthorized entry
  - The detection of a condition/hazard not authorized by the permit
  - The occurrence of an injury or near-miss during entry
  - A change in use or configuration of the space
  - Employee complaints about the program.
- Prescribe procedures for coordination of entry when personnel from multiple employers will work simultaneously. IT subcontractors shall follow IT procedures.

## 2.4 Procedures for Permit-Space Entry

### 2.4.1 Acceptable Entry Conditions

The following entry conditions and action levels will be strictly adhered to during permit-required confined space entries (refer to Section 2.4.4.2 for testing procedures):

AIRBORNE CONTAMINANT ENTRY CONDITIONS AND ACTION LEVELS		
Parameter	Reading	Action/Level of Protection
Volatile Organic Compounds (VOC)	>1 ppm but < 10 ppm above background* with benzene or vinyl chloride present.	Normal operations, Level C
	≥10 ppm above background* without benzene or vinyl chloride present.	Level C
	≥10 ppm above background with benzene or vinyl chloride present	Stop work; evacuate confined space, investigate cause of reading, ventilate area, re-sample, contact IT H&S manager
	≥20 ppm above background	Stop work; evacuate confined space, investigate
Hydrogen Sulfide	>1 ppm but <5 ppm	Normal operation, direct-reading at all times, Level C

<b>AIRBORNE CONTAMINANT ENTRY CONDITIONS AND ACTION LEVELS</b>		
<b>Parameter</b>	<b>Reading</b>	<b>Action/Level of Protection</b>
	>5 ppm	Stop work, evacuate confined space, ventilate area, resample, contact H&S manager
Flammable Vapors (LEL) Methane	<10% Lower Explosive Limit (LEL)	Normal operations
	>10% LEL	Stop work, evacuate confined space; ventilate area; investigate source of vapors, contact IT H&S manager
Oxygen	>20% and $\leq$ 23%	Normal operations
	<20%, >23%	Stop work, evacuate confined space, ventilate, re-sample, contact IT H&S manager

\* Note: Background concentrations are obtained in a "clean" location prior to work activities begin.

#### **2.4.2 Isolation Requirements**

Before personnel are permitted to enter the confined space, the confined space shall be isolated to preclude the entry of hazardous materials or physical conditions. The entry supervisor shall ensure the appropriate isolation requirements are implemented.

The entry supervisor shall verify personnel are protected from physical hazards involved with confined space entries, which include, but are not limited to the following:

- Tools or other objects dropping from overhead
- Tripping over hoses, pipes, tools, or equipment
- Slipping on wet, oily surfaces or colliding with objects in inadequately lit interiors

- Insufficient or faulty personal protective equipment
- Insufficient or faulty operations equipment and tools
- Noise in excess of acceptable levels
- Temperature extremes that may require additional protection
- Accidental introduction into the confined space of hazardous materials through interconnecting equipment such as piping and drains.

This information shall be documented on the CSE permit and communicated to designated personnel prior to entering the confined space.

### **2.4.3 Atmospheric Hazard Control**

Atmospheric hazards must be eliminated or controlled to meet the requirements specified in Section 2.4.1. If necessary, the space shall be purged or inerted, then ventilated to the extent necessary to meet the criteria in Section 2.4.1. Ventilation equipment may be needed to maintain these conditions.

### **2.4.4 Inspecting and Testing Procedures**

#### **2.4.4.1 Testing Equipment**

The following equipment shall be available for testing each confined space:

- HNu Model PI-101 photoionization detector (PID) 10.2 eV lamp, or equivalent
- MSA Model 360 (combustible gas, oxygen) continuous air sampling unit, or equivalent
- Industrial scientific HS267 hydrogen sulfide monitor or equivalent
- Draeger Tube Sample Kit with benzene and vinyl chloride indicator tubes or equivalent.

All equipment shall be maintained in such quantity, condition, and calibration, per manufacturer recommendations, to adequately monitor and assess all confined space entries.

#### **2.4.4.2 Testing Procedures**

Prior to entering each confined space, the entry supervisor shall perform initial testing of the atmosphere of the confined space from the outside. Tests performed shall include oxygen, flammability, organic vapors (H<sub>Nu</sub>) hydrogen sulfide, and specific tube tests for benzene and vinyl chloride. All air monitoring tests shall be conducted in a location that will be representative of the worse-case conditions that might be anticipated. All air monitoring results shall be recorded on the CSE permit and communicated to designated personnel prior to entering the confined space, as follows:

- For confined spaces that cannot be completely isolated, continuous testing with real-time direct reading instruments shall be required.
- Priority for atmospheric hazard testing shall be oxygen, combustible gases, then toxic gases.

#### **2.4.5 Communications**

Provisions for continuous communication between entrants and attendants may consist of the standard system of lifeline "tugs" as follows, so long as the attendants continuously hold the lifelines in their hands. If this is not practical or possible, portable air horns must be provided to all entrants and attendants. The same code for rope tugs will be used for air horn blasts:

##### **Lifeline "Tug" Signals or Air Horn Signals**

- 1 Tug/Horn Blast = Are you OK?
- 2 Tugs/Horn Blast = Yes, I am OK.
- 3 Tugs/Horn Blast = Exit the confined space immediately.

If the lifeline tug system or the air horn system are not feasible, powered communication equipment with the appropriate National Electric Code (NEC) rating shall be provided.

The lifeline tug signals and voice commands will be used during all CSEs.

#### **2.4.6 Personal Protective Equipment**

Personnel entering confined spaces will be wearing Level C protection, along with the body harness and lifelines. Additional equipment will also include a retrieval tripod for all overhead entries. Level C protection shall consist of the following:

- Hard hat, American National Standards Institute (ANSI)-approved
- Steel-toe safety shoes
- Full-face respirator with GMC-H cartridges
- Polyethylene-coated Tyvek
- Nitrile gloves (outer)
- Surgical gloves (inner)
- Hazmat booties or equivalent
- Duct tape around ankle and wrist areas.

Personnel entering the confined space shall be equipped with parachute harness and lifelines as follows:

- The body harness shall be a full-body parachute type that will suspend a person in an upright position. A man-rated hoisting device (tripod) shall be provided for lifting employees out of the space.
- The full-body parachute harness will be equipped with approved lifelines at least 0.5-inch diameter and 2,000 pounds test. (NOTE: Wristlets may be used only when a harness presents a greater hazard to the employee and wristlets are the safest, most effective alternative.) All lifelines shall be secured to a mechanical device or fixed point outside the confined space. Mechanical devices shall be used for all vertical entry permit spaces greater than 5 feet deep.

## **2.4.7 Other Required Equipment**

### **2.4.7.1 Lighting Equipment**

Lighting and electrical shall be of the appropriate NEC rating. Rating should be Class I, Division I unless the space specifically meets other rating requirements.

### **2.4.7.2 Ingress and Egress Equipment**

Protective barriers will be used to protect entrants from external pedestrian, vehicle, or equipment hazards.

Appropriate barricades will be located adjacent to each unattended opening.

### **2.4.7.3 Rescue Equipment**

All lifelines must be attached to a mechanical device or a fixed point outside the space so that a rescue can begin as soon as the rescuer becomes aware that a rescue is necessary. A mechanical device must be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

For top entries, a tripod will be used to lower/extricate personnel from sewer manways. Prior to entering the confined space, the person shall wear a parachute harness with approved lifeline at least 0.5-inch diameter and 2,000 pounds test.

## **2.5 Permit System**

Before entry is authorized, the entry supervisor shall complete and sign an entry permit to document that all pre-entry requirements have been met and that acceptable entry conditions exist. The complete permit shall be posted at the primary entrance to the confined space.

All pertinent personnel shall be required to review the CSE permit and sign off on the permit. The completed permit shall be posted at the primary entrance to the confined space.

All entry permits are valid for a maximum of one work shift, and shall be canceled by the entry supervisor when the shift ends, confined space operations are complete, or whenever a prohibited condition arises in or near the space. All confined spaces shall be securely closed or barricaded whenever the entry permit is canceled.

## **2.6 Training**

### **2.6.1 General**

Prior to assignment to CSE work, all employees shall receive training in the hazards of confined spaces, work practices to control these hazards, and duties to be performed. Employee proficiency shall be established by testing and/or practical demonstration.

### **2.6.2 Requirements for Entrants, Attendants, and Supervisors**

Basic training requirements for entrants and attendants shall include Hazards & Protection (or equivalent) and IT CSE update training if Hazards & Protection training was received prior to April 1, 1993.

Basic training for entry supervisors and personnel conducting atmospheric testing shall include Entry Supervisor and IT CSE update training if Entry Supervisor training was received before April 1, 1993.

Equivalent training must be approved by the IT training department prior to assignment to entry duties.

Personnel assigned to attendant duties shall be trained in nonentry rescue procedures.

### **2.6.3 Requirements for Emergency Rescue Personnel**

Personnel assigned to provide emergency entry and rescue services shall be trained annually in the proper use of personal protective and rescue equipment. Such training shall include a simulated rescue exercise at least once every 12 months. In addition, rescue personnel shall be trained in the hazards and proper work practices for handling blood or other potentially infectious materials, and shall comply with other IT procedure HS512 provisions.

## **2.7 Emergency Procedures**

Rescue services will be provided by the NAS JRB Fire and Emergency Services, which has a qualified rescue team on Base that is available to IT and will be informed of the hazards of the confined space to be entered prior to entry. Prior to entry, all coordination must be completed; contact NAS JRB Fire and Emergency Services at (817) 782-6330.

**Client-Provided Emergency Rescue Services.** When the base fire department provides the emergency rescue services, the IT project manager must verify that the emergency personnel have been informed of the potential hazards they may confront, and have had an opportunity to examine the space(s). The project manager must also verify all necessary equipment is available, and MSDSs for potential contaminants are provided to the facility treating any injured/exposed entrants.

# TAB

*Attachment I*  
*Update, Material, Safety Data Sheets*

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**Genium Publishing Corporation**

 1145 Catalyn Street  
 Schenectady, NY 12303-1836 USA  
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**Material Safety Data Sheets Collection:**

 Sheet No. 397  
*n*-Hexane

Issued: 8/83 Revision: C, 8/89

29

**Section 1. Material Identification**

*n*-Hexane Description: *n*-Hexane is the chief constituent of petroleum ether or liqroin. Used to determine the refractive index of minerals; and as a mercury replacement in thermometers (usually with blue or red dye).

Other Designations: Normal-hexane; C<sub>6</sub>H<sub>14</sub>; CAS No. 0110-54-3.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide* (Genium ref. 73) for a suppliers list.

Comments: See *MSDS Collection*, No. 397A, for isohexanes.

 R 1  
 I 3  
 S 2  
 K 4


NFPA

HMIS

H 1

F 3

R 0

PPG\*

\* Sec. 8

**Section 2. Ingredients and Occupational Exposure Limits**

*n*-Hexane, ca 100%\*

**OSHA PEL**

 8-hr TWA: 50 ppm, 180 mg/m<sup>3</sup>
**ACGIH TLV, 1988-89**

 TLV-TWA: 50 ppm, 180 mg/m<sup>3</sup>
**Toxicity Data†**

 Human, inhalation, TC<sub>L</sub>: 5000 ppm/10 min  
 Rat, oral, LD<sub>50</sub>: 28,710 mg/kg

\* *n*-Hexane is this product's major component; however, possible contaminants are other isomers of hexane, C<sub>6</sub> to C<sub>7</sub>, saturated hydrocarbons, C<sub>6</sub> to C<sub>7</sub>, olefinic hydrocarbons, and aromatic hydrocarbons.

† See NIOSH, *RTECS (MN9275000)*, for additional data with references to reproductive, irritative, and neurological effects.

**Section 3. Physical Data**

Boiling Point: 156.11 °F (68.95 °C)

Melting Point: ca -139 °F (-95 °C)

Vapor Pressure: 124 torr at 68 °F (20 °C)

Vapor Density (Air = 1): 3.0

Molecular Weight: 86 g/mol

 Specific Gravity (H<sub>2</sub>O = 1): 0.66 at 68 °F (20 °C)

Water Solubility: Insoluble

Appearance and Odor: A clear, colorless, mobile, volatile, flammable liquid; a mild hydrocarbon odor.

**Section 4. Fire and Explosion Data**

Flash Point: -22 °F (-30 °C) CC

Autoignition Temperature: 473 °F (223 °C)

LEL: 1.2% v/v

UEL: 8% v/v

**Extinguishing Media:** Use carbon dioxide (CO<sub>2</sub>), foams, or dry chemical to put out *n*-hexane fires. Never direct solid streams of water into burning pools of liquid since this can scatter and spread the fire. Use water sprays to cool fire-exposed containers, prevent dangerous pressure rise and/or rupture, disperse vapors, and flush unignited spills away from sensitive exposures.

**Unusual Fire or Explosion Hazards:** *n*-Hexane is a very flammable, volatile liquid which burns like gasoline. It represents a dangerous fire and explosion hazard. Since it evaporates quickly, the resulting denser-than-air vapors can flow along surfaces, collect in low-lying or enclosed areas like sumps and utility rooms, reach distant sources of ignition, and flash back to the original liquid.

**Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

**Section 5. Reactivity Data**

**Stability/Polymerization:** *n*-Hexane is stable at room temperature during routine operations. Hazardous polymerization cannot occur.

**Chemical Incompatibilities:** *n*-Hexane can react violently with strong oxidizing agents.

**Conditions to Avoid:** Never expose this liquid to any ignition source (heat, sparks, open flames, or uninsulated heating elements).

**Hazardous Products of Decomposition:** Thermal oxidative degradation of *n*-hexane can produce carbon dioxide and toxic carbon monoxide (CO).

**Section 6. Health Hazard Data**

**Carcinogenicity:** Neither the NTP, IARC, nor OSHA lists *n*-hexane as a carcinogen.

**Summary of Risks:** The metabolic products of *in vivo* partial oxidation of *n*-hexane include 2, 5-hexanedione. This metabolite is the most highly neurotoxic compound formed from *n*-hexane. Occupational exposures to *n*-hexane are associated with chronic neurotoxic damage to the central nervous system (CNS) and the peripheral nervous system (PNS). The effects are not permanent; Genium reference 100 notes that recovery from neuropathy is usually complete within a year after the exposure. Methyl *n*-butyl ketone (MBK) (MSDS Collection, No. 425) produces the neurotoxic metabolite 2, 5-hexadione in even greater quantities than the *n*-hexane. Prevent simultaneous exposures to *n*-hexane and MBK.

Genium reference 89 notes: "... concurrent exposure to methyl ethyl ketone, and possibly other chemicals or drugs which boost liver oxidative mechanisms, reduces the time for neuropathy to appear as a result of exposure to both *n*-hexane and MBK." **Medical Conditions Aggravated by Long-Term Exposure:** CNS and PNS disorders, vision defects, and memory diminution. **Target Organs:** Skin, eyes, CNS, PNS. **Primary Entry:** Inhalation, skin contact. **Acute Effects:** Irritation of eyes, nose, and upper respiratory tract (URT); dermal erythema (abnormally red skin from capillary congestion), edema (abnormal accumulation of clear, watery fluid in body tissue), and vesiculation (blistering). Acute inhalation causes headache, dizziness, nausea, narcosis, and coma. High concentrations may act as asphyxiants. **Chronic Effects:** Anorexia, nausea, weight loss, malaise; muscular weakness, pain, and spasms in extremities; neurotoxic effects like sensorimotor polyneuropathy, generalized polyneuropathy, and other degenerative changes in the peripheral nervous system (PNS).

**FIRST AID**

**Eyes:** Flush immediately, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 min.

**Skin:** After rinsing affected area with flooding amounts of water, wash it with soap and water. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. Have a qualified medical personnel administer oxygen as required. **Ingestion:** Never induce vomiting! Severe aspiration hazard exists. If vomiting occurs spontaneously, lower victim's head to the knee level. Never give anything by mouth to an unconscious or convulsing person. Administer several ounces of edible oil to drink.

After first aid, get appropriate in-plant, paramedic, or community medical attention and support.

**Section 7. Spill, Leak, and Disposal Procedures**

**Spill/Leak:** Design and practice a *n*-hexane spill control and countermeasure plan (SCCP). When a spill occurs, notify safety personnel, evacuate unnecessary personnel, eliminate heat and ignition sources, provide maximum explosion-proof ventilation, and implement the SCCP. Cleanup personnel should wear fireproof personal protective equipment (Sec. 8).

**Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

**OSHA Designations**

Listed as an Air Contaminant (29 CFR 1910.1000, Subpart Z)

**EPA Designations**

Assigned the RCRA Hazardous Waste No. D001 (40 CFR 261.21, Ignitability)

Assigned as a CERCLA Hazardous Substance (40 CFR 302.4), Reportable Quantity (RQ): 100 lb (45.4 kg)

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

**Section 8. Special Protection Data**

**Goggles:** Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Where splashing is possible, wear a full face shield. **Respirator:** Wear a NIOSH-approved respirator if necessary. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA.

**Warning:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact. **Ventilation:** Provide general and local explosion-proof ventilation systems to maintain airborne concentrations below the OSHA PEL standard (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by eliminating it at its source (Genium ref. 103). **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, washing facilities, and properly serviced fire extinguishers. **Contaminated Equipment:** Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Launder contaminated clothing before wearing. Remove this material from your shoes and equipment. **Other:** Preplacement and periodic medical exams focusing on the skin and the central nervous system are advised.

**Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics. Handle this flammable, volatile material with appropriate caution.

**Section 9. Special Precautions and Comments**

**Storage Requirements:** Store *n*-hexane in closed containers in a cool, dry, well-ventilated, fireproof area away from heat and ignition sources and incompatible chemicals. Protect these containers from physical damage; shield them from direct sunlight.

**Engineering Controls:** To prevent static sparks, electrically ground and bond all containers, tank cars, and pipes used in shipping, receiving, or transferring operations in production and storage areas. All electrical services, including lights, must be sparkproof.

**Transportation Data (49 CFR 172.101-2)**

DOT Shipping Name: Hexane

IMO Shipping Name: Hexane (and its isomers)

DOT Hazard Class: Flammable liquid

IMO Hazard Class: 3.1

DOT ID No.: UN1208

IMO Label: Flammable liquid

DOT Label: Flammable liquid

IMDG Packaging Group: II

DOT Packaging Requirements: 49 CFR 173.119

DOT Packaging Exceptions: 49 CFR 173.118

MSDS Collection References: 1, 6, 7, 84-94, 100, 116, 117, 119, 120, 122

Prepared by: PJ Igoe, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: W Silverman, MD

F6

# MATERIAL SAFETY DATA SHEET

## GENIUM PUBLISHING CORPORATION

1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854



MSDS # 354

METHYL ALCOHOL  
Revision C

Issued:

Revised: September, 1985

From Genium's MSDS Collection, to be used as a reference.

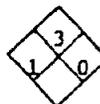
### SECTION 1. MATERIAL IDENTIFICATION

17

**MATERIAL NAME:** METHYL ALCOHOL

**OTHER DESIGNATIONS:** Methanol, Wood Alcohol, Carbinol, Wood Naphtha, Methyl Hydroxide, Monohydroxy Methane, CH<sub>3</sub>OH, CAS #67-56-1

**MANUFACTURER/SUPPLIER:** Available from several suppliers, including: E.I. DuPont DeNemours & Co. (302- 774-2290)  
Chemicals & Pigments Dept (800) 441-9442  
1007 Market St. Wilmington, DE 19898



### SECTION 2. INGREDIENTS AND HAZARDS

METHYL ALCOHOL

CH<sub>3</sub>-OH

\* Current OSHA Standard; ACGIH (1985-86) TLV adds (skin) notation.

NIOSH has recommended a TWA standard of 200 ppm with a fifteen minute ceiling of 800 ppm. This ceiling is well above the TLV STEL of 250 ppm.

%

ca 100

### HAZARD DATA

8 hr TWA: 200 ppm, or  
260 mg/m<sup>3</sup>\* (Skin)  
STEL: 250 ppm, or  
310 mg/m<sup>3</sup>

HUMAN

Eye: 5 ppm, primary  
irritation dose  
Oral: LDLo: 340 mg/kg  
Inhalation: TCLo: 86,000  
mg/m<sup>3</sup> - Toxic irritant  
effects (systemic)

### SECTION 3. PHYSICAL DATA

Boiling Point, 1 atm ..... 148.5°F (64.7°C)

Viscosity @ 20°C, cps ..... 0.59

Vapor density (Air=1) ..... 1.11

Specific gravity, 20°/4°C ... 0.791

Vapor pressure @ 21°C, mmHg ... 100

Melting point ..... -144°F (-97.8°C)

@ 50°C, mmHg ... 400

Volatiles, % ..... ca 100

Water Solubility ..... Totally Miscible

Evaporation rate (BuAc=1) ... 5.9

Molecular weight ..... 32.04

**APPEARANCE & ODOR:** Clear, colorless, highly polar liquid with a characteristic alcohol odor. The odor recognition threshold (100% of test panel) is 53.3 ppm

### SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	Lower	Upper
60.8°F (12°C) Closed Cup	725°F (385°C)	% by Volume	6	36.5

**EXTINGUISHING MEDIA:** Use carbon dioxide, dry chemical, or alcohol type foam. Do not use a solid stream of water since the stream will scatter and spread the fire. Use water spray to cool fire-exposed tanks/containers. Fires involving Methyl Alcohol are Class IB; use a blanketing effect to smother fire. Methyl Alcohol is a moderate explosion hazard and a dangerous fire hazard when exposed to heat, sparks, flame or oxidizers. Its vapors are heavier than air and may travel a considerable distance to an ignition source and flashback. Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting fires involving Methyl Alcohol.

### SECTION 5. REACTIVITY DATA

Methyl Alcohol is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. This material may react violently with chromic anhydride; iodine plus ethyl alcohol, and mercuric oxide; lead perchlorate; perchloric acid plus ethyl alcohol; dimethyl formamide plus phosphorous; potassium hydroxide plus chloroform; sodium hydroxide plus chloroform. It may also react with metallic aluminum at high temperatures.

Methyl Alcohol is incompatible with strong oxidizing agents (eg., nitrates, perchlorate or sulfuric acid), active metals, acetaldehyde, ethylene oxide, isocyanates, beryllium dihydride, chloroform, and potassium tert-butoxide. It may attack some forms of plastics and rubber. Thermal decomposition or burning will produce carbon monoxide, carbon dioxide and possible toxic formaldehyde and unburned methanol.

Revised: 9/85

MSDS # 054 Issued METHYL ALCOHOL (Rev. C)

SECTION 6. HEALTH HAZARD INFORMATION

TLV 200 ppm (skin) or 260 mg/m<sup>3</sup>

Methanol is a poisonous, narcotic chemical that may exert its effects through inhalation, skin absorption, or ingestion. Elimination of Methanol from the body is slow, and the toxic effects can be compounded by repeated excessive exposures over several days. Toxic effects are exerted upon the CNS, especially the optic nerve and possibly the retinae. Symptoms of overexposure include dizziness, visual impairment, nausea, respiratory failure, muscular incoordination and narcosis. Visual disturbances may clear temporarily then re-occur and progress to blindness. Prolonged or repeated contact with the skin may cause dermatitis, erythema, and scaling. Vapors of Methanol are mildly irritating to the eyes, while direct contact with the liquid may cause irritation, pain and transient corneal opacity. Ingestion of Methanol can cause blindness and death. The fatal dose is 100-250 ml, although death from ingestion of less than 33 ml has been reported.

FIRST AID: EYE CONTACT: Immediately flush eyes, including under eyelids, with plenty of running water for at least 15 minutes. Get medical attention if irritation persists. SKIN CONTACT: Flush exposed area with water while removing contaminated clothing. Wash with soap and water. Get medical attention if irritation persists.

INHALATION: Remove victim to fresh air. Restore and/or support breathing as needed. Get medical help (Inplant Paramedic, community). INGESTION: Give victim 3-4 glasses of water or milk and induce vomiting by sticking finger to back of throat. Contact a Poison Control Center or physician. Transport victim to a medical facility immediately. Do not induce vomiting or give anything to drink if victim is unconscious or having convulsions. Get medical attention (Inplant, paramedic, community).

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Evacuate all personnel from the area except for those involved in clean-up. Remove leaking container to safe place if feasible. Clean-up personnel should wear protective clothing, gloves, boots, and a self-contained breathing apparatus. Absorb small quantities on paper towel, vermiculite, or other absorbent and place in closed container for disposal. Dike large spills and collect for reclamation or disposal. Water spray may be used to knock down vapor and to dilute and flush spill away from sensitive areas. Do not flush to sewer. Keep out of watersheds and waterways.

DISPOSAL: Place in suitable container for disposal by a licensed contractor or burn in an approved incinerator. Waste solvent may be reclaimed via filtration and distillation procedures. Methyl Alcohol has been designated as a hazardous waste by the EPA (RCRA CFR 261.33). The EPA Hazardous Waste No. is U154. Aquatic Toxicity Rating: Tm96: Over 1000 ppm.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation (explosion-proof) to meet TLV requirements. For emergency or non-routine exposures where the TLV may be exceeded, wear an appropriate NIOSH-approved respirator. All electrical service in use or storage areas should have an explosion-proof design.

Prevent skin and eye contact by wearing rubber gloves and splash goggles or safety glasses. Use protective aprons, boots and face shield as necessary when splashing may occur.

Eyewash stations and safety showers should be available in areas of use and handling. Provide suitable training to those working with Methanol. Monitor the workplace and keep accurate records.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in tightly closed containers in a dry, well-ventilated area away from strong oxidizing agents, heat, sparks and open flame. Protect container from physical damage. When transferring or pouring Methyl Alcohol, ground and bond containers and equipment to prevent static sparks. Use non-sparking tools.

Do not smoke in areas of use or storage. Use with adequate ventilation. Do not breathe vapors. Avoid contact with eyes and skin. This material is poisonous when introduced into the body metabolism. DO NOT INGEST!!!

Provide preplacement medical exams and periodic medical surveillance for industrially exposed workers with emphasis on neurological and visual functions, liver, and kidney systems.

DOT CLASSIFICATION: Flammable liquid, UN1230

DOT LABEL: Flammable liquid.

DATA SOURCE(S) CODE (See Glossary) 1, 2, 4-12, 16, 19, 20, 23-26, 31, 34, 37-39, 43, 47, 63, 79. R.

Judgement as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranty, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

APPROVALS

JG Rocco, 11/85

INDUST. HYGIENE/SAFETY

JW 11-85

MEDICAL REVIEW:

Dec 85

# TAB

*Attachment II*

*Tables and Site Location Map*

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Table 3-1

**Toxicological Data  
Carswell Base Gas Station  
NAS Fort Worth, Carswell Field, Texas**

Suspected Compounds	Routes of Entry	Symptoms of Exposure
Toluene	<ul style="list-style-type: none"> <li>Highly toxic by inhalation</li> <li>Moderately toxic by ingestion and skin/eye contact</li> </ul>	<ul style="list-style-type: none"> <li>Ingestion - vomiting, diarrhea, depressed respiratory capability</li> <li>Inhalation - headache, dizziness, fatigue, muscular weakness, drowsiness, incoordination</li> <li>Skin/Eye - drying, cracking, fissured dermatitis, and temporary corneal injury</li> </ul>
Known carcinogen: Benzene	<ul style="list-style-type: none"> <li>Highly toxic by inhalation.</li> <li>Moderately toxic ingestion and skin/eye absorption.</li> </ul>	<ul style="list-style-type: none"> <li>Ingestion - euphoria, changes in motor activities, reduced number of blood platelets, dermatitis, and fever</li> <li>Inhalation - headache, dizziness, nausea, convulsions, and overall central nervous system depression</li> <li>Skin/Eye Contact - moderate irritability effect, erythema, burning sensation, and eye reddening and tearing</li> </ul>
Ethyl Benzene	<ul style="list-style-type: none"> <li>Highly toxic by inhalation.</li> <li>Moderately toxic by ingestion and skin/eye contact.</li> </ul>	<ul style="list-style-type: none"> <li>Ingestion - vomiting, diarrhea</li> <li>Inhalation - headache, dizziness, depression of central nervous system, narcosis, upper respiratory tract irritation</li> <li>Skin/Eye Contact - moderate eye irritation, defatting of skin dermatitis</li> </ul>
Xylene	<ul style="list-style-type: none"> <li>Moderately toxic by eye/skin contact and inhalation</li> <li>Slightly toxic by ingestion</li> </ul>	<ul style="list-style-type: none"> <li>Ingestion - mild upset stomach along with nausea, and throat irritation</li> <li>Inhalation - dizziness, drowsiness, nausea, vomiting, central nervous system depression and minor reversible effects upon liver and kidneys</li> <li>Skin/Eye Contact - severe eye irritation with reversible damage, and drying and defatting of skin which may lead to dermatitis</li> </ul>
1,1,1-Trichloroethylene	<ul style="list-style-type: none"> <li>Toxic by inhalation</li> </ul>	<ul style="list-style-type: none"> <li>Inhalation - headache, vertigo, visual disturbances, fatigue, giddiness, tremor, nausea, cardiac arrhythmia</li> <li>Ingestion - liver injury</li> <li>Skin Contact - irritation of eyes, skin, and dermatitis</li> </ul>
1,2-Dichloroethylene	<ul style="list-style-type: none"> <li>Moderately toxic by ingestion, inhalation, and skin contact</li> </ul>	<ul style="list-style-type: none"> <li>Inhalation - respiratory system and central nervous system depression</li> <li>Skin/Eye Contact - irritation of the eyes</li> </ul>
Vinyl Chloride	<ul style="list-style-type: none"> <li>Known carcinogen</li> <li>Highly toxic by ingestion, and skin contact</li> </ul>	<ul style="list-style-type: none"> <li>Inhalation - weakness, abdominal pain, GI bleeding, enlarged liver, cyanosis of extremities</li> </ul>

This list will be modified by the H&S Manager as site conditions warrant.

Table 3-2

**Airborne Exposure Guidelines  
Carswell Base Gas Station, NAS Fort Worth, Carswell Field, Texas**

Contaminants	OSHA PEL	ACGIH TWA	ACGIH STEL
Trichloroethylene	100 ppm	50 ppm	200 ppm
2-Hexanone	100 ppm	5 ppm skin	---
Benzene	1 ppm	10 ppm	---
Acetone	1000 ppm	750 ppm	1000 ppm
Toluene	200 ppm	100 ppm	150 ppm
Dichlorobenzene	50 ppm C	25 ppm skin	50 ppm skin
1,2-Dichloroethylene	200 ppm	200 ppm	---
1,2-Dichloroethane	50 ppm	10 ppm	---
Chloroform	50 ppm C	10 ppm	---
Xylene	100 ppm	100 ppm	150 ppm
Chromium	1 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	---
Vinyl Chloride	1 ppm	5 ppm	---
Methylene Chloride	500 ppm	50 ppm	---

ppm - parts per million

OSHA - Occupational Safety and Health Administration

PEL - permissible exposure limit

ACGIHA - American Conference of Governmental Industrial Hygienists

TWA - time-weighted average

STEL - short-term exposure limit

mg/m<sup>3</sup> - milligrams per cubic meter

Table 5-1

**Action Levels**  
**Carswell Base Gas Station, NAS Fort Worth, Carswell Field, Texas**

Contaminant	Action Level	Level of PPE
VOCs	< 25 ppm above background without benzene present > 1 ppm above background with benzene present >25 ppm above background with benzene present >50 ppm above background without benzene present	D C Stop Work Stop Work

\*Contact with the IT H&S Manager must be made prior to continuance of work.

VOC - Volatile organic compound  
 ppm - Parts per million

No one is permitted to downgrade levels of PPE without authorization of the H&S Manager.

Table 5-2

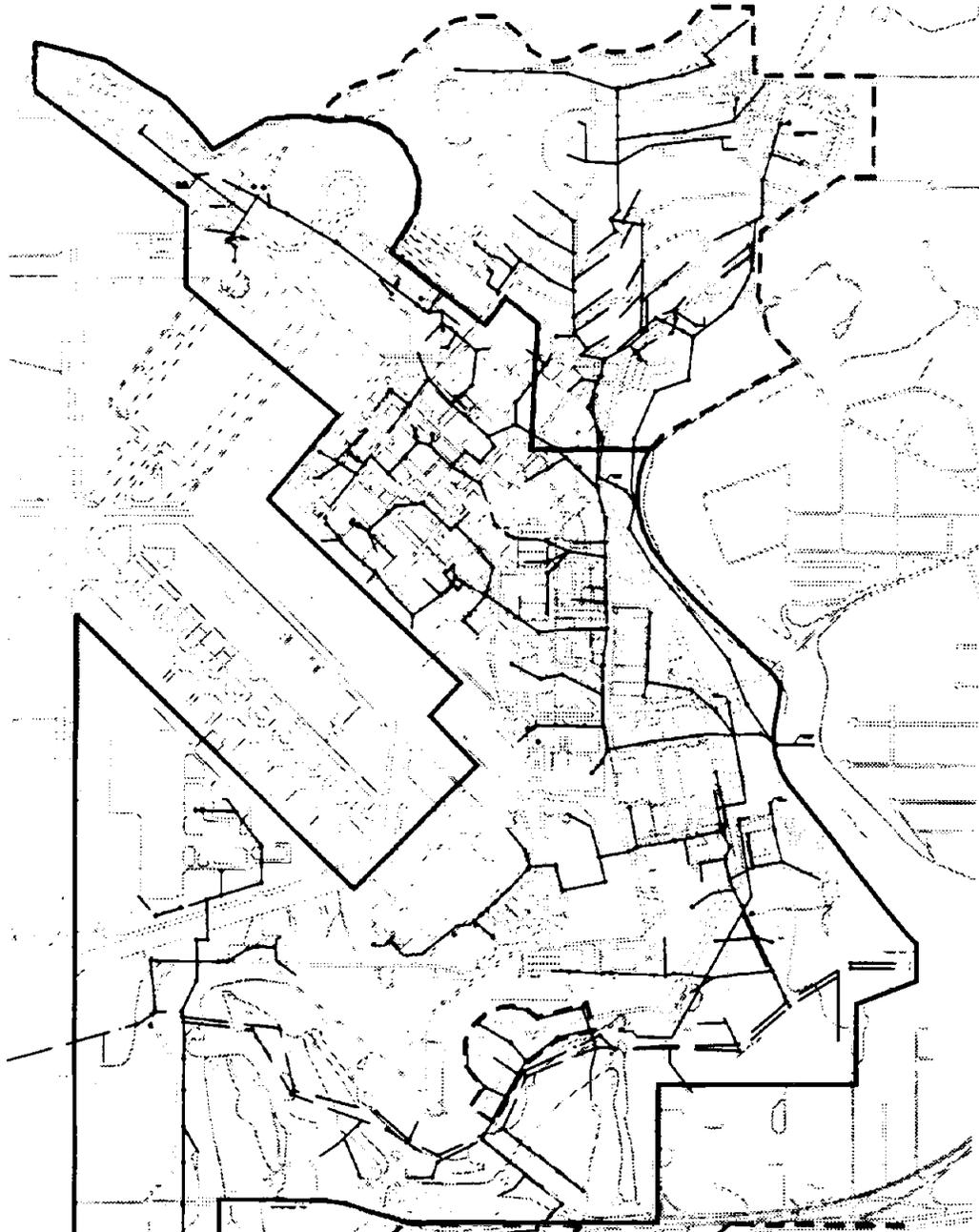
**PPE Selection Matrix**  
**Carswell Base Gas Station, NAS Fort Worth, Carswell Field, Texas**

Task	Initial Level of PPE
Staging equipment	Level D
Groundwater and soil sampling	Level D*
Drilling, monitoring well installation	Level D*
High pressure water jet cleaning	Modified Level D

\*Initial level will be raised to Modified Level D or higher if suspected contaminants warrant.

PPE - Personal protective equipment

STARTING DATE	02/11/97	DATE LAST REV		DRAFT CHCK BY:	R KNIGHT	INITIATOR:	T SMITH	UWG NO.	768579A S 025
DRAWN BY	R KNIGHT	DRAWN BY		ENCR CHCK BY:	T SMITH	PROJ MGR	W CARTER	PROJ NO.	768579



768579ES 025 08 30 27 FEB 17 1997 RMK

**FIGURE 1**  
**HEALTH AND SAFETY PLAN**  
**SITE LOCATION MAP**

*NAS FORT WORTH JRB*  
*FORT WORTH, TEXAS*



**FINAL PAGE**

**ADMINISTRATIVE RECORD**

**FINAL PAGE**

**FINAL PAGE**

**ADMINISTRATIVE RECORD**

**FINAL PAGE**